

ISSN-0976-0245 (Print) • ISSN-0976-5506 (Electronic)

Volume 6

Number 2

April-June 2015



# Indian Journal of Public Health Research & Development

An International Journal



Website:

[www.ijphrd.com](http://www.ijphrd.com)



# Indian Journal of Public Health Research & Development

## EDITOR

**Prof. R K Sharma**

Dean (R&D), Saraswathi Institute of Medical Sciences, Hapur, UP, India  
Formerly at All India Institute of Medical Sciences, New Delhi  
E-mail: editor.ijphrd@gmail.com

## EXECUTIVE EDITOR

**Dr. Manish Chaturvedi, (Professor)**

Community Medicine School of Medical Sciences & Research, Sharda University, Greater Noida

## ASSISTANT EDITOR

**Dr. Sonu Goel (Assistant Professor)**

Hospital Administration Post Graduate Institute of Medical Education & Research, Chandigarh

## INTERNATIONAL EDITORIAL ADVISORY BOARD

- Dr. Abdul Rashid Khan B. Md Jagar Din, (Associate Professor)**  
Department of Public Health Medicine,  
Penang Medical College, Penang, Malaysia
- Dr. V Kumar (Consulting Physician)**  
Mount View Hospital, Las Vegas, USA
- Basheer A. Al-Sum,**  
Botany and Microbiology Deptt, College of Science,  
King Saud University, Riyadh, Saudi Arabia
- Dr. Ch Vijay Kumar (Associate Professor)**  
Public Health and Community Medicine, University of Buraimi, Oman
- Dr. VMC Ramaswamy (Senior Lecturer)**  
Department of Pathology, International Medical University, Bukit Jalil,  
Kuala Lumpur
- Dr. Linah Askari, (PhD, Star Laureate 2006 Assistant Professor)**  
Psychology, Institute of Business Management, Clifton, Karachi,  
Pakistan
- Kartavya J. Vyas (Clinical Researcher)**  
Department of Deployment Health Research,  
Naval Health Research Center, San Diego, CA (USA)
- Prof. PK Pokharel (Community Medicine)**  
BP Koirala Institute of Health Sciences, Nepal
- Dr. Sunil Mehra (Paediatrician & Executive Director)**  
MAMTA Health Institute of Mother & Child, New Delhi

## SCIENTIFIC COMMITTEE

- Dr. Ruchi Sogarwal (Senior Technical Advisor)** Program & Research,  
MAMTA Health Institute for Mother and Child, New Delhi
- Dr. Anju Ade (Associate Professor)**  
Navodaya Medical College, Raichur, Karnataka
- Dr. E. Venkata Rao (Associate Professor)** Community Medicine,  
Institute of Medical Sciences & SUM Hospital, Bhubaneswar, Orissa.
- Dr. Amit K. Singh (Associate Professor)** Community Medicine,  
VCSG Govt. Medical College, Srinagar – Garhwal, Uttarakhand
- Dr. R G Viveki (Associate Professor)** Community Medicine,  
Belgaum Institute of Medical Sciences, Belgaum, Karnataka
- Dr. Santosh Kumar Mulage (Assistant Professor)**  
Anatomy, Raichur Institute of Medical Sciences Raichur(RIMS), Karnataka
- Dr. Gouri Ku. Padhy (Associate Professor)** Community and Family  
Medicine, All India Institute of Medical Sciences, Raipur
- Dr. Ritu Goyal (Associate Professor)**  
Anaesthesia, Sarswathi Institute of Medical Sciences, Panchsheel Nagar
- Dr. Anand Kalaskar (Associate Professor)**  
Microbiology, Prathima Institute of Medical Sciences, AP
- Dr. Md. Amirul Hassan (Associate Professor)**  
Community Medicine, Government Medical College, Ambedkar nagar, UP
- Dr. N. Girish (Associate Professor)**  
Microbiology, VIMS&RC, Bangalore
- Dr. BR Hungund (Associate Professor)** Pathology, JNMC, Belgaum.
- Dr. Sadhna Awasthi (Associate Professor)**  
Community Medicine, SDMT Medical College, Haldwani
- Dr. Shailendra Kumar (Associate Professor)**  
Community Medicine, Medical College, Muzaffernagar
- Dr. Rajib Roy (Assistant Professor)**  
Obstetrics & Gynecology, ESI Medical College, Kolkata

## NATIONAL EDITORIAL ADVISORY BOARD

- Dr. Ranabir Pal (Additional Professor)** Community Medicine and  
Family Medicine, All India Institute of Medical Sciences, Jodhpur
- Prof. Sushanta Kumar Mishra (Community Medicine)**  
GSL Medical College – Rajahmundry, Karnataka
- Prof. D.K. Srivastava (Medical Biochemistry)**  
Jamia Hamdard Medical College, New Delhi
- Prof. Bhavna Pant (Community Medicine)** Subharti Medical College, Meerut
- Prof. M. Sriharibabu (General Medicine)** GSL Medical College,  
Rajahmundry, Andhra Pradesh
- Prof. Pankaj Datta (Principal & Prosthodontist)**  
Indraprastha Dental College, Ghaziabad
- Prof. Samarendra Mahapatro (Pediatrician)**  
Hi-Tech Medical College, Bhubaneswar, Orissa
- Dr. Abhiruchi Galhotra (Additional Professor)** Community and Family  
Medicine, All India Institute of Medical Sciences, Raipur
- Prof. Deepti Pruthvi (Pathologist)** SS Institute of Medical Sciences &  
Research Center, Davangere, Karnataka
- Prof. G S Meena (Director Professor)**  
Maulana Azad Medical College, New Delhi
- Prof. Pradeep Khanna (Community Medicine)**  
Post Graduate Institute of Medical Sciences, Rohtak, Haryana
- Prof. Jaya Chaturvedi (Obstetrics & Gynecology)**  
Himalayan Institute of Medical Sciences, Dehradun

Print-ISSN: 0976-0245 Electronic - ISSN: 0976-5506, Frequency: Quarterly (Four issues per volume)

**Indian Journal of Public Health Research & Development** is a double blind peer reviewed international journal. It deals with all aspects of Public Health including Community Medicine, Public Health, Epidemiology, Occupational Health, Environmental Hazards, Clinical Research, and Public Health Laws and covers all medical specialties concerned with research and development for the masses. The journal strongly encourages reports of research carried out within Indian continent and South East Asia.

The journal has been assigned International Standards Serial Number (ISSN) and is indexed with Index Copernicus (Poland). It is also brought to notice that the journal is being covered by many international databases. The journal is covered by EBSCO (USA), Embase, EMCare & Scopus database. The journal is now part of DST, CSIR, and UGC consortia.

**Website: www.ijphrd.com**

©All right reserved. The views and opinions expressed are of the authors and not of the **Indian Journal of Public Health Research & Development**. The journal does not guarantee directly or indirectly the quality or efficacy of any product or service featured in the advertisement in the journal, which are purely commercial.

## Editor

**Dr. R.K. Sharma**

**Institute of Medico-legal Publications**  
4th Floor, Statesman House Building, Barakhamba Road,  
Connaught Place, New Delhi-110 001

## Printed, published and owned by

**Dr. R.K. Sharma**

**Institute of Medico-legal Publications**  
4th Floor, Statesman House Building, Barakhamba Road,  
Connaught Place, New Delhi-110 001

## Design & Printed at

M/s Vineeta Graphics, B-188, Subash Colony, Ballabgarh, Faridabad

## Published at

**Institute of Medico-legal Publications**  
4th Floor, Statesman House Building, Barakhamba Road,  
Connaught Place, New Delhi-110 001



# Indian Journal of Public Health Research & Development

www.ijphrd.com

## Contents

Volume 6 Number 2

April-June 2015

1. The Impact of Short Term Hand Hygiene Campaign in a Tertiary Care Hospital ..... 01  
*Rakesh Kumar Sharma, Prateek Bhatia*
2. Accuracy of Conventional X-Rays in Diagnosing Airway Foreign Bodies among Children ..... 04  
*Munish K S*
3. A Study on Assessment of Obesity among High School Children in ..... 07  
Urban Area of Eluru, Andhra Pradesh  
*K Chandra Sekhar, P G Deotale, Siddhartha Sankar Reddy*
4. Efficacy of Tranexamic Acid in Decreasing Blood Loss During and after Cesarean ..... 12  
Section: a Randomized Case Controlled Prospective Study  
*Ramesh A C, Rajni S, Nitam Deka*
5. Evaluation of Efficacy of Topical Bupivacaine for Post-Tonsillectomy Pain Relief ..... 16  
*Priyadarshini M Bentur, Veeresh A R*
6. A Rare Case of Von Willebrand Disease as a Cause of Menorrhagia Since Menarche: ..... 19  
Case Report from Tertiary Care Hospital of North Karnataka  
*Mohan D Kashinkunti, Gundikeri SK, Dhananjaya M*
7. Place, Time and Season of Suicidal Attempts in Davangere City, Karnataka ..... 22  
*Sathish B C, Nagendra Gowda M R, M Sambaji Rao*
8. Prevalence of Overweight and Obesity among Urban School Going Children in Mysore, India ..... 27  
*D Narayanappa, HS Rajani, KB Mahendrappa*
9. Study of Rate of Union of Fracture Forearm Bones by Open Reduction and LC-DCP Fixation ..... 31  
*Prakash S, Basanthi BS*
10. Evaluation of Registered Visual Handicap Individuals in a District of Karnataka, India ..... 36  
*Praveen Kumar Sadanand, Jaishree Bembalkar*
11. A Comparative Study of Oral Seven Day of Metronidazole Versus Tinidazole in Bacterial Vaginosis ..... 40  
*Manisha Gupta, Amita Sharma, Geeta Gupta*
12. Effectiveness of a Planned Teaching Programme for DOTS Providers on ..... 44  
Tuberculosis and its Related Quality of Life  
*Jenifer D'Souza, Radha Aras, Christopher Sudhakar*



## II

13. Factors Affecting Exclusive Breastfeeding, after Counselling at a Rural Health Centre .....	50
<i>G Sarat Chandra, A Sri Hari, C Susheela</i>	
14. Misconceptions and Beliefs Regarding Cataract Surgery and Outcome of the .....	55
Cataract Surgery in a Rural Community of Uttar Pradesh	
<i>Singh A, Dwivedi S, Dabral S B, Bihari V, Rastogi A K, Kumar D</i>	
15. Effect of National Rural Health Mission on Rural Mothers and Community Leaders .....	60
<i>Veena M Chandavri, Chhaya Badiger</i>	
16. Role of Intramedullary Titanium Elastic Nails in the Paediatric Femoral Diaphyseal Fractures .....	66
<i>Shrinivas Kalliguddi, Arun K N, Anirudh Kulkarni, Chandrakanth V Rathod, Praveen Reddy</i>	
17. Perceptions about Smoking and Tobacco Control Measures among College Students .....	72
of Visakhapatnam City, India - a Cross-Sectional Study	
<i>Devi M Bhimarasetty, Srikanth Gopi, Srikanth Koyyana, Shefali Vishnoi</i>	
18. Comparative Study Between 2% and 4% Lignocaine Nebulisation on Pressor .....	77
Response to Laryngoscopy and Intubation	
<i>Vishalakshi Patil, Anirudh Kulkarni, Chandrakanth V Rathod, Sanjivani C R</i>	
19. Knowledge on Dengue in a Section of Medical Students of Rajahmundry, Andhra Pradesh .....	83
<i>S K Patnaik</i>	
20. Factors Affecting the Acceptance of Abortion Services in Rural Area of Central India .....	87
<i>Meenakshi Khapre, Raviprakash Meshram, Abhay Mudey, Vasant Wagh</i>	
21. Post Pubertal Cryptorchidism in Developing Countries: Fertility Outcomes and .....	93
Challenges in Management	
<i>Vikram Singh Chauhan, Ashutosh Niranjana</i>	
22. A Study of Knowledge, Attitude & Practices Regarding Preconception & Prenatal .....	98
Diagnostic Techniques Act among Antenatal Women Attending a Tertiary Hospital of Andhra Pradesh	
<i>Anindita Mishra, S K Mishra, Sipra Komal Jena, Ch. Ganapathy Swamy, K S Suneetha</i>	
23. Pyrethroid Based Mosquito Repellent Inhalation Induced Changes in Physical Activity in .....	103
Albino Rats after Chronic Exposure	
<i>Saim Hasan, Maheshwari T P</i>	
24. Pattern of Blunt Abdominal Trauma - an Autopsy Based Cross-Sectional Study .....	108
<i>Santhosh C S, Tejas J</i>	
25. Analysis of Factors Causing Infertility in Women Using Statistical .....	112
Analysis and Association Rule Mining	
<i>K Meena, N Vijayalakshmi</i>	
26. Epidemiological Profile of H1N1 Cases in Western Rajasthan from January 2012 to December 2012 .....	118
<i>Singh Mahendra, Bhansali Suman, Hakim Afzal, Sharma Savitri</i>	
27. Informed Consent How Important ? .....	123
<i>Nalini M S</i>	

28. Reporting Confidence Interval Instead of a Point Estimate: a Review .....	129
<i>Biswas S S, Jain V</i>	
29. Study of Psycho- Social Aspects of Schizophrenia at Tertiary Care Hospital in Maharashtra .....	132
<i>Ashturkar MD, Dixit JV, Kulkarni AP</i>	
30. Epidemiology and Outcome of Hospitalized Burn Patients in a Tertiary .....	137
Care Teaching Hospital in South India <i>Gowri Shankar, Eshwar B Kalburgi, Gagan S, Sarojini Hunshikatti</i>	
31. A Comparitive Study on the Changes in Hand Function in Geriatrics vs .....	140
Young Healthy Adults as Measured by Grip and Pinch Strength <i>Khyati Shah, Ajin Jayan Thomas, Sujata Yardi</i>	
32. A Comparative Study of Nebivolol and Metoprolol on Blood Pressure and Heart .....	146
Rate in Essential Hypertensive Patients <i>Ravibabu K, Murthy KSN, Lakshmana Rao N, Jayasree P, Akhila T</i>	
33. Antibioqram of Pseudomonas Aeruginosa in a Tertiary Care Hospital in South India .....	151
<i>Chandan N G, S Manju Bhargavi, Venkatadri T V</i>	
34. The Sample Size Estimation and its SAS Code for Binary Response .....	156
Endpoints Clinical Study- a Review <i>Singh Rajneesh, Namdev Kuldeep Kumar, Deepak, Rao Shireen</i>	
35. Assessment of Supplementary Nutritional Programme in Anganwadi .....	161
Centre of Kolar Dristrict, Karanataka State <i>Nagaraja G M, Ravishankar S, Anil NS, Muminarayana C</i>	
36. Oral Health Care and Dental Caries Experience among 9-14 Year Old Children in Mangalore .....	166
<i>Bhagat TK, Rao A, Shenoy R</i>	
37. Study of Opportunistic Infections in HIV Seropositive Patients Attending .....	170
Government General Hospital Vijayawada <i>Swetha R, J Ravikumar, R Nageswara Rao</i>	
38. Study of Nutritional Status and Schooling among Children of .....	174
Construction Workers in Bangalore City <i>Ashoojit Kaur Anand, Margaret Menzil, Puttaswamy M</i>	
39. Prevalence of Protein Energy Malnutrition among Primary School Children in Govt. Schools of .....	179
Thiruvananthapuram Corporation -A Cross Sectional Study <i>Shyla J, Athirarani M, Sara Varghese</i>	
40. A Study on Lifestyle Modifications among Patients with Select Non Communicable Diseases .....	182
<i>Harsha Kumar H N, Anshika Agarwal, Mohamed Shamheed, Jefrin Roy Mathew, Palki Dewan, Anshul Arora</i>	
41. A Study on Depression & its Determinants among Undergraduate .....	188
Medical Students from Coastal South India <i>Harsha Kumar H N, Vinod Malipatil, Supriya H</i>	

## IV

42. A Study on Socio Demographic and Psychological Risk Factors for ..... 193  
Depression among Adult Population of Karimnagar District  
*K Padma, G Kashi Ram, B Sita Rama Rao, K Chandra Sekhar, P G Deotale*
43. Calculation of NPI Score: Prognosis of Breast Cancer ..... 199  
*Ritu Yadav, Rajeev Sen, Preeti Chauhan*
44. A Study on Awareness and Preparedness about Global Warming among Medical Interns ..... 203  
*Pai Divya Venkatesh, A H Suryakantha*
45. A Study on Detection of Protein Energy Malnutrition in 1-5 Years of Age ..... 207  
Group and Nutritional Intervention to the Same Age Children in Rural  
and Urban Field Practice Areas of Rajiv Gandhi Institute of Medical Sciences, Kadapa  
*K Chandra Sekhar, C Bala Krishna, K J Kishore Kumar, Suresh Kumbhar, Devidas*
46. Lowered Platelet Count as a Prognostic Factor in Pregnancy ..... 213  
Induced Hypertension - a Prospective Study  
*Saroja C Kamatar, Rajesh B P, V S Raju*
47. Assessment of Stunting among Children of Government & Private Primary ..... 218  
Schools of Davangere City of Karnataka State  
*Dayalaxmi T Shedole, B Vijayakumar, Vidya G S*
48. Burn Injuries in Geriatric Patients Admitted in Tertiary Care Hospitals in India ..... 223  
*Gowri Shankar, Vijaya A Naik*
49. Study of Urinary Tract Infection in Infants and Young Children with Acute Diarrhea ..... 226  
*D Narayanappa, HS Rajani, A Sangameshwaran*
50. Reproductive Health of Married Young Women in the Context of HIV/AIDS in India ..... 230  
*Hazra Avishek, Chakraborty Sandip*
51. A Study of Oral Cancers and Some Epidemiological Factors in Patients ..... 237  
Attending Tertiary Care Hospital  
*Nirmala C J, Hemanth T, Henjarappa K S*
52. A Study of Oral Health Awareness among Undergraduate Medical Students in ..... 243  
Davangere City - a Cross Sectional Survey  
*Sujatha B K, Puja C Yavagal, Nagesh L, Mary Shimy S Gomez*
53. Assessment of Grip Strength and Sensations in Computer users ..... 246  
Versus Individuals Doing Writing Task  
*Thakur A M, Pandey S P, Yardi S S*
54. Measurement of Obesity and Related Perceptions among College Girls of Agra ..... 251  
*Thakkar HK, Singhal RK, Misra SK, Gupta SC, Chaturvedi M*

55. A Comparative Study of Different Morphometric Measurements of Liver ..... 257 Specimens from Adult Cadavers and Dead Foetuses <i>Neelima Pilli, Ragam Ravi Sunder</i>	257
56. MR Imaging Findings of Balo's Concentric Sclerosis, a Rare ..... 263 Variant of Multiple Sclerosis: a Case Report <i>Anindita Mishra</i>	263
57. Clinically Mild Encephalitis with Isolated Transient Reversible Splenic Lesion - ..... 267 Uncommon Clinicoradiological Entity <i>Parakh RB, Mohsin KM, Rajoor UG, Aithal KR, Patil PB</i>	267
58. Microbiological and Biochemical Profile of Cerebrospinal Fluid (CSF) in ..... 271 Various Non-Tuberculous Cases of Meningitis in HIV Positive Patients <i>Susheela Chaurasia, Ashwini Saminder Waghmare, Ameeta Joshi, Sitalakshmi Shivram</i>	271
59. A Study of Risk Factors Associated with Low Birth Weight Babies Born to ..... 277 Mothers Attending a Tertiary Hospital of Andhra Pradesh <i>Sipra Komal Jena, S K Mishra, Ganapathy Swamy</i>	277
60. Efficacy of Sildenafil in Secondary Pulmonary Arterial Hypertension ..... 282 <i>Lohia D, Nandwani S, Bhatnagar M, Saluja M, Gupta V</i>	282
61. Detection of AmpC b-lactamases Producing Multidrug Resistant Gram ..... 287 Negative Bacteria in a Tertiary Care Hospital <i>Veena Manjunath, Archana Sharma, Mridula Raj Prakash</i>	287
62. Health and Psycho-Social Problems of Elderly Persons in Rural Area of Andhra Pradesh ..... 293 <i>P Sukla, S H N Zaidi, Karun Dev Sharma</i>	293
63. Comparison of Growth Pattern (Height and Weight) among HIV Infected and ..... 298 Uninfected Children Attending ART Centre, Hubli: a Prospective Study <i>Anil Kumar L, Dattatreya D Bant</i>	298
64. Effects of Intravenous Lidocaine on the Pharmacodynamics of Vecuronium ..... 304 <i>Sanjay Kumar Lal, Sachin Narayan Rathore</i>	304
65. Pattern of Road Traffic Injuries: One Year Hospital-Based Study in Bareilly District ..... 310 <i>Kumar Keshav, Joshi H S, Singh Kashmir</i>	310
66. Alcoholism in Female Sex Workers and Clients, Barrier in Practice of Safe Sex, ..... 314 a Study on FSWS of Red Light Area of Pune City <i>Manisha N Gore, Sanjay K Juvekar</i>	314
67. A Sonographically Evaluation of Cervical Lymphadenopathy in Rural Population ..... 320 at Peripheral Centre, Western U.P. India <i>Anil Kumar Kem, Subhash Chand Sylvania, Vandana Singh</i>	320

# The Impact of Short Term Hand Hygiene Campaign in a Tertiary Care Hospital

Rakesh Kumar Sharma<sup>1</sup>, Prateek Bhatia<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Hospital Administration, <sup>2</sup>Assistant Professor, Department of Paediatrics  
Post Graduate Institute of Medical Education and Research, Chandigarh, India

## ABSTRACT

**Introduction:** Hand washing is the single most effective precaution for prevention of infection transmission between patients and staff. Despite evidence based guidelines for healthcare workers on hand hygiene, compliance is internationally low.

**Aims & Objectives:** To assess the impact of short term hand hygiene campaign on "Moment One" and "Moment Two" of hand hygiene practice as defined by the WHO and to report comparable results of hand hygiene practice pre and post intervention.

**Materials & Method:** The study was conducted in the following Units of a Tertiary care hospital of Northern India- Coronary Care Unit (CCU), Cardio-thoracic Surgery ICU (CTVS-ICU), Cardiology Wards and Cardio-thoracic Surgical Wards (CTVS-W's). The study was conducted through a three cross evaluation periods to moment one for hand hygiene (before touching a patient) and moment two (after touching the patient); Pre intervention (p1), Post intervention (p2). Pre intervention data was harvested in above units through direct observation. This was followed by the celebration of "Hand hygiene awareness week" (interventional phase) lasting six days of hectic campaign to spread the message of hand hygiene. After awareness week, post intervention data was collected from above units.

**Results:** The hand hygiene compliance improved from an overall score of 45% (in pre interventional phase) to 88% (in post interventional phase) for "Moment One" and from 68% to 96% for "Moment Two".

**Discussion & Conclusion:** Poor compliance with hand hygiene practice can be improved with short term campaigns lasting 4-6 days. These short term campaigns are economical and easy to organize.

**Keywords:** Compliance, Data, Hand Washing, Intervention, Healthcare Workers

## INTRODUCTION

Hand washing is the single most effective precaution for prevention of infection transmission between patients and staff. The WHO "My 5 Moments for Hand Hygiene" approach defines the key moments when health-care workers should perform hand hygiene<sup>1</sup>. Though Evidence based guidelines for

healthcare workers' hand hygiene practices exist, but compliance with these is internationally low. Numerous studies have highlighted the above fact and show that despite availability of hand hygiene opportunities, the compliance rates generally remain below 50%<sup>2-4</sup>.

### Problem at our Institute

Sub-optimal compliance to hand hygiene practices during patient care delivery by the Health care workers (HCW's), thereby subjecting patients to increased risk of Hospital Acquired Infections (HAI'S). This was noted during periodic observation at rounds of the hospital ICU/Wards. A prior study by a resident

---

### Corresponding author:

**Prateek Bhatia**

Assistant Professor, Department of Paediatrics  
PGIMER, Chandigarh-160012, India  
E-mail: prateekbhatia@rediffmail.com  
Tel: +91-172-2755329

doctor from department of Hospital administration also revealed poor compliance by HCW's in the Intensive Care Units (ICU's).

The aims and objectives of the present pilot study were to assess the impact of short term hand hygiene campaign on "Moment One" and "Moment Two" of hand hygiene practice as defined by the WHO and to report comparable results of hand hygiene practice pre and post intervention.

### STUDY DESIGN & METHODOLOGY

**Place of Study:** Tertiary care hospital of Northern India, involving the following Units of the Hospital- Coronary Care Unit (CCU), Cardio-thoracic Surgery ICU (CTVS-ICU), Cardiology Wards and Cardio-thoracic Surgical Wards (CTVS-W's).

**Type of Study:** Quasi-Experimental

**Staff Involved:** Three Infection control Nurses (ICN's) and one Hospital Administrator and a Clinician.

**Interventional Methodology:** Depicted in the form of flow chart (see flow chart 1)

Flow chart 1: Detailed outline of methodology adopted

### RESULTS

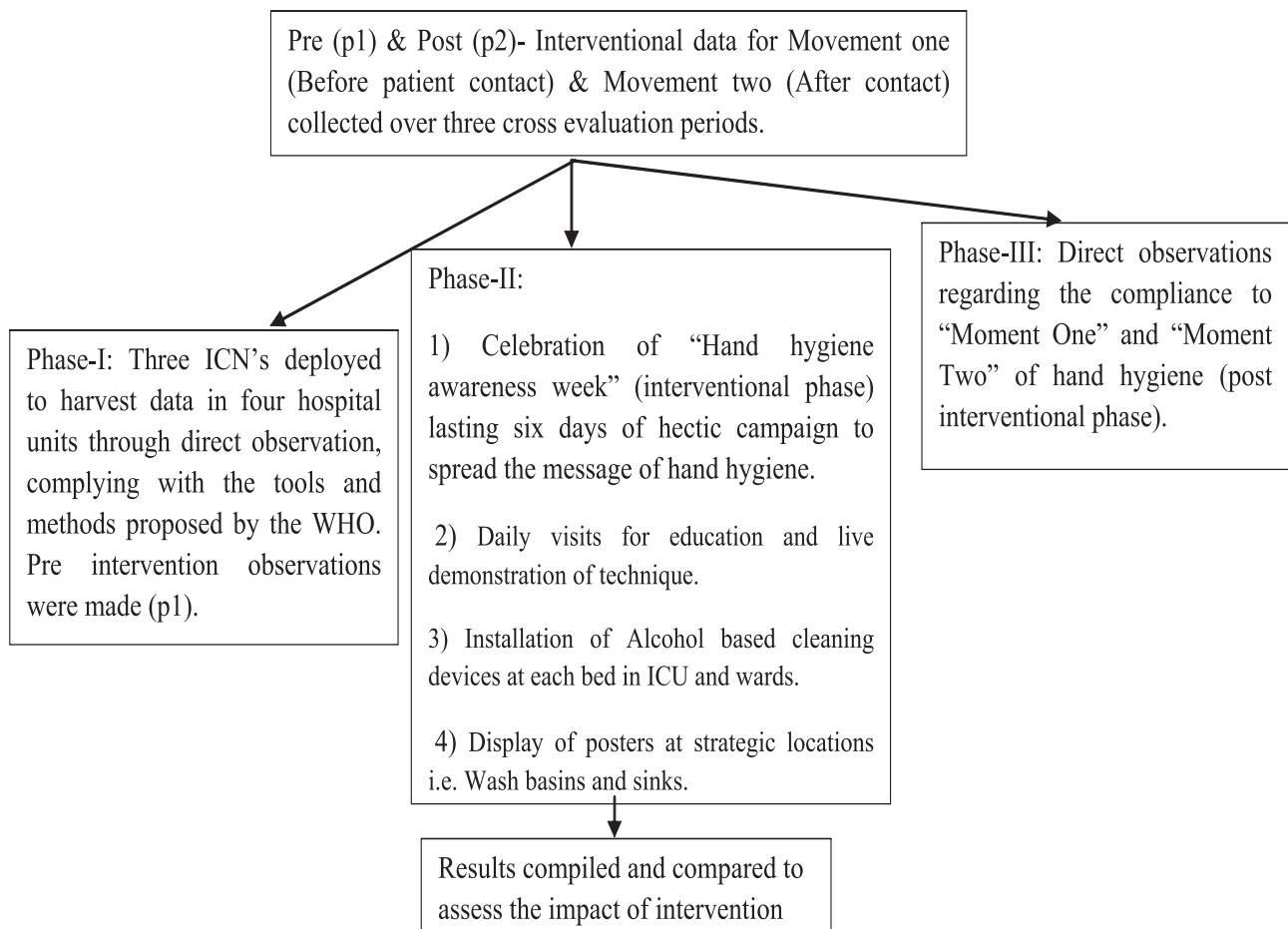
Comparison of Pre and Post interventional data was done and the percentage compliance on hand hygiene was calculated as follows-

$\% \text{ compliance} = \frac{\text{Number of times the desired activity carried out}}{\text{Total number of opportunities available}} \times 100$

Total number of opportunities available

The target audience included all the doctors including resident fellows and faculty along with the paramedical staff (nursing, dietetic and physiotherapy staff) posted in the above four units.

The table 1 highlights the Pre and Post interventional data on hand hygiene compliance. The relative increase in compliance was more for Movement one i.e. hand washing practices improved tremendously before touching the patient.



**Table 1: Data on Hand hygiene compliance**

Parameter	Movement one	Movement two
Pre-interventional score (p1)-%*	45	68
Time of initial observation	May 2011	May 2011
Post-interventional score (p2)-%**	88	96
Time of final observation	June 2011	June 2011
Relative improvement in compliance	95%	41%

\*, \*\* p value <0.05

## DISCUSSION & CONCLUSION

The interventions improved overall hand hygiene compliance. The improvement was more marked for movement one (p1) as compared to movement two (p2).

Many western studies have shown that HAI rates can be reduced by up to one-third if healthcare workers comply with hand washing guidelines issued by the CDC<sup>5-7</sup>. Haley et al<sup>5</sup> showed in their study that effective training and education programmes including organized surveillance and control activities relating to infection control can reduce the risk of HAI by over 30%. Studies by Simmons et al<sup>8</sup>, Graham M<sup>9</sup>, Dubbert et al<sup>10</sup> and Tiballs J<sup>11</sup> have shown that simple interventional measures like use of gowns, installation of alcohol based solutions at bedside and training about effective hand washing procedure have tangibly improved hand washing compliance in the interventional group versus control group from 29.9% vs 22%, 45% vs 32%, 92% vs 81% and 64.8% vs 10.6% respectively.

### Take Home Message

1. Poor compliance with hand hygiene practice can significantly be improved even with short term campaigns lasting 4-6 days. Moreover, these short term campaigns are more economical and easy to organize/execute.
2. The results of our pilot study were very encouraging and will substantially contribute towards the achievement of optimum patient care and patient safety.

**Acknowledgement:** None; Financial support none reported.

**Conflict of Interests:** None

**Ethical Clearance:** The pilot study was duly cleared by the ethics committee of the institute.

## REFERENCES

1. WHO guidelines on Hand hygiene in Health care, 2009. Available: [http://whqlibdoc.who.int/publications/2009/9789241597906\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf). Accessed April 2 2012.
2. Jarvis WR. Selected aspects of the socioeconomic impact of nosocomial infections: Morbidity, mortality, cost, and prevention. *Infect Control Hosp Epidemiol*. 1996; 17(8): 552-7.
3. Pittet D, Mourouga P, Perneger TV. Compliance with hand washing in a teaching hospital. *Ann Intern Med*. 1999; 130: 126-30.
4. Lankford MG, Zembower TR, Trick WE, Hacek DM, Noskin GA, Peterson LR . Influence of role models and hospital design on hand hygiene of healthcare workers. *Emerg Infect Dis*. 2003; 9: 217-23.
5. Haley R, Culver D, White J, Morgan W, Emori T, Munn V. The efficacy of infection surveillance and infection control programs in preventing nosocomial infections in US hospitals. *American Journal of Epidemiology* 1985; 121: 182-205.
6. Larson E. A causal link between hand-washing and risk of infection: Examination of the evidence. *Infection Control Hospital Epidemiology* 1988; 9: 28-36.
7. Pittet D, Hugonnet S, Harbarth S et al . Effectiveness of a hospital wide programme to improve compliance with hand hygiene. *The Lancet* 2000; 356: 1307-11.
8. Simmons B, Bryant J, Km N, Spencer L, Arheart K. The role of hand washing in prevention of endemic intensive care unit infections. *Infect Control Hosp Epidemiol* 1990; 11: 589-94.
9. Graham M . Frequency and duration of hand washing in an intensive care unit. *Am J Infect Control* 1990; 18: 77-80.
10. Dubbert PM, Dolce J, Richter W, Miller M, Chapman SW . Increasing ICU staff hand washing: effects of education and group feedback. *Infect Control Hosp Epidemiol* 1990; 11: 191-3.
11. Tibballs J. Teaching hospital medical staff to hand wash. *Med J Aust* 1996; 164: 395-8.



# Accuracy of Conventional X-Rays in Diagnosing Airway Foreign Bodies among Children

**Munish K S**

*Assistant Professor, Department of ENT, SSIMS & RC, Davangere, Karnataka, India*

## ABSTRACT

**Background:** And Objectives: Foreign bodies of the airway are a common occurrence in pediatric population. Early diagnosis is the key to successful and uncomplicated management of these accidents. An orderly and systematic approach to these patients is needed including careful history, physical examination and radiographic studies.

The objective of the study was to know the role of conventional X-rays in diagnosing cases of tracheobronchial foreign bodies and to know the sensitivity and specificity of the same in diagnosing the cases.

**Materials & Method:** This study comprises 37 cases of tracheobronchial foreign bodies among children. This was a descriptive time bound study conducted at department of ENT, Karnataka Institute of Medical Sciences, Hubli, Karnataka, India. All cases of clinically suspected foreign bodies of tracheobronchial tree were included in the study.

**Results:** Routine chest X-rays were found to correlate with positive foreign body on endoscopy in 58.33% of the cases. However, in only 8.33% of cases there was no foreign body when the X-ray was normal.

**Conclusion:** This study was of the conclusion that Conventional X-ray studies were sensitive but not specific in diagnosing tracheobronchial foreign bodies.

**Keywords:** *Foreign Bodies, Sensitivity, Specificity*

## INTRODUCTION

Despite significant advance in prevention, first aid and endoscopic technology, foreign bodies of the airway in general population remain a diagnostic and therapeutic challenge.

Foreign body related problems could either be extremely easy or difficult to solve. It can help to establish the reputation of the medical practitioner, who often happens to be an otolaryngologist, while in the next instant snatch his crown of fame.

Foreign body accidents occur by aspiration, where the object is lodged in the laryngotracheobronchial axis. This condition is associated with significant morbidity and mortality if not diagnosed and treated in timely manner.

When foreign body aspiration is suspected, chest X-ray is always performed to show the pathophysiological changes caused by the foreign body. Radiological findings are atelectasis, shadow of foreign body, signs of air trapping, pleural fluid, pneumothorax and signs of pulmonary infection. These findings are not pathognomonic for foreign body inhalation and can also be present in a variety of pulmonary disorders. Diagnosis of this condition demands a high degree of suspicion since physical examination and basic radiology exams have low sensitivity<sup>1</sup>.

---

### Corresponding author:

**Munish K S**

#2035/88. "Munishree" 13th Cross Anjaneya Layout  
Davangere-577004

E-mail: docmuni@yahoo.com

Mobile- +919986043591



In this topic an attempt is made to analyse the necessity and reliability of the routine radiographs in the diagnosis of foreign bodies in the respiratory tract.

**OBJECTIVE**

To assess the sensitivity & specificity of routine X-ray studies in management of airway foreign bodies.

**MATERIALS AND METHOD**

The present study was a descriptive time bound study conducted in the Dept of ENT, Karnataka Institute of Medical Sciences, Hubli, Karnataka, India, for a period of two years. This study comprises 37 cases of airway foreign bodies in children.

**Inclusion Criteria**

- 1) Patients with history suggestive of foreign body aspiration.
- 2) Patients with clinical evidence of airway foreign bodies such as sudden onset of bouts of cough, choking, and respiratory distress in an apparently healthy patient.
- 3) Patients with radiologic evidence of sudden onset of lung collapse, emphysema, radio opaque foreign body in the respiratory tract.
- 4) Patients with chronic cough, pneumonia, bronchiectasis, wheeze, collapse, consolidation, refractory lung abscess, abnormal chest X-ray not responding to antimicrobial therapy who are referred to the dept of ENT for bronchoscopic evaluation.

**Exclusion Criteria:**

Patients in whom rigid bronchoscopy was contraindicated.

All patients were managed accordingly as follows,

- 1) Detail history from patient and the attender.
- 2) Detail physical examination of the patient.
- 3) X-ray chest - Posterio Anterior & lateral view in inspiration and expiration.
- 4) Endoscopy; Bronchoscopy - diagnostic & therapeutic

Proper written consent was taken from all the patients and the attenders.

The diagnosis of foreign body inhalation was based on history, clinical findings and a strong index of suspicion. All the 37 cases were studied in detail and the particulars were recorded in the proforma, specially designed for the study.

**RESULTS**

This study comprises 37 cases of airway foreign bodies. Among 37 patients, 23(62.16%) were males and 14(37.83%) were females.

**Table 1. Age distribution of patients with airway foreign body**

Age (yrs)	No.	%
0-2	17	45.94
2-4	9	24.32
4-6	2	5.40
6-8	5	13.51
>8	4	10.81

**Table 2. X-ray analysis of patients with airway foreign body**

	FB found on endoscopy	FB not found on endoscopy
Positive X-ray	21(58.33%) True Positive - a	6 (16.66%) False Positive - b
Negative X-ray	7 (19.44%) False Negative - c	3 (8.33%) True Negative - d

Sensitivity =  $a/(a+c) \times 100 = 21/(21+7) \times 100 = 75\%$

Specificity =  $d/(b+d) \times 100 = 3/(6+3) \times 100 = 33.33\%$

Predictive Value of Positive Test =  $a/(a+b) \times 100 = 21/(21+6) \times 100 = 77.77\%$

Predictive Value of Negative Test =  $d/(c+d) \times 100 = 3/(7+3) \times 100 = 30\%$

Routine chest X-rays were found to correlate with positive foreign body on endoscopy in 58.33% of the cases. However, in only 8.33% of cases there was no foreign body when the X-ray was normal. X-rays were found to be sensitive in 75% of the cases and specific in 33.3% of the cases. The Positive Predictive Value of Chest X-Rays was found to be good at 77.77%.

**DISCUSSION**

The most common diagnostic imaging modality is the X-ray chest which, according to Svedstrom et al <sup>2</sup> is neither sensitive nor specific enough to solve the purpose. Banerjee et al <sup>2</sup> say that radiology is neither always mandatory nor always contributory in diagnosing this problem.

In our study 19.44% of the cases showed normal chest X-ray in spite of presence of foreign body. Richard E. Black et al<sup>3</sup> in their study found normal chest X-ray in 12% of the patients. This may be due to the fact that,

- 1) A radiolucent object can present a perfectly normal picture on X-ray films.
- 2) Hallmark radiographic signs associated with foreign body aspiration are readily demonstrated by an expiratory plain film. Plain chest films on inspiration will not demonstrate the classical findings of airway obstruction.
- 3) In some cases right and left lateral decubitus films may demonstrate the pathology. If the down lung in the decubitus film remains fully aerated, obstruction exists.
- 4) Some objects will not be visualized on frontal films. In such case lateral X-rays will be helpful.

X-ray studies when correlated with that of endoscopic findings were found to be sensitive in 75% of cases and specific in 33.33% of cases in our study. However, study of Andrew B Silva<sup>4</sup> showed a sensitivity of 73% and specificity of 45%. Svedstrom et al<sup>2</sup> reported sensitivity of 68% and specificity of 67%.

In general sensitivity and specificity of X-rays is a function of,

- a) Type of foreign body, which has a wide geographical variation.
- b) Time gap between inhalation and X-ray taken.
- c) Auality of X-rays taken.

In our study among 16.66% of the cases foreign body was not found on endoscopy in spite of positive chest X-ray findings. This is because chest X-ray findings like pneumonia, bronchiectasis, collapse, consolidation and refractory lung abscess are not specific to foreign body of respiratory tract.

### CONCLUSION

Thus conventional X-ray studies are Sensitive but not Specific as seen in our study. If time permits, the

otolaryngologist can opt for higher modalities of imaging. However the question of their reliability and cost effectiveness is debatable.

### ACKNOWLEDGMENT

I would like to acknowledge my teacher Dr.Khaja Naseeruddin <sup>M.S,DLO,</sup> former Professor and Head Department of E.N.T., KIMS, Hubli, for his priceless guidance, affection and constant encouragement in preparing this study. I express my sincere thanks to The Director and Principal, KIMS, Hubli for permitting me to utilize resources in completion of this work. I express my sincere thanks to all those patients without whose co-operation, this study would not have been possible.

**Conflict of Interest:** There were no conflicts of interest in this study.

**Source of Funding:** As the study was conducted in a government institution, the investigations and procedures were done free of cost.

**Ethical Clearence:** Informed written consent was obtained from parents/guardians before the study. Ethical clearance was obtained from the institution.

### REFERENCES

1. Joao A B, Gilberto B F. Foreign body aspiration in children, Paediatric Respiratory Reviews.2002;3(4) : 303-307.
2. Svedstrom E, Puhakka H, Kero P. How accurate is chest radiography in the diagnosis of tracheobronchial foreign bodies in children?. Pediatric Radiology 1989;19:520-522.
3. Black RE, Choi KJ, Syme WC, Johnson DG, Matlak ME. Bronchoscopic removal of aspirated foreign bodies in children. The American Journal of Surgery 1984;148: 778-781.
4. Silva AB. Utility of conventional radiography in the diagnosis of pediatric airway foreign bodies. Ann Otol Rhinol Laryngol 1998;107:834-837.

# A Study on Assessment of Obesity among High School Children in Urban Area of Eluru, Andhra Pradesh

K Chandra Sekhar<sup>1</sup>, P G Deotale<sup>2</sup>, Siddhartha Sankar Reddy<sup>3</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Prof & HOD, <sup>3</sup>Assistant Professor, at Alluri Sita Rama Raju Academy of Medical Sciences, ,  
Eluru

## ABSTRACT

**Introduction:** Obesity can occur in any age, and generally increases with age. The aetiology of obesity is complex, and is one of multiple-causation. The first adverse effects of Obesity to emerge in population in transition are hypertension, hyperlipidaemia, glucose intolerance, coronary heart disease and the long term complications of Diabetes. Hence, it is necessary to detect the obesity at the early age and effectively correct the obesity during childhood and adolescence by advocating some life style changes.

**Objectives:** 1. To determine the prevalence of Obesity in high school children. 2. To study the some risk factors of Obesity.

**Materials & Method:** The present community based cross sectional study was conducted at urban area of Eluru during the period from July 2010 to October 2010 with the help of Community Medicine staff. A total of 258 high school children were selected from two different schools randomly and prior permission taken from concerned authorities. Importance of the study was explained to the school management and teachers. Pretested study questionnaire was filled and the height, weight, Body mass index and waist hip ratio were recorded in both sexes. Diagnosis of Obesity was based on Body mass index >25, BMI 18.5 to 25 taken as normal as per the WHO technical report guidelines. Results were critically analyzed and necessary statistical tests like proportions and chi square tests were applied.

**Results:** Out of 258 students, 157 were boys and 101 girls. Prevalence of Obesity in the study population was 9.3%. Out of 24/258 (9.3%) obese individuals 16 girls and 10 boys. About 84% boys were taking junk food and 90% girls were consuming junk food. About 71.7% were spending 1hour time on watching TV, 23.3% were spending > or = 2 hours time on watching TV and remaining 5% were not watching the TV in their houses. Obesity was significantly associated with female sex, junk food consumption, practice of exercise and watching TV (P<0.01).

**Conclusions:** The prevalence of Obesity was found to be higher as compared to other studies. We recommend that there is a need for checking simple body mass index and waist/hip ratio were useful to assess obesity in high school going children. So that simple life style modifications and nutritional advice to the students can be initiated as early as possible and also periodical school surveys must be taken up for early identification of obesity. Wide IEC programmes about healthy dietary practices for children must be advised.

**Keywords:** Age, Sex, High School Children, BMI, Exercise practice, Junk Food, Obesity

---

## Corresponding author:

**K Chandra Sekhar**

Associate Professor

Department of Community Medicine, Alluri Sita Rama Raju Academy of Medical Sciences, Eluru- 534005.

E-mail:cskalevaru@yahoo.com

Mobile No: 09849360226

## INTRODUCTION

Obesity may be defined as an abnormal growth of the adipose tissue due to an enlargement of fat cell size or an increase in fat cell number. Obesity is perhaps the most prevalent form of malnutrition. It is now so common that it is replacing the more traditional

public health concerns including undernutrition. It is one of the most significant contributors to ill health. It has been suggested that such increase in body weight have been caused primarily by reduced levels of physical activity, rather than by changes in excess food intake or by other factors <sup>1,2</sup>. The World Health Organization (WHO) describes overweight and obesity as one of today's most important public health problems, which is escalating as a global epidemic <sup>3</sup>.

It is also increasingly recognized as a significant problem in developing countries and countries undergoing economic transition <sup>4</sup>. The problem of overweight and obesity is confined not only to adults but also being reported among the children and adolescents of developed as well as developing countries. Since, adolescence is a period of transition from childhood to adulthood; it assumes critical position in the life cycle of human beings, characterized by an exceptionally rapid rate of growth <sup>5</sup>. The prevalence of obesity among children and adolescents has increased significantly in the developed countries during the past two decades and similar trends are being observed even in the developing world, though less rapidly.

A fundamental step in the prevention and control of obesity is the identification of risk factors contributing to the rapid increase of obesity. Relevant research in this area, in India is minimal and the data available is mostly inconsistent. With this intention study was taken up to enlighten the hidden morbidity of obesity and its control some extent useful to gain long term benefits to school children.

## OBJECTIVES

1. To determine the prevalence of Obesity in high school children.

2. To study the some risk factors of Obesity.

## MATERIALS & METHOD

The present community based cross sectional study was conducted at urban area of Eluru during the period from July 2010 to October 2010 with the help of Community Medicine staff. A total of 258 high school children were selected from two different schools randomly and prior permission taken from concerned authorities. Importance of the study was explained to the school management and teachers. The study was approved by the ethical committee of the Alluri Sita Rama Raju Academy of Medical Sciences, Eluru. An individual survey was carried out by the investigator. After obtaining written informed consent from the student and teacher, then information about the socio-demographic characteristics was recorded in the predesigned, pretested proforma. This was followed by a clinical examination of the subject including height and weight, Body mass index and waist hip ratio were recorded in both sexes. Socio-economic status (SES) was verified according to a information available at school records.

**Sample Size Criteria:** During the study period, I could able to get the 258 sample from two different private schools of 6<sup>th</sup> and 7<sup>th</sup> standard classes were taken. This would extend in the future by selecting and comparison with Government schools. In the future, this study is planning to keep it as a longitudinal study.

**Diagnostic Criteria:** Diagnosis of Obesity was based on Body mass index >25, BMI 18.5 to 25 taken as normal as per the WHO technical report guidelines.

**Statistical Analysis:** Results were critically analyzed and necessary statistical tests like proportions and chi square tests were applied.

## RESULTS

Table 1: Sex in relation to Body Mass Index in study population

Sex	Obesity (BMI>25)	No Obesity (BMI<25)	Total
Boys	10 (6.3%)	147 (93.7%)	157 (100%)
Girls	14 (13.8%)	87 (86.2%)	101 (100%)
Total	24 (9.3%)	234 (90.7%)	258 (100%)

$\chi^2$ - 4.8, 1df, P<0.05

Table 1 depicts that about 9.3% of the adolescent school children was obese (BMI > 25). Of which, 13.8%

were girls and 6.3% were boys.

**Table 2: Sex versus Waist Hip Ratio (WHR)**

Sex	Normal WHR	Abnormal WHR	Total
Boys	146 (92.9%)	11 (7.1%)	157 (100%)
Girls	85 (84.1%)	16 (15.9%)	101 (100%)
Total	231 (89.5%)	27 (11.5%)	258 (100%)

$\chi^2$ - 4.29, 1df, P<0.05

Table 2 shows that 11.5% of the school children were showing abnormal Waist Hip Ratio (WHR). Of which, 15.9% were girls and 7.1% were boys. Hence, WHR has become the one of the sensitive indicator of the Obesity.

**Table 3: Junk food consumption pattern in study population**

Sex	Junk food (Yes)	Junk food (No)	Total
Boys	132 (84%)	25 (16%)	157 (100%)
Girls	91 (90%)	10 (10%)	101 (100%)
Total	223 (86.4%)	35 (13.6%)	258 (100%)

Table 3 indicates that in the study population, about 90% of the girls were consuming junk food and 84% of the boys were consuming the junk food. High junk food consumption pattern was observed in this study.

**Table 4: Exercise practice in study population**

Sex	Exercise (Yes)	Exercise (No)	Total
Boys	121 (77%)	36 (23%)	157 (100%)
Girls	37 (36.6%)	64 (63.4%)	101 (100%)
Total	158 (61.2%)	100 (38.8%)	258 (100%)

$\chi^2$ - 42.86, 1df, P<0.001

Table 4 revealed that about 77% of the boys were practicing the exercise and 63.4% of the girls were not practicing the exercise and this association was statistically significant.

**Table 5: Sex in relation to spending of time on Television (TV)**

Sex	0 hr	1 hr	> or = 2 hrs	Total
Boys	8 (5%)	125 (79.6%)	24 (15.4%)	157 (100%)
Girls	5 (5%)	60 (59.4%)	36 (35.6%)	101 (100%)
Total	13 (5%)	185 (71.7%)	60 (23.3%)	258 (100%)

Table 5 indicates that about 71.7% of the study population spending 1 hour time on Television everyday, 23.3% of the study population were spending more than 2 hours on TV watching per day and very less proportion (5%) of the people were not watching TV. More number of hours of TV watching also one of the predisposing factor of Obesity and was significantly associated with female sex.

## DISCUSSION

The Present cross sectional community based study conducted at urban field practice area of Community Medicine Department of ASRAM Medical College during the period from July 2010 to October 2010. Out of 258 adolescent school children, 157 were boys and 101 were girls. Prevalence of Obesity in the study



population was 9.3%. Out of 24 (9.3%) obese individuals 16 (13.8%) were girls and 10 (6.3%) were boys. A recent study conducted among the affluent public school children in New Delhi, revealed prevalence of obesity was 7%<sup>6</sup>. Similarly, Subramanyam et al have reported that the prevalence of obesity among the affluent adolescent school children in Chennai, Tamil Nadu was about 15%<sup>7</sup>. There are evidences that children and adolescents of affluent families are increasingly becoming overweight / obese in recent times, possibly because of decreased physical activity & sedentary life styles and change in dietary habits. However, the prevalence observed in this study was lower compared with sporadic studies carried out in various cities [41] such as Ludhiana, Pune, Delhi<sup>6</sup> and Chennai<sup>7</sup>. The reason for higher prevalence of overweight (26%) and obesity (7.4%) among the urban adolescent population studied in Delhi and Ludhiana could be due to confinement of study for cities and selection of the subjects from very affluent societies and few schools. The prevalence of overweight and obesity was significantly higher among girls in the present study, which is comparable with figures reported for other developing countries. The dietary habits of the children and adolescents with indulgence in high fatty foods intake and sedentary life styles in the higher socioeconomic group are well known causes for overweight and obesity. The results clearly indicate that regular physical activity was one of the important factors for lower prevalence of overweight and obesity. The prevalence was also significantly ( $p < 0.05$ ) lower among the adolescents, who participated regularly in the household activities, played out door games and performed physical exercises. In addition, the prevalence of overweight and obesity was higher among the adolescents who were involved in sedentary activities such as spending  $\geq 2$ hrs/day watching television, which is consistent with earlier studies. Klesges et al<sup>9</sup>, reported the effect of watching television on metabolic rate and prevalence of overweight and obesity among adolescents. In urban areas, considering the safety of keeping children away from the heavy traffic congestion, parents feel more comfortable, if their children played indoor games or watched television, consequently hindering their children participation in out door games and sports. The diet survey carried out by 24-hour recall method also revealed that the intake of energy and protein among overweight and obese adolescents was significantly higher as compared to non-overweight and non-obese adolescents.

## CONCLUSIONS

The over all prevalence of obesity in the Eluru urban areas was about 9.3%, which was significantly higher among girls (13.8%) as compared to boys (6.3%). The major correlates for the overweight and obesity among urban adolescents were physical inactivity such as duration of watching television, carrying out homework/ tuition/playing video or computer games, consumption of junk foods such as vegetable/non-vegetarian puffs, burgers, pizzas, cakes, pastries, high intake of energy and protein. The involvement in physical activity such as participation in outdoor games/sports, household activities and physical exercises were associated with low prevalence of overweight and obesity.

**Acknowledgement:** My sincere thanks to our ASRAM Management society for providing transport facility to take up this study and successful completion of the study. Special thanks to our principal Dr. K. Uma Maheshwara Rao, M.D., D.Ch., for constant support, guidance and motivation towards research and publications in different journals.

**Source of Funding:** None

**Conflict of Interest:** None

## REFERENCES:

1. Hager, A. (1981). *British Med.Bull.*, 37 (3) 287.
2. Aykroyd, W.R. and J.Mayer. Food and nutrition Terminology. In: WHO Doc Nut/68.6, Geneva.
3. WHO Nutrition, 2003, <http://www.who.int/nut/obs/ht>, accessed in 2003.
4. Popkin BM. The nutrition transition and obesity in the developing world. *J Nutr* 2001; 131: 871S-873.
5. Tanner JM. *Fetus in to Man: Physical Growth from Conception to Maturity*. New York Wells, Open Book publishing limited, 1978. pp 22-36.
4. Chinn S, Rona RJ. Prevalence and trends in overweight and obesity in three cross-sectional studies of British children, 1974-94. *Br Med J* 2001; 322: 24-26.
5. Kromeyer-Hauschild K, Zellner K, Jaeger U, Hoyer H. Prevalence of overweight and obesity among school children in Jena (Germany). *Int J Obes Relat Metab Disord* 1999; 23: 1143-1150.
6. Umesh Kapil et al Prevalence of Obesity among affluent Adolescent School children in Delhi. *Indian Pediatrics*, May 2002.
7. Subramanyam V, Jayasree R, Mohmad Rafi.

- Prevalence of overweight and obesity in Affluent girls in Chennai 1981 and 1998, *Indian Pediatrics*, 2003.
8. Dietz WH, Gortmaker SL. Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. *Pediatrics* 1985; 75: 807-812.
  9. Eck LH, Klesges RC, Hansson CL, Slawson D. Children at familial risks of obesity: an examination of dietary intake, physical activity and weight status, *Int J Obes Relat Metab Disord* 1992; 16: 71-78.
  10. World Health Organization (WHO), 1999. Obesity: Preventing and Managing the Global epidemic, Report of WHO Consultation; technical research Series No.894, 2000: pp 1-253.
  11. Laxmaiah, A., Balakrishna, N., Vijayaraghavan, K and Nair V.M. Factors effecting Overweight among urban Adolescents in Hyderabad, Andhra Pradesh, *Obesity* 2007; 15:1384-1390
  12. Sakmota N, Wansorns S, Tantrisirink, Marni E. A social epidemiological study of obesity among preschool children in Thailand. *Int J Obes Relat Metab Disord*. 2001; 25: 389-94.

# Efficacy of Tranexamic Acid in Decreasing Blood Loss During and after Cesarean Section: a Randomized Case Controlled Prospective Study

Ramesh A C<sup>1</sup>, Rajni S<sup>2</sup>, Nitam Deka<sup>3</sup>

<sup>1</sup>Professor, Department of Obstetrics and Gynecology, <sup>2</sup>Associate Professor, Department of Biochemistry, <sup>3</sup>Postgraduate Department of Obstetrics and Gynecology, J.J.M.Medical College Davangere

## ABSTRACT

**Objectives:** To study the efficacy of Tranexamic acid in reducing blood loss during and after the lower segment Cesarean section.

**Materials & method:** A randomized, case controlled, prospective study was conducted on 200 women undergoing lower segment cesarean section (LSCS). 100 of them were given Tranexamic acid immediately before LSCS & were compared with 100 others to whom Tranexamic acid was not given. Blood loss was collected and measured during two periods. The first period was from the placental delivery to LSCS and second from the end of LSCS to 2 hours postpartum. Vital signs at time of delivery, at 1 hour & 2 hour postpartum & Apgar score at 1min were studied in both the groups.

**Results:** Tranexamic acid significantly reduced the quantity of blood loss from the the end of LSCS to 2 hours postpartum. 71.5ml in the study group versus 112.6 ml in the control group (p=0.0002). It also significantly reduced the quantity of blood loss from placental delivery to 2 hours post-partum. 360.9 ml in the study group, versus 443 ml in the control group. (p=0.0008). No complications or side effects were reported in either group.

**Conclusion:** Tranexamic acid significantly reduced the amount of blood loss during and after the lower segment cesarean section and its use was not associated with any side effects like nausea, vomiting, diarrhea & thrombosis. Tranexamic acid can be used effectively in women undergoing LSCS.

**Keywords:** Tranexamic acid, Cesarean section, Postpartum, Antifibrinolytic

## INTRODUCTION

Cesarean section rates have increased to as high as 25 to 30 % in many areas of the world. Delivery by Cesarean section can cause more complications than normal vaginal delivery and one of the most common complications is primary or secondary postpartum hemorrhage (20%). It leads to increased maternal mortality and morbidity. In order to reduce maternal mortality and morbidity caused by bleeding, it is important to reduce the amount of bleeding during and after segment cesarean

## Section. <sup>1</sup>

Blood loss frequently leads to transfusion of allogeneic blood products, which expose patients to the risk of transfusion-related adverse effects such as febrile non-hemolytic transfusion reactions, transfusion errors and blood -borne infections. A popular approach is to minimize post-operative bleeding through the prophylactic use of the antifibrinolytic agents aprotinin, Tranexamic acid and epsilon aminocaproic acid.<sup>2</sup>

Tranexamic acid is a synthetic derivative of the amino acid lysine that exerts its antifibrinolytic effect through the reversible blockade of the lysine binding sites on plasminogen molecules. Tranexamic acid potentiates the blood clotting system and is used to treat and prevent bleeding. The mechanism of action of Tranexamic acid is related to its antifibrinolytic effect, which makes this drug potentially very effective

---

**Corresponding author:**

**Ramesh A C**

Professor

Dept. of OBG, JJM medical College, Davangere-4

Mobile: 9448154735

Email: rameshac67@yahoo.com



in the third stage of labour. Tranexamic acid is an effective agent for the reduction of blood loss, which has been widely used in various areas of medicine. It is an inhibitor of fibrinolysis that blocks the lysme - binding site of plasminogen to fibrin. It has been used to decrease blood loss for many years in cases of hemorrhage, and is reported to reduce intraoperative blood loss.<sup>3,4</sup>

### MATERIALS METHOD

The study included patients from Bapuji Hospital, Chigateri General Hospital and Women and children Hospital, Davangere from November 2010 to November 2012.

Each gave an informed consent and this study was approved by Ethical and Research Committee of J.J.M. Medical College, Davangere to use human subjects in the research study. The patients and controls voluntarily participated in the study.

A total number of 200 patients participated in the present study. Cases included 100 term primipara with a singleton delivered by Cesarean section with regular antenatal care.

Patients with severe medical and surgical complications including the heart, liver and kidney, brain disease and blood disorders, Allergy to Tranexamic acid, history of thromboembolic disorders,

abnormal placenta, severe pre-eclampsia, multiple pregnancies were excluded from the study.

**Study group:** - Preparation of Tranexamic acid injection solution: - 1gm/10ml Tranexamic acid diluted with 20ml of 5% glucose

**Administration :-** 10 minutes before incision, Tranexamic acid 1gm IV slowly infused ( over five min). After delivery of the neonate, oxytocin 10units IV drip and 20 units into the intra uterine wall were administered simultaneously.

**Control group :-** No Tranexamic acid was given. Oxytocin was administered as in the study group.

#### A. Collection of Sample

Blood will be collected via suction container, soaked in gauge pads and operation table sheets can be weighted. Blood measurements can be obtained postpartum during two separate periods from placental delivery to 2 hours postpartum

**Calculation of quantity Of blood:-**The quantity of bloom included in the =(weight of used materials +unused material-weight of all materials prior to surgery)/1.05, plus the volume included in the suction container after placental delivery.

Statistical analysis is done by Arithmetic mean, Standard deviation, Student' unpaired t test and paired t test.

### OBSERVATION & RESULTS

**Table 1: Effect of Tranexamic acid: Comparison of blood loss from time of placental delivery to completion of skin closure**

Blood loss(ml)	Cases			Controls		
	Mean	SD	mean	SD	Mean difference	P*value, sig
Placental delivery to end of cs	316.90	73.96	3976.00	96.36	80.1	P<0.001 HS

Table 1 shows mean blood loss from time of placental delivery to completion of skin closure was 316 ml in the study group & it was 397 ml in the control group (p=0.0001), suggesting that there was

statistically highly significant difference in blood loss in both the groups. Patients who received Tranexamic acid had 80 ml less blood loss than patients who didn't received Tranexamic acid.

**Table 2: Effect of Tranexamic acid: Comparison of blood loss from time of placental delivery to completion of skin closure**

Blood loss(ml)	Cases			Controls		
	Mean	SD	mean	SD	Mean difference	P*value, sig
End of CS to 2hrs postpartum	45.80	8.55	79.70	17.14	33.9	P<0.001 HS

Table 2 reveals mean blood loss from time of completion of skin closure to 2hrs postpartum was

45.80 ml in the study group and it was 79.70 ml in the control group (P=0.001), suggesting that there was

statistically highly significant difference in blood loss in both the groups. Patients who received Tranexamic

acid had 33.9 ml less blood loss than patients who didn't received Tranexamic acid.

**Table 3: Total blood loss**

Blood loss(ml)	Cases			Controls		
	Mean	SD	mean	SD	Mean difference	P*value, sig
Total	362.70	77.50	476.70	105.90	114	P<0.001 HS

Table 3 shows mean blood loss from placental delivery to 2 hours postpartum was 362.70 ml in the study group and it was 476.70 ml in the control group (p<0.001) suggesting that there was statistically highly

significant difference in blood loss in both the groups. Patients who received Tranexamic acid had 114 ml less blood loss than patients who didn't received Tranexamic acid.

**Table 4: Effect of Tranexamic acid: Comparison of incidence of patient with blood losse" 500 ml in both the groups.**

PPH	Cases	Controls
Present	2	7
Absent	98	93
Total	100	100

P=0.085 NS

Table 4 shows incidence of blood losse" 500 ml In both the groups. The difference was found to be statistically not significant (P=0.085)

**Table 5: The difference in Hb % postoperative-both in cases and control group**

Hb%	Cases			Controls		
	Mean	SD	mean	SD	Mean difference	P*value, sig
Before delivery	10.84	0.75	11.04	0.89	0.204	0.08 NS
After delivery	9.62	0.78	9.11	1.63	0.511	0.005 S
difference	1.22	0.68	1.93	1.34	0.715	P<0.001 HS

\*Student's unpaired t test

Table-5 shows fall in Hb% is more in patients –not given Tranexamic acid. Difference in Hb in the cases 1.22 gm %, difference in Hb in control cases 1.93%. Mean difference is 0.715 gm% which is highly significant, P-0.001

### DISCUSSION

Tranexamic acid exerts its antifibrinolytic effect by blocking the lysine binding locus of the plasminogen and plasmin molecules, thereby preventing the binding of plasminogen and plasmin to the fibrin substrate. Tranexamic acid also inhibits conversion of plasminogen to plasmin by plasminogen activators. It has been used in the treatment of bleeding for many years.<sup>3,4</sup>

Our study showed that Tranexamic acid

significantly reduces bleeding from time of placental delivery to 2hrs postpartum in LSCS. Results show that study group patients had mean blood loss of 362.70ml±110.3 as standard deviation, while control group patients had mean blood loss of 476.70±88.552 as standard deviation. Thus, there is reduction in blood loss by about 30% and was found to be statistically highly significant (P value=0.001). There was reduction in blood loss in both loss in both the parameters,i.e. from time of placental delivery to completion of skin closure and from completion of skin closure to 2 hrs postpartum. Tranexamic acid also reduces the incidence of postpartum hemorrhage in the study group as compared to control group.<sup>5,6</sup> There was no significant alteration in the vital signs of subjects following Tranexamic acid administration at time of delivery and at 1 hr and 2 hr postpartum.<sup>7</sup>

## CONCLUSION

Tranexamic acid significantly reduced the amount of blood loss during and after the lower segment cesarean section. Its use was not associated with and adverse drug reaction like nausea, vomiting, diarrhea or thrombosis. Fetal outcome as evaluated by Apgar score was not adversely affected by use of Tranexamic acid. Tranexamic acid can be used safely in subjects with lower cesarean section.

**Acknowledgement:** It is my privilege to thank everyone who helped me during my study and I am also thankful to all my patients for their kind cooperation.

**Conflict of Interest:** None

**Source of Funding:** Self

## REFERENCES

1. Kambo I, Bedi N, Dhillon BS, et al. A critical appraisal of caesarean section rates at teaching hospitals in India. *Int J Gyneacol Obstet* 2002 Nov ; 79 :151-8.
2. Tidsskr Nor Tægeforen: Hemmorhage in LSCS; *J Obstet Gynaecol* Oct 10 (2000) 120(24)2864-6.
3. Throsen S. Differences in the binding to fibrin of native plasminogen modified by proteolytic degradation : influence of w-aminocaproic acids. *Biochem Biophys Acta* 1975; 393:55-65.
4. Hoylaerts M, Linjen HR, Colleen D: Studies on mechanism of antifibrinolytic action of Tranexamic. *Biochem Biophys Acta* 1981;673: 75-85.
5. Guenther CR Pro: Tranexamic acid & aprotinin were better than other agents in decreasing bleeding after cardiac surgery. *J cardiothor vasc Anesth* 1994 Aug;8 471-3.
6. Okamoto S, Sato S, Takada Y et al. An active stereoisomer (trans form) of AMCHA & its fibrinolytic (antiplasminic) action in vitro & in vivo. *Kieo J Med* 1964;13:177-85.
7. Leila sekhavat, A. Tabatabai, M. Dalili, et al. Efficacy of Tranexamic acid in reducing blood loss after cesarean section. *J of Mate-fetal & Neon Med*; 22, 1 Jan 2009:72-75.

# Evaluation of Efficacy of Topical Bupivacaine for Post-Tonsillectomy Pain Relief

Priyadarshini M Bentur<sup>1</sup>, Veeresh A R<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Anaesthesia & Intensive Care, J.J.M. Medical College, Davangere, Karnataka,

<sup>2</sup>Associate Professor, Dept of ENT, Head and Neck Surgery, Basaweshwara Medical College, Chitradurga, Karnataka

## ABSTRACT

**Background:** Post-tonsillectomy pain is a major morbidity. Use of topical bupivacaine has been studied to see its efficacy in causing pain relief in this setting.

**AIMS:** To evaluate the efficacy of topical bupivacaine application in the tonsillar fossa for post-tonsillectomy pain relief

**Setting, Design, Materials and Method:** 50 adult and paediatric patients posted for tonsillectomy were selected. Their right tonsillar fossa was packed with gauze soaked in 0.5% BUPIVACAINE after removal of the tonsil and their left fossa with saline which acted as control. Post-op analgesia was assessed using VAS score.

**Statistical Analysis:** Results were analyzed using unpaired t-test

**Results and Conclusion:** Topical use of bupivacaine caused considerable pain relief, patients were more comfortable on the side where bupivacaine was used.

**Keywords:** Topical Bupivacaine, Post Tonsillectomy Pain Relief

## INTRODUCTION

Tonsillectomy is one of the commonest performed ENT surgeries. Post operative pain is considerable and a very significant cause for morbidity. It restricts oral intake causing dehydration. Swallowing is impaired predisposing to infection, increased risk of haemorrhage<sup>1</sup> & delayed discharge from ward. Pain is most intense in the immediate post-op period and first three days<sup>2</sup>. This period is protracted and characterized by pain, fever, halitosis and poor oral intake<sup>3</sup>.

Hence, post tonsillectomy pain management has become an important arena of interest. Systemic medications are available for use but they are associated with their own systemic side-effects. Hence, local therapy for pain has gained much interest. These include pre-emptive and intra-operative analgesia with local anaesthetics used either as local infiltration or as packs applied topically. Use of pethedine<sup>4</sup> and dexamethasone<sup>5</sup> topically has also been advocated. Because of its prolonged action,

bupivacaine is gaining popularity. Serious life threatening complications can occur with its infiltration in the peritonsillar area.

This study was undertaken to determine the efficacy of topically applied bupivacaine.

## MATERIAL AND METHOD

50 patients were chosen for this multi-centric study. Ethical committee approval was obtained; parental consent was taken for patients less than 18yrs. Age group was between 8 & 30 yrs. The patients included those with chronic tonsillitis, recurrent episodes of acute tonsillitis and/ or hyperplastic obstructive tonsils with obstructive sleep apnea syndrome. Exclusion criteria included those with adenotonsillitis, peritonsillitis, peritonsillar abscess, tonsillar neoplasia, other concomitant systemic illness or known hypersensitivity to local anaesthetics.

The patient was premedicated with Injn Glycopyrrolate 5µg/kg iv and Injn Pentazocaine

0.5mg/kg iv induction was carried out with Injn Propofol 2mg/kg iv titrated till loss of eye lash reflex followed by Injn Scoline 2mg /kg iv. Appropriate sized cuffed endotracheal tube was passed orally. Surgery commenced and anaesthesia was maintained with controlled ventilation with O<sub>2</sub> and N<sub>2</sub>O mixture with Injn Vecuronium 0.08mg/kg iv and intermittent halothane. Tonsillectomy was done by dissection method after haemostasis was achieved on both sides, the right tonsillar fossa was packed with a gauze 3x3cm<sup>2</sup> soaked with 1-3 ml of 0.5% sensorcaine and the left with a similar volume soaked with saline, both of which were left in place for 5 mins .After pack removal anaesthesia was terminated with Injn Neostigmine 0.5 mg/kg and Injn Glyco 10ig/kg i.v

and patient extubated after full recovery of reflexes. VAS SCORES were recorded immediately after extubation, ½ hour, 1 hour, 2hour, 4 hour, 6 and 8 hours post-operatively. Whenever VAS SCORE went beyond 7, Injn Diclofenac 1.5 mg/kg was given i.m.

### RESULTS

This was an intra-group study as each patient acted as his/her own control. Mean age was 15 years and male: female ratio was 1:1. Mean VAS scores were found to be significantly lower on the right side at all time intervals (Table-1). No reactions/complications were noted during the study.

**Table 1: Comparison of Pain scores ( V A S ) between two groups at diff. Time interval**

Time Interval	Right Tonsillar Fossa	Left Tonsillar Fossa	Right Tonsillar Fossa / RLeft Tonsillar Fossa		
			Mean Diff	t value	P value
0 Hr	3.40 ± 0.64	7.56 ± 0.97	4.16	25.28	< 0.001
1/2 Hr	3.58 ± 0.54	7.52 ± 0.74	3.94	30.58	< 0.001
1 Hr	3.56 ± 0.67	7.90 ± 0.76	4.34	30.13	< 0.001
2 Hrs	3.78 ± 0.86	7.84 ± 0.62	4.06	27.02	< 0.001
4 Hrs	4.08 ± 0.70	8.04 ± 0.67	3.96	29.03	< 0.001
6 Hrs	4.30 ± 0.71	8.20 ± 0.67	3.90	28.31	< 0.001
8 Hrs	4.54 ± 0.61	8.60 ± 0.53	4.06	35.29	< 0.001

Unpaired t test P <0.001,HS

### DISCUSSION

Post-tonsillectomy pain is a major problem. The oropharynx and tonsillar fossae are exquisitely sensitive to pain because of their widespread innervation by branches of Glossopharyngeal n & Trigeminal n. They possess a wide area of innervation in the sensory area of the cerebral cortex.

Bupivacaine is a local anaesthetic which blocks generation and conduction of nerve impulses .It increases the threshold for action potential generation, inhibits the rise of action potential and slows the propagation of nerve impulse. Its action depends on diameter, extent of myelination and conduction velocity of the nerve fibres. It has been used as a topical spray, pack or infiltration, pre-operatively (pre-emptive analgesia) and intra-operatively and has produced varied results<sup>17, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100</sup>.

Infiltration of local anaesthetics in the tonsillar fossa has been associated with complications like arrhythmias, airway obstruction<sup>11</sup>, cervical

osteomyelitis<sup>12</sup>, facial nerve palsy<sup>14</sup>, Horner’s Syndrome<sup>15</sup> and vocal cord palsy<sup>13</sup>. Local complications like sloughing of the mucosa resulting in haemorrhage are known to occur.

Pain is a complex subjective sensation which is difficult to quantitate and the perception of its severity differs from individual to another. In our study VAS scores were significantly lower (P<0.05) in the Bupivacaine side and the difference was recordable even upto 24 hours. We did not observe any side-effects during the study. The surgeon did not observe any oozing after pack application.<sup>19, 20</sup>

We hereby conclude that, topical Bupivacaine is a safe and effective option for post tonsillectomy pain relief.

**Acknowledgement:** To my family.

**Conflict of Interest:** None Declared.

**Source of Funding:** Nil

## REFERENCES

1. Hung T, Moore-Gillon V, Hern J, Hinton A, Patel N. Topical Bupivacaine in paediatric day-case tonsillectomy; a prospective randomized controlled trial. *J Laryngol Otol* 2002; 116(1): 33-6
2. Schoem SR, Watkins GL, Kuhn JJ, Thompson DH. Control of early post-operative pain with Bupivacaine in paediatric tonsillectomy. *Ear Nose Throat J* 1993; 72(8): 560-3
3. Cowan DJ, Hibbert J. Acute infection of the pharynx and tonsils. In Hibbert J. Editor. *Scott Brown Otolaryngology*. London: Butterworth Heinemann Publishers 1997/6/4/22.
4. Warnock FF, Lander J. Pain progression. Intensity and outcomes following tonsillectomy. *Pain* 1998; 75: 37-45.
5. Nordah SH, Albrektsen G, Guttormsen AAB, Pedersen IL, Breidablikk HJ. Effect of bupivacaine on pain after tonsillectomy: a randomized controlled trial. *Acta Otolaryngol* 1999; 119(3): 369-76.
6. Johansen M, Harbo G, Iillum P. Peri-incisional infiltration with bupivacaine in tonsillectomy. *Arch Otolaryngol Head Neck Surg* 1996; 122(3):261-263
7. Wong AK, Bissonette B, Braude BM, Macdonald RM, Fear DW, St- Louis PJ. Post-tonsillectomy infiltration with Bupivacaine reduces immediate post-operative pain in children. *Can J Anaesth* 1995; 42(9): 770-774.
8. Elkahim M, Abdul Salam AY, Eid A, Kaschef N, Mostafa BE. Inclusion of pethidine in lidocaine for infiltration improves analgesia following tonsillectomy in children. *Acta Anaesthesiol Scand* 1997; 41(2) :214-217.
9. Boliston TA, Upton JJM. Infiltration with lignocaine and adrenaline in adult tonsillectomy. *J Laryngol Otol* 1980; 1257-'1259.
10. Kaygusuz I, Susaman N. The effects of dexamethasone, bupivacaine and topical lidocaine spray on pain after tonsillectomy. *Int J Paediatric Otorhinolaryngology* 2003; 67(7): 737-742.
11. Bean-Lijewski JD. Glossopharyngeal nerve block for pain relief after paediatric tonsillectomy: retrospective analysis and 2 cases of life-threatening upper airway obstruction from an interrupted trial. *Anaesth Analg* 1997; 84: 1232-1238.
12. Cyna AM, Bell KR, Flood LM. Cervical osteomyelitis after tonsillectomy. *Anaesthesia* 1997; 52: 1084-1087.
13. Weksler N, Nash M, Rozentsveig V. Vocal cord paralysis as a consequence of peritonsillar infiltration with bupivacaine. *Acta Anaesthesiol Scand* 2001; 45: 1042-1044.
14. Shlizerman L, Ashkenazi D. Peripheral facial nerve paralysis after peritonsillar infiltration of bupivacaine: a rare case report. *Am J Otolaryngol* 2005; 26(6): 406-407.
15. Hobson JC, Malla JV. Horner's Syndrome following tonsillectomy. *J Laryng Otol* 2006; 120(9): 800-1.
16. Violaris NS, Tuffin JR . Can post-tonsillectomy pain be reduced by topical bupivacaine? Double blind controlled trial. *J Laryngol Otol* 1989 Jun; 103(6): 592-3.
17. Hydri AS, Malik SM. Post-tonsillectomy pain and bupivacaine, an intra-individual design study. *J Coll Physicians Surg Pak* 2010 Aug; 20(8): 538-41.
18. Jebeles JA, Reilly JS, Guitierrez JF, Bradley EL Jr, Kissin I. The effect of pre-incisional infiltration of tonsils with bupivacaine on pain following tonsillectomy and general anaesthesia. *Pain* 1991; 47: 305-8.
19. Broadman LM, Patel RI, Feldman B, Sellman GL, Milmoie G, Camilon F. The effects of peritonsillar infiltration on reduction of intra-operative blood loss and post-tonsillectomy pain in children. *Laryngoscope* 1989; 99: 578-81.
20. Singh GB, Singh Yadav SP, Singh J. Comparative study of infiltration and surface application of bupivacaine in post-tonsillectomy pain. *Ind J Otolaryngol Head and Neck Surg* 2006; 58: 147-151.



# A Rare Case of Von Willebrand Disease as a Cause of Menorrhagia Since Menarche: Case Report from Tertiary Care Hospital of North Karnataka

Mohan D Kashinkunti<sup>1</sup>, Gundikeri SK<sup>2</sup>, Dhananjaya M<sup>3</sup>

<sup>1</sup>Professor, <sup>2</sup>Associate Professor, <sup>3</sup>Postgraduate Student, Department of Medicine, SDM College of Medical Sciences and Hospital, Sattur, Dharwad, Karnataka, India

## ABSTRACT

Puberty menorrhagia is a common symptom to present. If not investigated as per protocol, a rare cause of it, like von Willebrand disease can be missed for years and anemia as a result, might make the patient handicapped in her developing age. There are limited studies about this disease reported from Karnataka. A 15 year old woman from north Karnataka presented with menorrhagia since menarche. Investigations revealed low levels of von Willebrand factor (vWF) antigen diagnosed as von Willebrand's disease type 1. She was treated with blood transfusion and antifibrinolytics.

**Keywords:** Menorrhagia, von Willebrand Disease, North Karnataka

## INTRODUCTION

Von Willebrand disease (vWD) is most common amongst inherited bleeding disorders with a prevalence of approximately 1% in general population<sup>1</sup>. It was first described in Aland Islands by Erik von Willebrand. It occurs as a result of decrease in plasma levels or defect in von Willebrand factor which is a large multimeric glycoprotein. It is under diagnosed in India showing 11% prevalence due to limited studies. A major cause of menorrhagia in Indian women is hereditary platelet function defects<sup>2</sup>. Amongst the coagulation defects, vWD is the commonest as reported from the Caucasian population. It is an autosomal inherited congenital bleeding disorder involving a qualitative or quantitative deficiency of von Willebrand factor (vWF). Dominant and recessive patterns of transmission also exist. Von Willebrand factor is a large multimeric glycoprotein present in blood plasma

produced constitutively in endothelium (Weibel-Palade bodies), megakaryocytes (α-granules of platelets), and sub endothelial connective tissue that is necessary for proper platelet adhesion, it protects coagulant factor VIII against degradation<sup>3,4</sup>. There are three main types of von Willebrand disease: Type 1 (quantitative deficiency of vWF), the most common. Type 2 (qualitatively abnormal vWF) is less common. Type 3 (complete absence of vWF), and pseudo von Willebrand are rarer form. The presenting signs and symptoms are variable<sup>5</sup>. Acquired Von Willebrand disease is a rare entity that is primarily associated with lympho and myeloproliferative disorders. In females, prolonged menorrhagia could be a symptom of vWD which is misinterpreted more gynecological than hematological entity. The diagnosis of vWD factor is complex and difficult for milder forms of the disease. Common tests required are Factor VIII levels, vWF Ag and Ristocetin assay. Testing for vWD should be considered in adolescents without pelvic pathology.

---

### Corresponding author:

**Mohan D Kashinkunti**

Professor

Department of Medicine, SDM College of Medical Sciences and Hospital, Manjushreenagar, Sattur, Dharwad, Karnataka

Email: drmohandk@gmail.com

## CASE REPORT

The patient was a 15 year old female with menorrhagia since menarche, attained at 14<sup>th</sup> year of age. Chief complains were irregular and prolonged menstrual cycles with 20-25 days of heavy bleeding at every menstruation, which would stop only after

estrogen and progesterone administration. In her past history, she had prolonged bleeding at trauma site. 4 months back she had bleeding from mouth. Blood and fresh frozen plasma was transfused. She required high dose of estrogen and progesterone to stop bleeding, with recurrence of bleeding on reducing the dose. Family history her younger brother has bleeding tendency following minor trauma. On general examination, she was anemic. Height was 138 cm and weight was 44 kg, without any clinical features of hypothyroidism, lymphadenopathy. Her cardio-respiratory, gastrointestinal system was normal, gynecological examination was normal.

**Investigations:** Hemoglobin-6 gm%; Total leukocyte count of  $8.5 \times 10^3/L$ ; Platelet count of  $3.26 \times 10^5/l$ ; Peripheral smear showed microcytic hypochromic blood picture. Bleeding Time: 15 minutes, Clotting Time: 6 minutes. USG abdomen- left ovary enlarged in size  $46 \times 52 \times 26$  mm, volume 33 cc. Urea solubiity test for Factor XIII was Negative. Blood group- A positive. Von Willebrand Antigen (vWF Ag): 10% (reference range for O Blood Group: 52-154% and for Non-O blood group: 60-200%).

**Diagnosed:** Type I von Willebrand disease.

Prothrombin Time: 14.7 seconds with control of 13.2 seconds and INR - 1.10.

APTT- 72.3 seconds with control being 30 seconds.

Renal and liver function tests, thyroid function tests were normal.

## DISCUSSION

This patient was diagnosed as Type I von Willebrand's disease. No other abnormality was detected. Factor VIII, which on multimeric analysis was normal, i.e. there was a quantitative defect of vWF leading to factor VIII deficiency causing acquired von Willebrand's disease. vWF antibody acts as an inhibitor for synthesis of the vWF reducing functional factor VIII molecules as large molecules of vWF are essential for stabilizing factor VIII. Low vWF levels cause degradation of factor VIII very fast leading to apparent

low factor VIII levels, resulting in bleeding disorders. Other underlying disorders such as systemic lupus erythematosus<sup>6</sup>, non-Hodgkin's lymphoma<sup>7</sup> and myeloma<sup>8</sup> show similar pathogenesis. Hypothyroidism may cause a decrease in the circulating factor VIII level without the presence of an inhibitor<sup>9</sup> because at a cellular level tri-iodothyronine acts on nuclear receptors to cause an increase in mRNA sequences for synthesis of various factors<sup>10</sup>.

## CONCLUSION

There is an evolution in the direction of genetic testing for the management of families with hereditary bleeding disorders including VWD. Testing centers and counselors play a vital role in supporting the patients. In spite of scientific development in clinical research in bleeding disorders, still there is a need for skilled clinicians and laboratory scientists with expertise in haemostasis. Testing for vWF should be considered in young patients with menorrhagia even though they do not show any bleeding episodes from other sites. Failure to diagnose an underlying inherited bleeding disorder may have an important and bad implication on the health of women.

**Source of Funding:** Nil

**Previous Presentation:** Nil

**Conflict of Interest:** Nil

**Acknowledgement:** Nil

SDM college of Medical sciences ethical committee's clearance: taken

## REFERENCES

1. Abshire T.C. Prophylaxis and von Willebrand's disease (vWD). *Thromb Res* 2006; 118: S3-7.
2. Sandip Kumar, Ruchi Kishore, Vineeta Gupta, Madhu Jain, Jyoti Shukla. *Indian Journal of Pathology and Microbiology* 2010; 53:486-89.
3. Peter J. Lenting, Jan A. van Mourik and Koen Mertens. *The Life Cycle of Coagulation Factor VIII in View of Its Structure and Function. Blood* 1998; 92:3983-96.



4. Sadler JE. Biochemistry and genetics of von Willebrand factor. *Annu Rev Biochem.* 1998; 67: 395-424.
5. Pruthi RK. A practical approach to genetic testing for von Willebrand Disease. *Mayo Clin Proc.* 2006; 81:679-91.
6. Simone, JV, Comet JA, Abildgaard CF. Acquired von Willebrand's syndrome in systemic lupus erythematosus. *Blood* 1968;31:806-12.
7. Ingram, G.I.C., Kingston, P.J., Leslie, J. & Bowie, E.J.W. Four cases of acquired von Willebrand's syndrome. *Br J Haematol* 1983; 54:189-99.
8. Zetterwall O, Nilsson IM. Acquired von Willebrand's disease caused by a monoclonal antibody. *Acta Med Scand* 1978; 204:521-28.
9. Takahasi, H., Yamada, M. & Shibata, A. Acquired von Willebrand's disease in hypothyroidism. *Thromb Haemost* 1987; 58:1095.
10. Oppenheimer J. Thyroid hormone action at the cellular level. *Science* 1979; 203:971-74.

# Place, Time and Season of Suicidal Attempts in Davangere City, Karnataka

Sathish B C<sup>1</sup>, Nagendra Gowda M R<sup>2</sup>, M Sambaji Rao<sup>3</sup>

<sup>1</sup>Associate Professor in Community Medicine, Meenakshi Medical College, Kanchipuram, Tamilnadu,

<sup>2</sup>Associate Professor, <sup>3</sup>Professor Dept. of Community Medicine, Basaveshwara Medical College and Hospital, Chitradurga, Karnataka

## ABSTRACT

**Objective:** To find out the place, time, methods used and month of attempting suicide.

**Type of Study:** Cross Sectional Study.

**Setting:** Bapuji and C.G Hospitals attached to JJM Medical College, Davanagere.

**Participants:** 540 suicidal attempters admitted to emergency wards.

**Methodology:** A pre tested questionnaire was used to interview the subjects relating the factors responsible for the attempt. The data thus obtained was compiled and analyzed.

**Statistical analysis:** Proportions, Chi square test.

**Results:** Evening and night times were preferred timings for the suicidal attempt. Home (73.3%) was the commonest place of the Suicidal Attempt in both the sexes. 22.6% of them committed the act on Wednesday compared to any other days of the week. Highest numbers of attempts were recorded in January, May and August.

**Conclusions:** A national strategy for prevention of suicide is the need of the hour. So policy makers and programme managers have to give a serious thought in this regard.

**Keywords:** *Attempted Suicide, Time, Place of attempt, Seasonality of Attempt*

## INTRODUCTION

Suicide as an issue has attracted the attention of society since times immemorial. The world health report 2001 estimates that, 10 – 20 million people attempt for suicide and 1 million people will be successful in that<sup>1</sup>. Suicide is a result of complex interaction of biological, psychological, social and situational factors<sup>2</sup>.

---

### Corresponding author:

**Nagendra Gowda M R**

Associate Professor

Department of Community Medicine, Basaveshwara Medical College and Hospital, JMIT Campus, NH-4 Bypass, Chitradurga. Karnataka-577501.

E-mail: nhimabindu2003@gmail.com

According to Durkheim (1951[1897]), seasonal fluctuations in suicide rates are caused by the varying intensity of communal life and social activity. He also found that suicide rates are highest during spring or during early summer and lowest in winter. A popular way to study the effect of the intensity of social activity in suicidal behavior is to examine the incidence of completed suicides around weekends or major public holidays. It is commonly known that certain days of the year have special meanings<sup>3</sup>. Many studies have been conducted in this regard across the world<sup>4</sup>. But there are very fewer studies in India in order to find out these factors. Identifying rhythmic patterns in suicidal behavior may have implications for understanding the etiology of suicide and for planning and staffing prevention and support services.

Hence it was decided to take up this study in order to find out the situational factors such as Place, Time, Day of week and Month of suicidal attempt.

### MATERIALS AND METHOD

A Cross sectional study was conducted in order to find out the situational factors of attempted suicide in two teaching Hospitals attached to J J M Medical College, Davanagere. For the purpose of the study, a case of suicidal attempt was defined as "A person who had made deliberate act of self harm consciously aimed at self destruction, irrespective of his\her intention to die".

A total of 756 patients admitted to the emergency wards of these hospitals in a period of one year were contacted for willingness to participate in the study. 216 of them were excluded from the study either due to refusal to take part in the study or discharged before

the interrogation. Remaining 540 attempters constituted the study sample. A written consent was obtained before interrogation. The WHO SUPRE MISS<sup>5</sup> Questionnaire was modified according to local circumstances, pretested and used for the interview. The data thus obtained was compiled and analyzed by using SPSS 13 (Statistical Package for Social Sciences version 13).

### RESULTS

This study was taken with an aim of studying the place and time of the suicidal attempt. More than half of the subjects belonged to 15 – 29 years with male preponderance. The most common reasons for committing the act was due to family problem and Physical illness. Use of organo- phosphorous poisoning was the main mode of attempting suicide. However, this study is dealing with time, place and day of the week for attempting the suicide.

**Table 1: Time of attempt**

Time of Attempt	Sex		Total
	Male	Female	
12 am – 6 am	27 (8.2)	9 (4.3)	36 (6.7)
6 am – 12 pm	79 (23.9)	77 (36.8)	156 (28.9)
12 pm – 6 pm	101 (30.5)	52 (24.9)	153 (28.3)
6 pm – 12 am	124 (37.5)	71 (34.0)	195 (36.1)
Total	331 (100)	209 (100)	540 (100)

\*Figures in parenthesis are percentages.

Evening and night times were preferred timings for the suicidal attempt between 6 pm – 12 am to the extent of 36.1%, followed by 6 am morning – 12 noon (28.9%). Most of the attempts occurred between

6 pm – 12 am in both males and females, with a higher proportion among males 37.5% compared to females (34.0%). Majority of females (36.8%) preferred 6 am – 12 pm for attempting suicides.

**Table 2: Place of the attempt**

Place of Attempt	Sex		Total
	Male	Female	
Field	79 (23.9)	4 (1.9)	83 (15.4)
Home	196 (59.2)	200 (95.7)	396 (73.3)
Outside	46 (13.9)	5 (2.4)	51 (9.4)
Shop	7 (2.1)	0	7 (1.3)
Street	3 (0.9)	0	3 (0.6)
Total	331 (100)	209 (100)	540 (100)

\*Figures in parenthesis are percentages.

Home (73.3%) was the commonest place of the Suicidal Attempt in both the sexes as evident in table 2. Most of the Males (59.2%) and females (95.7%) had committed the act in their Homes. Field (23.9%) was

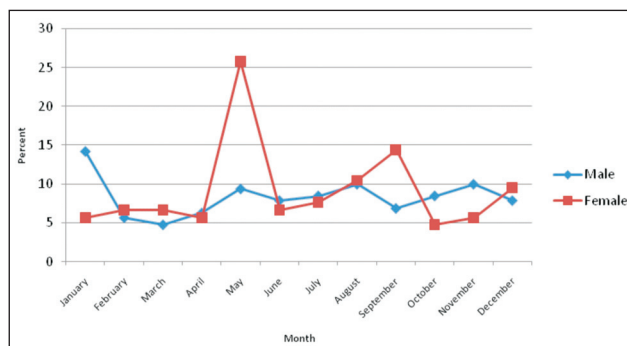
the next common place of the attempt since most of them were farmers. People attempted suicides even outside (9.4%) the home, in shops (1.3%) and in streets (0.6%).

**Table 3: Day of suicidal attempt of the study group**

Day of the week	Sex		Total
	Male	Female	
Sunday	39 (11.8)	18 (8.6)	57 (10.6)
Monday	39 (11.8)	29 (13.9)	68 (12.6)
Tuesday	48 (14.5)	39 (18.7)	87 (16.1)
Wednesday	67 (20.2)	55 (26.3)	122 (22.6)
Thursday	44 (13.3)	12 (5.7)	56 (10.4)
Friday	38 (11.5)	20 (9.6)	58 (10.7)
Saturday	56 (16.9)	36 (17.2)	92 (17.0)
Total	331 (100.0)	209 (100.0)	540 (100.0)

\*Figures in parenthesis are percentages.

Distribution of the Suicidal attempters on the basis of Day of the attempt has shown that about 22.6% of them committed the act on Wednesday compared to any other days of the week. It was followed by Saturday (17.0%), Tuesday (16.1%) and Monday (12.6%). Other days constituted about 10% of attempts each. Most of the male and female attempters committed the act on Wednesday s followed by Saturday and Tuesday respectively in both the sexes.



**Fig. 1. Month of suicidal attempt**

Highest numbers of attempts were recorded in January, May and August had 59, 63 and 55 attempts respectively.

**DISCUSSION**

This study was undertaken with the aim to find out the situational factors like Time, Place, Day of week and season of suicidal attempt. Evening and night

times were preferred for the suicidal attempt especially between 6 pm – 12 am to the extent of 36.1%. This was followed by 6 am morning – 12 noon (28.9%) in this study. Jessen<sup>3</sup> et al noted that peak time of day for attempted suicide in both sexes was the late evening, whereas suicide is very frequent during the daytime. About half of the suicide attempts occur in the evening or early part of the night is particularly relevant to prevention, especially the availability of telephone help-lines and the accessibility of other sources of help for people in crisis. Ponnudurai<sup>6</sup> noted that fateful hour in suicidal completers was between 6:00 pm and 12 midnights in both the sexes followed by 12 noon to 6:00 pm. Gururaj<sup>7</sup> also noticed the same. The high incidence during evening and night hours gives room for the speculation whether there is any association between social behavior, diurnal variation of the depressive mood and abnormal plasma cortisol levels in the evening and night hours as reported in many depressed patients.

Home (73.3%) was the commonest place of the Suicidal Attempt in both the sexes as evident in table 2. Most of the Males (59.2%) and females (95.7%) had committed the act in their Homes. In a study in Bangalore<sup>7</sup> it was observed that home was the commonest place of the attempt for Suicidal act followed by lodging establishments and construction areas. It was coupled with the fact that many subjects from lower socioeconomic status with minimum accommodation and space especially in urban areas is indicative that victims will identify a time and place

within the home without getting noticed by anyone else. But the situation differs in rural areas where the farmers will be working in the field and due to liberal availability of the organophosphorus compounds the attempt will be more common in the fields.<sup>8</sup>

Distribution of the Suicidal attempters on the basis of Day of the attempt has shown that about 22.6% of them committed the act on Wednesday compared to any other days of the week. Jessen observed that suicidal deaths are most common on Mondays, the peak days for attempted suicide was Sunday with fewest attempts occurring on Friday. Again this pattern was only statistically significant in females. Zollner observed a significant excess of total suicidal deaths on Mondays and a trough on Saturdays, with no significant difference between gender patterns. An association between specific national holidays and events and suicides was found, which was explained through a psychosocial theory of "broken promises". In countries where people have the day off work on Monday there were significantly fewer attempts during the 3 days before, but where Whit Monday is a normal working day significantly fewer attempts occurred on the Monday to Wednesday after Whit Sunday. There appears to be a transposition of a significant number of suicide attempts from before (and during) a major public holiday until after it. The division of holidays into non-working and working days showed that a 'holiday effect' could only be found around major public holidays, particularly Christmas, Easter and Whitsun. These findings support the theory of the 'broken-promise effect' for major public holidays. Since most of the suicidal attempters in this study were farmers it may be artifactual.

Evidence was found to support the theory of the "broken-promise effect" for major public holidays in that there appears to be a postponement of a significant number of suicides from before a holiday until after. The division of holidays into nonworking and (half-time) working days showed that a "holiday effect" could only be found around major public holidays, particularly Christmas, Easter, and Whitsun.

Highest number of attempts was recorded in January, May and August which had 59, 63 and 55 attempts respectively in this study. Similar to this result, in a study Emad salib et al noted that the suicidal attempts were peak in December and minimum in March<sup>9</sup>. Andrew barker in a follow up study noted peak of attempted suicides in May and June<sup>10</sup>.

According to Durkheim, seasonal fluctuations in suicide rates are caused by the varying intensity of communal life and social activity. A popular way to study the effect of the intensity of social activity in suicidal behavior is to examine the incidence of completed suicides around weekends or major public holidays. It is commonly known that certain days of the year have special meanings. Special occasions, such as major public holidays, national sport events, or the deaths of cultural icons, often seem to bring family, friends, and acquaintances closer together. These occasions are also likely to provide a sense of belonging, fellowship and social integration. Durkheim argued that the suicide rate of a society is inversely related to the social integration of the society, and he equated a person's social integration with his or her subjectively felt obligation to participate in the ceremonies of the society.

## CONCLUSION

There is no single reason or no single cause making Suicide more complex. An effort to study the situational factors such as Time, Place, Day of the week and seasonality can add to initiate the preventive measures for Primary Health Care Workers, in suicide prone countries like India. One cannot rule out the role of these factors in attempted suicide and completed suicide. But this study is not without limitations. The rate of admission, completed suicides before reaching the hospital, significant data loss may also contribute much to our understanding about these factors. But one can provide the preventive measures for the patients who are at high risk of committing suicide especially by Primary Health Care Workers. A national strategy for prevention of suicide is the need of the hour. So policy makers and programme managers have to give a serious thought in this regard.

**Acknowledgement:** Nil

**Conflicts of Interest:** None declared

**Source of Support:** None

**Ethical Clearance:** Obtained

## REFERENCES

1. Ahuja, N, editor. Emergency Psychiatry In: A short text book of psychiatry. Jaypee Brothers Medical Publishers (P) Ltd., 5<sup>th</sup> Edition, 2002, p228-9.

2. Heikkinen, M. E, Isometsa, E.T, Marttunen, M. J, Aro, H. M, Lonqvist, J. K, Social factors in suicide. *Br J Psychiatry*, 1995, 167, p747-753.
3. Jessen G, Andersen K, Arensman E, Bille-Brahe U, Crepet P, De Leo D, et al. Temporal fluctuations and seasonality in attempted suicide in Europe. Findings from the WHO/EURO multicentre study on parasuicide *Archives of Suicide Research*. 1999, 5, p 57 - 69.
4. Zollner, L, Moller, S, Jensen, B. F, The relationship between suicide and day of the week, major holidays, and national events in Denmark 1970-1998, Centre for Suicide Research, Denmark.
5. WHO – suicide prevention SUPRE multi-site intervention study on suicidal behaviours – SUPRE-MISS, protocol of SUPRE-MISS, Management of Mental and Brain Disorders, Department of Mental Health and Substance Dependence, World Health Organization, Geneva 2002.
6. Ponnudurai R, Jayakar J. Suicide in Madras. *Indian Journal of Psychiatry* 1989, 22, p 203–205.
7. Gururaj G, Isaac MK. Epidemiology of suicides in Bangalore. National Institute of Mental Health and Neuro Sciences, publication no. 43; 2001.
8. Sato T, Takeichi M, Hara T. suicidal attempters by agricultural chemicals. *Indian Journal of Psychiatry* 1993, 35(4), p209–210.
9. Salib, E, Gray, N, Weather conditions and fatal self-harm in Cheshire 1989-1993. *Br J Psychiatry*. 1997, 170, p 473-477.
10. Barker, A, Hawon, K, Fagg, J, Jennison, C, Seasonal and weather factors in Para suicide. *Br J Psychiatry*. 1994, 165, p 375-380.
11. Preventing suicide a resource for primary health care workers. *Mental and Behavioural Disorders*. Department of Mental Health, World Health Organization, Geneva 2000.



# Prevalence of Overweight and Obesity among Urban School Going Children in Mysore, India

D Narayanappa<sup>1</sup>, HS Rajani<sup>2</sup>, KB Mahendrappa<sup>3</sup>

<sup>1</sup>Professor and Head, <sup>2</sup>Assistant Professor, <sup>3</sup>Professor, Department of Paediatrics JSS Medical College, JSS University, Mysore, India

## ABSTRACT

The objective of this cross sectional study was to estimate the prevalence of overweight and obesity among urban school going children between 5-15 years in Mysore, Karnataka, India. The prevalence of overweight and obesity was 11.7% and 4.4% respectively

**Keywords:** Obesity, Overweight, Prevalence

## INTRODUCTION

The prevalence of childhood obesity ranges from over 30% in USA to less than 2% in sub-Saharan Africa [2]. Obesity in children is emerging as an important public health concern in developing countries including India as well because of rapid urbanisation, changes in lifestyle and economic development. It is an independent risk factor for cardiovascular diseases and also increases the risk for hypertension, diabetes, osteoarthritis and hence increased mortality and morbidity during adult life. There is paucity of nationally representative data on prevalence of overweight and obesity in India. This study was done to know the prevalence of overweight and obesity among school children in Mysore, Karnataka, India.

## METHODOLOGY

In this school based cross sectional study, 1217 children from three urban schools in Mysore city between the age group of 5-15 years were included (with upper and lower limit of 95% CI at  $\pm 0.02$ ). The schools were selected by using purposive sampling method keeping in view the operational feasibility. Information regarding age was obtained from the school records and was also rechecked from each student. The age was recorded in completed years. A pre tested proforma was used to record age, anthropometric measurements, body mass index (BMI). The weight (kg) was taken by

standardized digital weighting machine calibrated to 0.5kg accuracy. Height (to the nearest 0.5 cm) and weight (to the nearest 0.5kg) were measured using standard techniques. Anthropometric measurements were taken by medical graduates under supervision of co-investigators. Their techniques were corrected and retested until desired level of intra-observer and inter-observer variability was reached (coefficient of variation for all measurements < 5%). For diagnosing obesity, the BMI was calculated by the following formula weight in kg divided by height in m<sup>2</sup>. WHO approved CDC age specific charts of BMI were used as reference standards. Overweight and obesity were assessed by considering the BMI for a particular age and sex. Children with BMI above 95th percentile for age and sex were considered obese, those between 85th and 95th percentile were considered overweight<sup>1</sup>. Lipid profile and fasting blood sugar was estimated in children between 5-10 years of age. A written consent for inclusion of children was taken from parents. Ethical committee clearance was obtained from institutional ethical committee. Statistical analysis was done using EPIINFO software.

## RESULTS:

A total of 1217 children were included in the study out of which 714 were males and 503 were females. 728 children were in the age group 5-10 years and the remaining 489 were aged 11—15 years (TABLE I)

**Table I : Age and sex distribution of children included in the study(5-10years).**

AGE(in years)	SEX		TOTAL
	MALE	FEMALE	
5 - <6	60(57.7)	44(42.3)	104(100)
6 - <7	65(60.2)	43(39.8)	108(100)
7 - <8	70(53.8)	60(46.8)	130(100)
8 - <9	73(63.5)	42(36.6)	115(100)
9 - <10	70(62.5)	42(37.5)	112(100)
10 - <11	96(60.4)	63(39.6)	159(100)
11 - <12	43(59.7)	29(40.3)	72(100)
12 - <13	74(55.2)	60(44.8)	134(100)
13 - <14	95(54.9)	78(45.1)	173(100)
14 - <15	63(63.6)	36(36.4)	99(100)
15 - <16	5(50 )	5( 50)	10(100)
TOTAL	714(58.7)	503(41.3)	1217(100)

\*Number in parentheses indicates percentage.

The prevalence of overweight and obesity between 5-10 years age group was 11% and 5.4% respectively (TABLE II) and between 11-15 years age group was 12.9% and 3.1% respectively.(TABLE III).

**Table II: Number of children with normal, overweight and obese BMI according to age**

AGE (in years)	Obesity			TOTAL
	Normal	Overweight	Obese	
5-<6	90(86.5)	7(6.7)	7(6.7)	104(100)
6-<7	85(78.7)	15(13.9)	8(7.4)	108(100)
7-<8	112(86.2)	16(12.3)	2(1.5)	130(100)
8-<9	99(86.1)	11(9.6)	5(4.3)	115(100)
9-<10	92(82.1)	11(9.8)	9(8.0)	112(100)
10-<11	131(82.4)	20(12.6)	8(5.0)	159(100)
TOTAL	609(83.7)	80(11)	39(5.4)	728(100)

Number in parentheses indicates percentage

**Table III: Number of children with normal, overweight and obese BMI according to age**

Age	Normal	Over weight.	Obese	Total
11-<12	61(84.7)	8(11.1)	3(4.2)	72(100)
12-<13	111(82.8)	19(14.2)	4(3.0)	134(100)
13-<14	146(84.4)	22(12.7)	5(2.9)	173(100)
14-<15	86(87.8)	10(10.2)	2(2.0)	98(100)
15-<16	5(50.0)	4(40.0)	1(10.0)	10(100)
Total	410(84.0)	63(12.9)	15(3.1)	488(100)

Number in parentheses indicates percentage.

The overall prevalence of overweight and obesity between 5-15 years was 11.7% and 4.4% respectively.

There was no statistically significant difference in prevalence of overweight and obesity among male and female children (P value > 0.05).. Prevalence of overweight and obesity did not show any age related trend.

There was no statistically significant association between overweight, obesity and biochemical investigations in children between 5 -10 years (TABLE IV). (P value > 0.05).

Table IV: Mean, standard deviation of biochemical parameters according to age

AGE (in years)	Total cholesterol		Serum triglyceride		HDL		LDL		VLDL		Fasting Blood Sugar	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
5-<6	159.0	33.08	92.2	100.1	40.4	6.78	104.9	29.2	16.8	8.65	76.2	11.5
6-<7	164.1	28.67	79.3	42.2	39.5	6.81	113.9	26.1	15.7	8.42	78.0	11.8
7-<8	159.6	29.9	81.7	36.1	38.5	6.57	112.6	29.3	16.5	8.40	78.1	15.0
8-<9	163.2	28.6	94.2	51.6	42.9	8.21	118.1	28.8	19.5	12.5	82.1	16.2
9-<10	157.0	32.9	81.0	76.0	39.1	8.48	109.4	34.7	15.8	7.20	75.0	11.4
10-<11	171.7	79.9	96.3	51.8	42.2	8.61	117.9	30.7	18.7	10.2	71.5	21.8

## DISCUSSION

Childhood obesity is emerging as a global epidemic in developed as well as in developing countries affecting all socioeconomic groups. Evaluation of obesity in children is important as it provides an opportunity to identify the problem and prevent disease progression in to adulthood (2,3). Indian data on current trends in obesity in children are emerging.

The prevalence of overweight and obesity in our study was in concordance with other school based data in India, which demonstrated prevalence of obesity in the wide range of 5.6% to 24% among children and adolescents<sup>4-12</sup> thereby highlighting that obesity is an emerging health problem in India.

In Mysore childhood obesity study done at Mysore in 2010<sup>8</sup>, a total of 43152 children in the age group of 5-16 years from both Government and urban schools participated and the overall prevalence of overweight and obesity was 8.5% and 3.4% respectively which was slightly lower than in our study, where children from only private school participated. .

Kapil, *et al*<sup>6</sup> observed that the overall prevalence of obesity was higher in male than female children. In our study, there was no significant difference in overall prevalence between male and female children in concordance with Mysore childhood obesity study<sup>8</sup>. Another study<sup>6</sup> has shown increase in overweight and obesity as the age advanced from 6-9 years. Mysore childhood obesity study<sup>8</sup> showed that prevalence of both overweight and obesity decreased as the age advanced from 5 to 16 years but no age related trend was observed in our study. The prevalence observed in our study is far less compared to several other studies reported earlier<sup>6,9-11</sup>.

India is a densely populated country with vast cultural and ethnic differences. Hence further research on large scale is needed to determine the burden of overweight and obesity in Indian children and to develop standard growth charts representative of Indian children and also to identify the risk factors associated with.

**Acknowledgement:** We acknowledge the assistance provided by senior research fellows : Dr Ravikumar, Dr Purushottam V, Dr Purushottam DR and Medical Social Workers : Smt Sharada and Smt Prakruti.

**Funding:** ICMR

**Conflicting Interests:** None

## REFERENCES

- Centers for disease and prevention. 2000 CDC growth charts: United States. Available at: [www.cdc.gov/growth\\_charts](http://www.cdc.gov/growth_charts).
- Greydanus DE, Bhav S. Obesity and Adolescents; Time for increased physical activity. *Indian Pediatr* 2004; 41: 545-550
- Hill JO, Trowbridge FL. Symposium on the causes and health consequences of obesity in children and adolescents. *Pediatrics* 1998;101: S497-S574
- Anand NK, Tandon L. Prevalence of HTN in school going children. *Indian Pediatr*. 1996; 33: 377-381
- Bhave S, Bavdekar A, Otiv M. IAP National Task Force for childhood prevention of adult diseases: Childhood Obesity. *Indian Pediatr* 2004; 41: 559-575
- Kapil U, Singh P, Pathak P, Dwivedi S, Bhasin S. Prevalence of obesity amongst affluent adolescent

- school children in Delhi. *Indian Pediatr* 2002; 39: 449-552.
7. Ramachandran A, Snehalatha C, Vinitha R, Thayyil.M, Sathishkumar CK, Shubha C, *et al.* Prevalence of overweight in urban Indian adolescent school children. *Diabetes Res Clin Pract* 2002; 57: 185-190.
  8. Mysore Childhood Obesity Study. Premanath M, Basavanagowdappa H, Shekar MA, Vikram SB, Narayanappa D. *Indian Pediatr* 2010; 47: 171-173
  9. Sidhu S, Kaur N, Kaur R. Overweight and obesity in affluent school children of Punjab. *Ann Hum Biol* 2006; 33: 255-259.
  10. Bose K, Bisai S, Mukhopadhyay A, Bhadra M. Overweight and obesity among affluent Bengali school girls of Lake Town. *Matern Child Nutr* 2007; 3: 141-145.
  11. Khadlikar VV, Khadlikar AV. Prevalence of obesity in affluent school boys in Pune. *Indian Pediatr* 2004 ; 41: 857-858

# Study of Rate of Union of Fracture Forearm Bones by Open Reduction and LC-DCP Fixation

Prakash S<sup>1</sup>, Basanthi BS<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Orthopedics, <sup>2</sup>Assistant Professor, Department of Obstetrics and Gynecology, MVJ Institute, RGUHS University, Bangalore

## ABSTRACT

**Background:** Fracture of both bones of forearm pose a unique management problem. Return of function depends on union of the bones and motion of forearm. Conservative therapy often results in malunion, non-union or synostosis. Older methods of plating produce large frictional force leading to periosteal vascular compromise and healing. Limited contact dynamic compression plate has emerged as a better alternate to older plating.

**Objectives:** To know the injury profile and rate of union of forearm bone fractures by LC-DCP.

**Method:** 30 cases of both bone forearm fracture were treated by open reduction and internal fixation with 3.5 mm LC-DCP, were followed up for 6-24 months and radiological union assessed by Andersons criteria.

**Results:** Middle third of the bones were the most affected region being caused commonly by RTA, with a higher rate in men. Fractures united in all the cases with fewer complications.

**Conclusion:** Fracture union rate was 100% with an average union duration of 13.6weeks.

**Keywords:** Fracture Forearm Bones, LC-DCP, Union of Fracture

## INTRODUCTION

Fractures of the forearm present a unique management problem from years. Function of the forearm and hand is dependent on the combination of stability and mobility. Thus return of function of forearm injuries depends on union of the fracture and motion of the forearm <sup>1</sup>. A forearm fracture involving both bones requires open anatomical reduction with stable fixation <sup>1</sup>. Conservative treatment has resulted in malunion, non-union, synostosis and ultimately poor functional outcome <sup>2</sup>.

Closed management of forearm fractures has been met with frustration in adults and resulted in poor functional outcome, hence perfect fracture reduction and rigid fixation is mandatory and can be achieved by plating <sup>3</sup>.

In older methods of plating, the screw acts as an anchor, with its axial force compressing the plate against bone, which produces large frictional force at

the bone plate interface and this force causes vascular disturbance, especially in the periosteum.

This observation has led to the development of limited contact dynamic compression plate (LC-DCP), which decreases the bone contact area to approximately 50% of the total area of the under surface of the plate, it does not hinder periosteal circulation. So, fracture healing is good and refracture is less <sup>4</sup>. To know the rate of union, advantages and complications of the LC-DCP present study was undertaken.

## OBJECTIVES

- To know the injury profile of forearm bone fractures.
- To study the union rates and complications of open reduction and internal fixation of fracture both bone forearm with LC-DCP.

## METHODOLOGY

Present study included treatment of 30 cases of fracture both bones of forearm by open reduction and internal fixation with 3.5mm LC-DCP at a medical institute in Bangalore, between 2004-August to 2006-August.

### Inclusion criteria

- Patients with both fresh and old diaphysial fractures of both bones of forearm.
- Patients above the age 16years.

### Exclusion criteria

- Compound fractures, segmental fractures of forearm.
- Pathological fractures, infected fractures, non-union, malunion, delayed union.
- Monteggia and Galeazzi fractures.

On admission of the patient, a careful history was taken from the patient or attendants to reveal the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and the local injury.

Necessary investigations including Radiographs of the radius and ulna i.e., anteroposterior and lateral views including elbow and wrist joints were done. The limb was then immobilized in above elbow plaster of Paris slab with cuff and collar sling.

Patients were taken for surgery after obtaining informed consent and fitness for surgery. Proximal radius was approached by Dorsal Thompson incision and Volar Henry approach was used for middle and distal radius. Ulna was approached by (Boyd's) an incision along the subcutaneous border of ulna. After identifying the fracture ends, periosteum was stripped sparingly with a periosteal elevator. Fracture ends were cleaned and with the help of the reduction clamps fractures were reduced and held in position. A plate of at least 6 holes was chosen and longer plates were applied in spiral, and comminuted fractures after contouring if required.

For upper third radial fracture, the plate was fixed dorsally and for distal radial fractures it was fixed on the volar aspect. For middle third of the radius either one of them were used. In ulnar fractures the plate was applied over the posteromedial surface of the ulna.

Using neutral guide drill, drills were made into the exact center of the plate hole without imparting any compression. After the first hole, proper screw length was determined with the depth gauge, holes were tapped to accommodate the threads of the screw, and initial screws were inserted. Next, drill were made at the nearest available hole on the opposite side of the fracture from the initial screw using the eccentric drill guide. The arrow on the eccentric guide always pointed towards the fracture; Neutral screw was seated completely followed by eccentric screw in their respective holes. The contour between the plate and the screw head of the eccentrically placed screw moved the screw head towards the center of the plate until the deepest portion of the hole was reached. The bone fragment into which the screw was being inserted was moved in the same direction so that the fragments were impacted. Remainder of the screws was inserted using the neutral drill guide. In case of porotic bone long screws were used and in case of comminuted fractures long plates were used. A narrow 3.5mm LC-DCP was used and a minimum of 6 cortices were engaged with screw fixation in each fragment.

The LC-DCP, 3.5 mm is available in length 51mm to 155mm, with 4-12 holes. Important dimensions were thickness 4.0mm, width 11mm, hole spacing 13mm and hole length 7mm.

Post operative above elbow POP slabs were applied. Physiotherapy advised and follow up done after 8, 12, 16 and 24 weeks to know radiological union and complications.

95% confidence intervals were calculated to find the significance of study parameters. Student t test was used to find the significance of union of time with surgical type.

SPSS 11.0 and Systat 8.0 were used for the analysis of the data and Microsoft Word and Excel were used to generate graphs and tables.

## RESULTS

Age of the patients ranged from 16-60 years with fracture being most common in 2<sup>nd</sup> and 3<sup>rd</sup> decade with an average age of  $32.27 \pm 10.93$  years. Out of 30 patients, 25 patients (83%) were males and 5 patients (17%) were females with a mean age of  $30.44 \pm 9.73$  and  $41.40 \pm 13.26$  respectively.

Road traffic accident was the mode of injury in 56.7% of cases, fall in 33.3% and assault in 10% of cases.



Fracture both bones in left forearm was 60% with 95 % Confidence Interval of 42.32-75.41%, which is border line significant and the Injury profile is shown in Table No. 1.

**Table No. 1. Depicts injury profile of the patients.**

Trait	Number (n=30)	%	95% CI <sup>47</sup>
<b>Side of Injury</b>			
Left	18	60.0	42.32-75.41
Right	12	40.00	24.59-57.68
<b>Fracture site</b>			
Proximal third	7	23.33	11.79-40.33
Middle third	16	53.33	36.14-69.77
Lower third	7	23.33	11.79-40.93

36.75% of cases had comminuted fracture (Radius 10 cases, Ulna 12 cases) and transverse/ short oblique fractures in 63.3% of cases (Radius 20 cases, Ulna 18 cases). 3.3% each of the cases had associated abdominal, fracture of left tibia, fracture of right tibia, head injury, rib fracture and right colle's fracture.

Thomson surgical approach was employed in 23.33% and Henrys in 76.67% of cases. In 26.7% of cases Tourniquet time was 40-50min, 51-60min in 73.3% with a confidence interval of 55.55-85.82%.

93.33% patients had sound union in less than 6 months (66.67% in <16 weeks) and 6.66% patients had delayed union. 16.6% had postoperative complications in the form of superficial infection (10%), postoperative interosseous nerve injury (3.3%, recovered in about 12 weeks) and radioulnar synostosis (3.3%) and none had intraoperative problems.

## DISCUSSION

To provide functional rehabilitation of forearm, anatomic reduction and rigid fixation is mandatory. This can be achieved by open reduction and internal fixation with limited contact dynamic compression plate and screws<sup>6</sup>. We evaluated the results and compared them with those obtained by various other studies. Our analysis as follows:

In our study fracture both bones of forearm was common between age group of 20-40 years with an average of 32.26 years (16-60 year). Our findings are comparable to the study series made by Matejic AA<sup>1</sup> found average age as 43 years, Frankie L<sup>4</sup> accounted an average age of 36 years (11-90 years), Chapman M<sup>7</sup> reported average of 33 years (13-79 years), Burwell HN<sup>8</sup> found the average age as 44.8 years, Herbert SD<sup>9</sup> found 24 years as the average age and Moed BR<sup>10</sup>

found the average age as 22 year. Our series had male predominant with 83% male patients and 17% female patients, which were comparable to previous studies by Herbert SD<sup>3</sup>, noted 89% males, Frankie L<sup>4</sup> series showed 82.6% males and 17.4% females, Chapman MW<sup>11</sup> noted 78% males and William<sup>12</sup> in his series had 67% males. This higher incidence in male adults could be due to higher exposure to riskier environment and employment in hard labor.

In our study 56.7% of patients had sustained fracture from road traffic accidents, 33.3% from fall and 10% due to direct blow (assault). Our studies are comparable to previous studies by Moed BR<sup>10</sup>, accounted 50% to RTA, 20% to industrial accidents, 14% to fall, 12% to direct blow and 4% to gunshot injuries; Thomas Grace et al<sup>13</sup> noted about 45% patients with automobile/motorcycle accident 22% with fall, 3% gunshot wounds and remainder with other miscellaneous types of injuries; Smith<sup>14</sup> noted 45% due to RTA, 36% due to fall and 19% due to industrial accidents. Road Traffic accidents are still the leading cause in developed and developing countries.

We have found 40% incidence of fracture both bones in right extremity, which is in contrast to the previous studies by Burwell HN<sup>8</sup> and Chapman MW<sup>11</sup>, who report an equal or a higher incidence in the right forearm (50 & 55% respectively). This could be because of a higher incidence of RTA in our set up compared to western studies where trauma has occurred at industries, due to fall and assaults making more used right limb prone for fracture.

63.3% of fractures were transverse/ short oblique and 36.7% were comminuted. The results are not comparable to Chapman MW<sup>11</sup> series, noted 53% as comminuted. Herbert DS<sup>3</sup> documented 71.5% at middle third, 21.5% at distal third and 7% at proximal third. Sarmiento A et al<sup>15</sup> noted 84.6% of fracture on both bones at middle third and 15.4% at lower third both bones, Chapman MW<sup>11</sup> also noted 59% and 40% of fractures in middle third of radius and ulna, 13% and 21% in proximal third of radius and ulna and 28% and 12% in lower third of radius and ulna respectively. This can be attributed to low velocity trauma, different manner of production of injury in our nation.

Anderson's criterion for union was taken into account to determine time of union. In our series we had an average union time of 13.56 weeks with range of 8 to 26 weeks. We had 100% union of both radius and ulna. The results of present study are comparable to previous studies and the same is depicted in Table.2.

**Table No. 2: Depicting comparative fracture union between the studies.**

Series	Union time (Weeks)	Range (Weeks)	Union (%)
Anderson <sup>5</sup>	7.4	5-10	97
Chapman <sup>7</sup>	12	6-14	98
Frankie L. <sup>4</sup>	17	8-36	100
Mc Knee <sup>16</sup>	10.7	5-18	97.3
Present study	13.56	8-26	100

Duration of surgery ranged between 60 to 90 minutes, with an average 77.83 minutes. The tourniquet time ranged from 40 to 60 minutes, with an average of 50.66 minutes. These findings could not be compared to the previous studies, as there was no data available in our literature search.

Apart from the rate of superficial infection and posterior interosseous nerve injury which were negligible high, rates of Nonunion and Radioulnar synostosis were similar to or even less than the study series of Frankie L <sup>4</sup>, Anderson <sup>5</sup> and Chapman MW <sup>11</sup>. We do not believe that infection or nerve injury is related to the method of fixation: but rather to level of fracture and the degree of comminution.

### CONCLUSION

Open reduction and internal fixation with narrow LC-DC plating is an excellent mode of fixations as it gives good result and minimizes the complication of non-union, refracture and synostosis. It is important for 6 cortices to be fixed on either side of fracture; however length of the plate shall depended on the degree of comminution. Site of ulnar plate application be on subcutaneous border and site of majority of radial plate application be on volar aspect.

We acknowledge the Dean, MVJ Institute, Bangalore for his encouragement & permission for this study.

**Conflict of Interest:** None declared.

**Source of Support:** Nil.

There are no financial assistance, direct or indirect concerned to this study. There are no sources of outside support for the project.

The ethical clearance, informed consent and permission was obtained by the head of the Institute

for the study and for publication, as it is the teaching institute all the cases will be operated with prior informed consent and permission.

### REFERENCES

1. Aljo a matejic, Milhovil Ivica, Mladen Tomljenovic. Forearm shaft fractures: results of ten- year follow-up. *Acta clin Croat* 2000; 39: 147-53.
2. Morgan, William J, Thomas F. Breen. Complex fractures of forearm. *Hand Clin* 1994; 10 (3): 375-90.
3. Dodge, Herbert S., Gerald W. Cady: Treatment of fractures of the radius and ulna with compression plates. *JBJS* 1972; 54-A (6):1167-76.
4. Leung, Frankie, Shew-Ping Chow. A prospective, randomized trial comparing the LC-DCP with the point contact fixator for forearm fractures. *JBJS* 2003; 85A (12): 2343--48.
5. Anderson LD, Sisk TD, Tooms RE, Park W, I III. Compression: Plate fixation in acute diaphyseal fractures of radius and ulna. *JBJS* 1975; 57-A: 287-97.
6. Routt, Chip M. L.: Forearm fractures. Chapter-14, In Orthopaedic trauma protocols, Sigvard T, Hausen, and Marc F. Swiontkoski, New York; 1993:121-24.
7. Chapman, Michael W.et.al., Compression plate fixation of acute fractures of the diaphysis of forearm. *J Bone & Joint Surg* 1989; 68(7):1008-16.
8. Burwell HN, Arnold D. Charnley: Treatment of forearm fractures in adults with particular reference to plate fixation. *JBJS* 1964; 46-B (3): 404-24.
9. Dodge, Herbert S., Gerald W. Cady: Treatment of fractures of the radius and ulna with compression plates. *J Bone & Joint Surg* 1972; 57-A: 287-97.
10. Moed, Berton R, Kellam James F, Foster Robert J, Tilemaa. Immediate internal fixation of open fractures of the diaphysis of forearm. *JBJS* 1986; 68 (7): 1008-16.
11. Chapman, Michael W, Gordon JE, Zissimos BS, Anthony G et al. Compression plate fixation of acute fractures of the diaphyses of radius and ulna. *JBJS* 1989; 71-A (2): 159-69.

12. Teipner, William A, Jeffrey W. Mast. Internal Fixation of Forearm Diaphyseal fractures: Double plating versus single compression plating. *Orthop Clin N Am* 1980; 1(3): 381-91.
13. Grace TG, Eversmann WW. Forearm fractures treated by rigid fixation with early motion. *JBJS* 1980; 62(3): 433-8.
14. Smith JE. Internal Fixation in the Treatment of Fractures of the shaft of Radius and Ulna in Adults. *JBJS* 1959; 41-B (1): 122-131.
15. Sarmiento, Augusto, Jack S. Cooper and William F. Sinclair. Forearm fractures. *JBJS* 1975; 57-A (3): 297-- 304.
16. Mcknee MD, Seiler JG, Jupiter JB. The application of limited contact dynamic compression plate in the upper extremity. Analysis of 114 consecutive cases. *Injury*, 1995; 26 (10): 661-66.

# Evaluation of Registered Visual Handicap Individuals in a District of Karnataka, India

Praveen Kumar Sadanand<sup>1</sup>, Jaishree Bembalkar<sup>2</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor, Department of Ophthalmology, BRIMS, Bidar

## ABSTRACT

**AIM:** To identify various ocular disorders leading to permanent visual disability in Bidar district of Karnataka based on visual handicap certification.

**Materials and Method:** Retrospective analysis of patients obtaining visual handicap certificate for complete blindness during 1st January 2009 to 31st December 2011 attending Ophthalmology outpatient department, Bidar Institute of Medical Sciences, Bidar was done. Information was retrieved and analysed with respect to cause of blindness, age, sex, place and reason for obtaining the certificate.

**Results:** 224 patients were certified as 100% blind who came for visual handicap certification. Age group ranged from 4yrs to 74yrs with 141males (62.9%) and 83 females (37.1%). Out of 448 eyes, corneal opacity (19.19% of eyes) was most common cause for blindness followed by phthisis bulbi (16.96%), congenital ocular anomalies (13.37%), glaucomatous optic atrophy (9.82%), absolute glaucoma (9.37%), retinitis pigmentosa (8.92%).

**Conclusion:** High number of corneal blindness and phthisis bulbi demands proper eye health education and early appropriate treatment. Increased prevalence of retinitis pigmentosa warrants genetic counselling. Screening and regular treatment of glaucoma patients should be of top priority. Male gender bias demands concern.

**Keywords:** Visual Handicap Certificate, Corneal Opacity, 100 % Blind

## INTRODUCTION

Registration as blind or partially blind in India is voluntary and is certified by duly constituted board that includes an Ophthalmologist. Prevention of visual impairment is an international priority, and its planning requires contemporary data regarding incidence and causes based on which priorities can be identified. However underregistration of the blind is a global problem<sup>1,2</sup>. It is also important to know whether the present certification system fulfils the need of all sections of the society. There have been no studies on the causes of visual handicap and reason for

obtaining visual handicap certificates in this area. This study may be useful to the governmental agencies to plan future strategies to prevent visual handicap and provide facilities for visual handicap in this area.

## MATERIALS AND METHOD

Patients attending Ophthalmology OPD at Bidar Institute of Medical Sciences, Bidar for visual disability certificate during 1<sup>st</sup> January 2009 to 31<sup>st</sup> December 2011 were retrospectively analysed. Patients with best corrected visual acuity <3/60 in better eye who were certified as 100% blind were included in the study.

A written consent and ethical committee clearance were obtained. The percentage of disability was calculated, based on the guidelines for the evaluation of various disabilities as proposed by Ministry of Social Justice and Empowerment depicted in Table 1. Three Ophthalmologists examined every case noting the cause of blindness, percentage of visual disability and

---

**Corresponding author:**

**Praveen Kumar Sadanand**

Assistant Professor

Department of Ophthalmology, Bidar Institute of Medical Sciences, Bidar, Karnataka

E-mail: drpravs@yahoo.co.in

Mob : 09591866086

the purpose of visual disability certificate which is recorded in the blindness register of the hospital. The diagnosis was based on the medical history, slit lamp

examination, tonometry, fundoscopy and B-scan were done as and when they were necessary.

**Table1. Categories of visual disability**

Best corrected visual acuity in better eye	Best corrected visual acuity in the worse eye	Percentage of impairment
6/18 -6/36	6/60 to nil	40
6/60 – 4/60 or field of vision 10 <sup>0</sup> to 20 <sup>0</sup>	3/60 to nil	75
3/60 to 1/60 or field of vision 10 <sup>0</sup>	Finger counting at 1ft. to nil	100
Finger counting at 1 ft. to nil or field of vision 10 <sup>0</sup>	Finger counting at 1 ft. to nil of field of vision 10 <sup>0</sup>	100

**RESULTS**

The study was conducted on 448 eyes of 224 individuals who were 100% blind. Age group ranged from 4yrs to 74yrs. There were 141 males(62.9%) and

83 (37.1%) females . 85 patients had no perception of light in both the eyes while 139 patients hand no perception of light in one eye and vision varying from 1/60 to 3/60 in better eye.

**Table2:Distribution of eyes according to the causative factor and sex:**

Cause	Male	Female	Total	Percentage of eyes
Corneal opacity	53	33	86	19.19
Phthisis bulbi	53	23	76	16.96
Glaucomatous optic atrophy	24	20	44	9.82
Absolute glaucoma	32	10	42	9.37
Retinitis pigmentosa	28	12	40	8.92
Microphthalmos	15	18	33	7.36
Anterior staphyloma	15	11	26	5.8
Anophthalmos	11	7	18	4.01
Complicated cataract	8	6	14	3.12
Optic atrophy	6	7	13	2.9
Congenital Leber’s	6	4	10	2.23
Macular dystrophy	4	6	10	2.23
Retinichoroidalcoloboma	5	4	9	2
Central choroiditis	6	3	9	2
Pathological myopia	6	-	6	1.33
Lens subluxation	4	-	4	0.89
Aphakic retinal detachment	2	2	4	0.89
CMV Retinitis	2	-	2	0.45
Diabetic retinopathy	2	-	2	0.45
	282	166	448	100

Leading causes of blindness ( Table 2 ) included corneal opacity (19.19% of eyes), phthisis bulbi (16.96%), glaucomatous optic atrophy(9.82%), absolute glaucoma(9.37%), congenital ocular anomalies(13.37%) in the form of microphthalmos(7.36%), anophthalmos (4.01%) and retinochoroidalcoloboma (2% ) and retinitis pigmentosa (8.92%).

<20yr age group(23.2%) had 32 males and 20 females and common causes for blindness were

microphthalmos (23 eyes), anophthalmos (14 eyes), congenital leber’s(10 eyes), macular dystrophy (10 eyes), retinochoroidalcoloboma (7 eyes),optic atrophy (10 eyes) and phthisis bulbi (18 eyes).

Age group between 21 to 40(22.3%) there were 35 males and 15 females with predominant causes being corneal opacity (27 eyes), phthisis bulbi(21 eyes), retinitis pigmentosa(16 eyes), anterior staphyloma(10 eyes), pathological myopic degeneration(6 eyes).



Between 41 to 60 year age group (32.2%) there were 47 males and 25 females and common causes of blindness were corneal opacity (41 eyes), phthisis bulbi (29 eyes), absolute glaucoma (19 eyes) and glaucomatous optic atrophy (24 eyes).

>60 year age group (22.3%) had 32 males and 18 females with common causes for blindness being absolute glaucoma (25 eyes), phthisis bulbi (19 eyes), glaucomatous optic atrophy (18 eyes) and complicated cataract (5 eyes).

Reasons for obtaining visual handicap certificates were, financial benefits (90 %), travel benefits (7%), educational benefit (2%) and employment benefit (1%). Most of the population belong to rural areas of Bidar district (85%).

## DISCUSSION

The WHO estimated that there were approximately 161 million visually impaired people all over the world, among whom 37 million were blind. Over 90% of the blind people lived in the developing countries<sup>4</sup>. Blindness and vision impairment remain major public health problems in India that need to be addressed<sup>5</sup>. Prevalence of blindness in the community provide important information related to the causes of blindness and contribute in formulating preventive strategies, providing low vision assistance and rehabilitation services. Providing a visual handicap certificate is a part of rehabilitation of a blind person. Data collected in this study may be helpful in planning strategies for rehabilitation and prevention.

This study deals with those blind persons who were certified totally blind following the criteria set by the Ministry of Social Justice and Empowerment for complete blindness. Our study included 224 patients with 141 males (62.9%) and 83 females (37.1%) which is comparable to Joshi S<sup>6</sup> with 56.9% males and 43.01% females.

Males predominated in all age groups which may be because of existing certification system which was institution based and hence a problem for access for the females could occur due to social and economic obstacles.

86 eyes had corneal blindness in the form of corneal scar. Majority of patients had bilateral corneal opacity suggesting vitamin A deficiency precipitated by measles or debilitation, ocular infections like

gonococcal conjunctivitis, corneal ulcers, penetrating ocular injury at work etc.,. Corneal blindness accounted for 19.29% of eyes in our study. A survey carried out in a tertiary eye care hospital, Hyderabad, India shown 11.6% patients had corneal opacities<sup>7</sup>. 13.99% patients had corneal blindness in study done by Rajesh Joshi<sup>6</sup>.

76 eyes had phthisis bulbi most of them following trauma, corneal ulcers, uveitis etc., indicating the need for protective eye wear, timely management of uveitis and keratitis. Our study found phthisis bulbi as second most common cause for blindness with 16.96% of eyes. Phthisis bulbi was most common cause in a study by S Ghosh<sup>8</sup> (17.74% of eyes).

In our study 22 patients (9.82%) had glaucomatous optic atrophy while 21 patients (9.37%) had absolute glaucoma. Only 4.04 % patients had glaucoma blindness in a study by Dadapeer<sup>9</sup> while 5.81% of eyes were involved in Ghosh et al<sup>8</sup>, and 12.7% in a study by Andrew (1997)<sup>10</sup>.

Congenital ocular anomalies in the form of microphthalmos (7.36%), anophthalmos (4.01%) and retinochoroidal coloboma (2%) were encountered. Congenital abnormalities worldwide account for severe visual impairment and blindness in 18% and 25.8% of blind school children in South and North India respectively<sup>11, 12</sup>. Study by Rajesh Joshi<sup>6</sup> encountered 13.61% and a study by Ghosh et al<sup>8</sup> encountered 38.7% of eyes.

20 patients (8.92%) of Retinitis pigmentosa were seen. Increased prevalence could be related to increased consanguineous marriages and lack of genetic counselling in the area<sup>13</sup>. A study done on retinitis pigmentosa patients in various states of India has shown an autosomal recessive, predominant inheritance pattern and >92% of cases in autosomal recessive category had positive history of consanguinity<sup>13</sup>. The clinical analysis of retinitis pigmentosa patients was beyond the scope of this study.

Only one patient with end stage diabetic retinopathy (0.45%) was registered as blind indicating elderly population with diabetes mellitus in this area may still be well controlled or are being treated elsewhere appropriately. In a study by Dadapeer<sup>9</sup>, 1.10% of cases had diabetic retinopathy while in study by Joshi<sup>6</sup>, 12.90% had constituted the group for blindness.



Compared to the findings of study of Bunce C and Wormald R (2008)<sup>1</sup>, the leading causes of certification for blindness and partial sight in England and Wales were age related macular degeneration (57.2%), glaucoma(10.9%), optic atrophy(3.1%) and hereditary retinal disorders (2.8%), while in a study by Avisar et al (2006)<sup>14</sup>, the causes of blindness in Israel were age related macular degeneration (28%), diabetic retinopathy(14.4%), glaucoma (11.8%), myopic maculopathy (7.4%), optic atrophy(6.5%). In our study corneal blindness (19.19%), phthisis bulbi (16.96%), glaucomatous optic atrophy (9.82%), absolute glaucoma (9.37%), retinitis pigmentosa (8.92%), congenital ocular anomalies (13.37%) were seen.

This study is only a data collected in a Government medical college hospital and not a community survey to give a true reflection of distribution of various causes of blindness. Protective wear while working in fields, prompt treatment of corneal ulcers and penetrating ocular injuries would help in reducing blindness. Few cases of corneal blindness could have been benefited by keratoplasty, necessitating the need for establishing eye bank in this area. We recommend similar type of study in other parts of the state and country to find out geographical differences in causes of visual handicap which could help in planning strategies for prevention and rehabilitation.

**Acknowledgement:** We would like to acknowledge the Director of the institute and Head of the department and other staff members of Ophthalmology department, Bidar Institute of Medical Sciences, Bidar.

**Ethical Committee Clearance:** was obtained. No funding was obtained.

**Conflict of Interest:** Nil

## REFERENCES

1. Bunce C, Evans J, Fraser S, Wormald R. BD8 Certification of visually impaired people. Br.J.Ophthalmol. 1998; 82:72-6.
2. Barry RJ, Marray PI. Unregistered visual impairment: Is registration a failing system? Br.J.Ophthalmol 2005; 89: 995-8.
3. Guidelines for evaluation of various disabilities and procedures for certification. The Gazette of India extraordinary part 1: section 1:No.154.
4. Resuikoff S, Pascolini D, Etyale D, Kocur I Pararajasegaram R, Pokharel GP. Global data on visual impairment in the year 2003. Bull World Health Organ 2004; 82: 844-51.
5. Thulasiraj RD, Nirmalan PK, Ramakrishnan R, Krishnadas R, Manimekalai TK, Baburajan N P et al. Blindness and vision impairment in a rural South Indian population: The Aravind Comprehensive Eye Survey. Ophthalmology, 2003 Aug; 110(8); 1491-98.
6. Rajesh S Joshi. Causes of visual handicap amongst patients attending outpatient department of a medical college for visual handicap certificate in Central India- Journal of Clinical Ophthalmology and Research. Jan-April 2013 –vol1, Issue 1.
7. Herse P, Gothwal VK. Survey of visual impairment in an Indian Tertiary Eye Hospital. Indian J. Ophthalmol 1997; 45:189-93.
8. Sambuddha Ghosh, Subhalakshmi Mukhopadhyay, Krishnendu Sarkar, Manas Bandyopadhyay, Dipankar Maji, Gautam Bhaduri. Evaluation of registered visually disabled individuals in a district of West Bengal, India. Indian J. Of Community Medicine, July 2008, Vol 33, Issue 3; 168-171.
9. Dadapeer Kareem Sab, Niranjana Mambally Rachaiah, Balasubramanya. The prevalence of the leading causes of Certification for blindness and partial sight in the Hassan district of Karnataka, India. Journal of Clinical and Diagnostic Research 2011 Dec, Vol-5(8): 1624-1626.
10. Andrew R. Potter. Causes of blindness and visual handicap in the Central African Republic. Br.J. Ophthalmol 1997, 75: 326-328.
11. Hornby SJ, Adolgh S, Gothwal VK, Gilbert CE, Dandana L, Foster A. Evaluation of children in six blind schools of Andhra Pradesh. Ind. J. Ophthalmol. 2000; 48:195-200
12. Titiyal JS, Pal N, Murthy GV, Gupta SK, Tandon R, Vajpayee R B et al. Causes of temporal trends of blindness and severe visual impairment in children in schools for the blind in North India. Br. J. Ophthalmol 2003; 87:941-5.
13. Vinchurkar M S, Sathye SM, Dikshit M. Retinitis pigmentosa genetics: A study in Indian population. Ind.J. Ophthalmol 1996; 44:77-82
14. Avisar R, Friling R, Snir M, Avisar I and Weinberger D. Estimation of the prevalence, incidence rates and the causes of blindness in Israel, 1998-2003. IMAJ; 8:880-81

# A Comparative Study of Oral Seven Day of Metronidazole Versus Tinidazole in Bacterial Vaginosis

Manisha Gupta<sup>1</sup>, Amita Sharma<sup>2</sup>, Geeta Gupta<sup>3</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Professor, Department of Obstetrics and Gynaecology, <sup>3</sup>Assistant Professor, Department of Microbiology, Santosh Medical College & Hospital, Ghaziabad, U.P.

## ABSTRACT

**Background:** Metronidazole has been the mainstay of treatment of BV. However, its drawback is the necessity to administer multiple doses of drug, thereby diminishing the compliance which results in risk of incomplete cure and recurrence of BV. Tinidazole, having a longer half life than metronidazole makes it suitable for a single dose therapy.

**Objective:** To compare the efficacy of single dose of tinidazole with 7 days metronidazole for treatment of bacterial vaginosis and compare side effects of the drugs.

**Study design:** This was a prospective, comparative, randomized clinical trial on 200 Indian women who attended a gynecology outpatient department with complaint of abnormal vaginal discharge or who had abnormal vaginal discharge on Gynecological examination but they did not complaint of it. For diagnosis and cure rate of bacterial vaginosis, Amsel's criteria were used.

**Result:** There were no significant differences between the treatment arms. Overall cure rates at 14 days were 72.1% in the metronidazole group whereas 78.1% in the tinidazole group. There were no significant differences in adverse events across treatment arms.

**Conclusions:** There were no significant differences in cure rates of metronidazole and the tinidazole dosing regimens studied. In addition, there were no important differences in the side effect profiles of metronidazole and tinidazole.

**Keywords:** Bacterial Vaginosis; Metronidazole; Tinidazole

## INTRODUCTION

Bacterial vaginosis (BV) is a complex vaginal infection most commonly associated with women of child-bearing age. It is associated with complications including preterm delivery of infants, pelvic inflammatory disease (PID), and acquisition/transmission of sexually transmitted diseases (STDs) including human immunodeficiency virus (HIV)<sup>(1,2)</sup>. Control of BV has been advocated as a means of decreasing the prevalence of these complications. The mainstay of BV therapy has been metronidazole, 500 mg by mouth twice daily or 750 mg extended release by mouth once daily for seven days. Alternatives to oral metronidazole include: vaginal therapies with 2% clindamycin or 0.75% metronidazole. Recurrence within three months is common and is associated with 30%–40% of all cases of BV<sup>(3)</sup>.

Tinidazole, an antimicrobial agent initially used for *Trichomonas vaginalis* infections has also been shown to be effective for BV. With a favorable pharmacokinetic profile and reduced side effects, tinidazole is an alternative agent for BV treatment. There are minimal head-to-head comparative data to establish tinidazole's superiority to metronidazole or other therapeutic agents. Available data suggest tinidazole has a role in special populations particularly for refractory or relapsing BV. We compared the efficacy of single dose of tinidazole with 7 days metronidazole for treatment of bacterial vaginosis and compared side effects of the drugs.

## MATERIALS AND METHOD

Women who attended the Santosh Hospital with symptomatic BV (as determined using a modified

Amsel criteria <sup>(4)</sup> were invited to participate in the study. Subjects were required to have a vaginal pH of >4.5, a positive “whiff” test result, and clue cells noted by microscopic evaluation to be eligible. Women were excluded from the study if they were pregnant or breast-feeding, allergic to metronidazole or tinidazole, had an STD that required treatment, or had HIV infection or other chronic disease. Patients were also excluded if they had received antibiotic or antifungal drugs within the past 14 days. The diagnosis of BV was later confirmed by a Nugent score above seven on bacteriological analysis of the preinclusion vaginal samples. The study was approved by the Ethics Committee of Santosh Hospital.

Subjects were administered standardized questionnaires about symptoms and a comprehensive sexual history. A pelvic examination was performed and specimens collected for vaginal pH, microscopy and Gram stain.

After signed informed consent the patients were randomized into two different groups in 1:1 ratio receiving oral metronidazole 400 mg twice a day for 7 days, or a single oral dose of 2 gm tinidazole. The dosing of both treatments was based on review of the literature.

Follow-up visit was conducted at day 14 of the study. At the follow-up visit, a standardized questionnaire was administered, a pelvic examination was conducted and specimens for the diagnosis of BV were collected. Microbiological cure was defined as a Nugent score of less than 7. Clinical improvement was defined as normalization of two of three criteria (pH, whiff test, and clue cells) and cure was defined as normalization of all three. The persistence of two or more abnormalities constituted clinical failure.

**Statistical analyses**

The proportion cured of BV at the 14 day follow-up visit (7 days after completion of therapy) was compared between the metronidazole and 2g

tinidazole group using the chi-square test of proportions and exact confidence intervals were computed. Descriptive statistics of the population such as age and religion were compared between the treatment arms by the t test. For all analyses a p value of <0.05 was considered statistically significant.

The proportion of women experiencing an adverse event was compared across the two treatment groups by the Fisher’ exact test for each type of event and for overall events.

**RESULTS**

Overall two hundred patients were enrolled into the study. At follow-up after 14 days, in the metronidazole group, 14 subjects were excluded from the analysis because 2 had a pre-existing protocol violation, 11 withdrew from the study, and 1 was withdrawn for pregnancy. In the tinidazole 2 gm once group 16 subjects were excluded from the analysis because 6 had a pre-existing protocol violation and 10 withdrew from the study.

The demographic characteristics of subjects by randomized treatment group are shown in Table 1. There were no significant differences with respect to race and age.

Cure rates defined by Nugent score are shown in Table 2. Percent treatment failure rates and 95% confidence intervals for metronidazole and tinidazole 2 gm for the 14 day visit were 27.9 (19.5, 38.2) and 34.5(25.2,45.2) respectively. Overall the cure rate was 68.8% at the 14 day follow-up visit. There was no statistical difference in clinical cure or improvement as measured by individual Amsel criteria among the two treatment arms. Cure or improvement was seen in 76.2%, and 78.1% of the subjects in the metronidazole and tinidazole 2 gm arms respectively at the 14 day visit. Adverse events associated with each treatment arm are displayed in Table 3. There were no significant differences in adverse events across treatment arms.

**Table 1: Demographic characteristics of subjects by randomized treatment group (n (%))**

Characteristic	Metronidazole (400mg twice a day for 7days)	Tinidazole (Single 2gm dose)	P value
<b>Religion</b>			
Hindu	56 (65.1)	50 (59.5)	0.52
Muslim	30 (34.9)	34 (40.5)	
Age	25.8± 4.47	26.0± 3.37	0.38

**Table 2: Primary outcome, as defined by Nugent criteria, after completion of therapy by randomized treatment group (N (%))**

Nugent Score(14 day follow-up visit)	Metronidazole (400mg twice a day for 7days)	Tinidazole (Single 2gm dose)	P value
≥7	24/86 (27.9)	29/84 (34.5)	0.4
<7	62/86 (72.1)	55/84 (65.5)	

**Table 3: Frequency of initial treatment emergent events by randomized treatment group among those reporting at least one adverse event \***

Event	Metronidazole (400mg twice n(%))	Tinidazole (2g n(%))	P value
Nausea/vomiting	12 (38.7)	16 (42.1)	0.8
Bad taste	5 (16.1)	7 (18.4)	1.0
Diarrhea	3 (9.7)	2 (15.2)	0.6
Anorexia	5 (16.1)	8 (21.1)	0.8
Headache	5 (16.1)	9 (23.6)	0.5
Total Number of Subjects with at Least 1 Adverse Event	31	38	

\*Subjects can experience more than one adverse event; the percents represent the number of subjects with that incident event out of the total number of individuals in each treatment group who experienced at least one adverse event.

## DISCUSSION

Antibiotic therapy is the mainstay of management of BV. Antimicrobials are directed at altering the abnormal flora by killing some of the organisms vital to the maintenance of BV. Treatment is then generally followed by a reversion to more typical, normal flora. This change is accompanied by the disappearance of signs and symptoms characteristic of BV.

Tinidazole, a 5-nitroimidazole similar to metronidazole but with a longer half-life and more favorable side effect profile has been used for decades in Europe. Recently it was licensed in the U.S. first for treatment of trichomoniasis and giardia and later for treatment of BV.

The indication for BV was based on a tinidazole versus placebo trial in which superior efficacy was demonstrated by tinidazole for the 1 g once daily for 5 days regimen (36.8% cured,  $P < .001$ , number needed to treat 3.2) and for the 2 g once daily for 2 days regimen (27.4% cured,  $P < .001$ , number needed to treat 4.5), when compared with placebo (5.1% cured) in the primary endpoint analysis. Using more traditional criteria for cure, efficacy was greater. Compliance with study therapy and tolerability were comparable in the three treatment groups<sup>(3)</sup>.

Oral tinidazole appears to be an effective drug for BV and is equivalent in effectiveness to clindamycin. One trial with a small sample size of 32 participants provided this evidence and it concluded that the short

term, 2g single oral dose tinidazole was at least as effective as 7-day of vaginal clindamycin. The sequential treatment of tinidazole and acidic vaginal gel was superior to vaginal clindamycin in lowering vaginal pH and achieving a higher laboratory tests normalization rate at 1-month follow-up<sup>(5)</sup>. In our study overall cure rates at 14 days were 72.1% in the metronidazole group whereas 78.1% in the tinidazole group.

In two studies where a single 2g dose of tinidazole was compared to oral metronidazole at 500mg BID  $\times$  7 days, oral metronidazole produced slightly higher efficacy rates<sup>(6,7)</sup>. In the Buranawarodmkul study, efficacy rates were 86% and 92% for tinidazole vs. metronidazole, respectively. The Sanz-Sanz study produced efficacy rates of 65% and 74% for tinidazole vs. metronidazole, respectively. Although a single 2g dose of tinidazole appears more effective than a single 2g dose of metronidazole, it may be slightly less effective than seven days of metronidazole.

The efficacy of two regimens of tinidazole (500 mg twice daily or 1 g twice daily for 7 days) was compared with metronidazole 500 mg twice daily for 7 days in a randomized trial recently. No significant difference was found in treatment failure rates (Nugent score  $\geq 7$ ) between tinidazole (27% for the 1 g regimen and 25% for the 500 mg regimen) and metronidazole (18%) at the 14-day follow-up visit. Similarly, short-term recurrence rates at the 2-month follow-up visit were not significantly different (40%, 20%, and 34%

respectively)<sup>(8)</sup>. Similarly, we found no differences in cure rates between metronidazole and tinidazole dosing regimen. Of note, our regimen is similar to those approved by the FDA. In addition, there were no significant differences in the side effect profiles of metronidazole and tinidazole

### CONCLUSION

Tinidazole is an effective option in patients with BV used instead of 7 days of metronidazole because of better compliance of tinidazole as a single-dose therapy. It should also be considered for patients with difficult to treat BV who have had multiple treatment regimens or suppressive therapy with either metronidazole or clindamycin.

**Acknowledgement:** The authors are thankful to the patients attending obstetrics and gynaecology OPD, Santosh Medical College & Hospital, Ghaziabad and took part in the present study for their co-operation.

**Source of Funding:** Nil.

**Conflict of interest:** None declared.

### REFERENCES

1. Eschenbach DA. Bacterial vaginosis and anaerobes in obstetric-gynecologic infection. *Clin Infect Dis* 1993;16:S282-S7. [PubMed: 8324132]
2. Martin H, Richardson BA, Nyange PM, Lavreys L, Hillier SL, Chohan B, et al. Vaginal lactobacilli, microbial flora, and risk of human immunodeficiency virus type 1 and sexually transmitted disease acquisition. *J Infect Dis* 1999;180:1863-8. [PubMed: 10558942]
3. Livengood CH 3rd, Ferris DG, Wiesenfeld HC, et al. Effectiveness of two tinidazole regimens in treatment of bacterial vaginosis: a randomized controlled trial. *Obstet Gynecol.* 2007;110(2 Pt 1): 302-309
4. Amsel R, Totten PA, Spiegel CA, Chen KCS, Eschenbach D, Holmes KK. Non-specific vaginitis: diagnostic and microbial and epidemiological associations. *Am J Med* 1983;74:14-22.
5. Milani M, Barcellona E, Agnello A. Efficacy of the combination of 2g oral tinidazole and acidic buffering vaginal gel in comparison with vaginal clindamycin alone in bacterial vaginosis: A randomised, investigator blinded, controlled trial. *European Journal of Obstetrics, Gynaecology, and Reproductive Biology* 2003;109:62-71..
6. Buranawarodomkul P, Chandeying V, Sutthijumroon S. Seven day metronidazole versus single dose tinidazole as therapy for nonspecific vaginitis. *J Med Assoc Thai* 1990;73:283-7.
7. Sanz Sanz F, Hernanz A, Sanchez E. Comparative trial of metronidazole versus tinidazole in the treatment of nonspecific vaginitis. *Rev Esp Obst y Gin* 1985;44:717-20.
8. Schwebke JR, Desmond RA. Tinidazole vs metronidazole for the treatment of bacterial vaginosis. *Am J Obstet Gynecol.* 2011;204:211. e1-e6



# Effectiveness of a Planned Teaching Programme for DOTS Providers on Tuberculosis and its Related Quality of Life

Jenifer D'Souza<sup>1</sup>, Radha Aras<sup>2</sup>, Christopher Sudhakar<sup>3</sup>

<sup>1</sup>Professor, Yenepoya University, Mangalore, Karnataka, <sup>2</sup>Professor, Department of Community Medicine, Yenepoya Medical College, Mangalore, Karnataka, <sup>3</sup>Professor and Dean, Manipal College of Nursing, Bejai, Mangalore

## ABSTRACT

**Background:** Tuberculosis (TB) is a major public health problem in most parts of India, including Karnataka. Being a chronic disease it affects the quality of life (QOL) of the patients and their families. Directly Observed Treatment Short course (DOTS) providers under Revised National Tuberculosis Control Programme (RNTCP) have an important role in educating clients as they receive DOTS. An awareness of tuberculosis and its impact on the QOL of clients is thus very imperative for DOTS providers.

### Objectives:

1. To determine the knowledge of DOTS providers in both the experimental and control group on TB and its related QOL.
2. To find the effectiveness of the planned teaching programme in terms of gain in post tests knowledge scores.

**Methodology:** A quasi experimental study was conducted at selected DOTS centers at Mangalore. A total of 50 DOTS providers were selected and randomly assigned into the control and experimental group during the period April 2010 and December 2012. The pretest knowledge of DOTS providers were assessed by a structured knowledge questionnaire and an intensive health education was given to the DOTS providers. The post test was conducted after 7th, 30th, 90th, and 180th day. After every post test the planned teaching program was reinforced.

**Results:** The mean post test knowledge of DOTS providers on the 7th day after the planned teaching programmes and then at the 30th, 90th and 180th day was significantly higher in the experimental group than the control group. The Obtained F value [F (4,96) =484.517, p<0.05] showed that the teaching programme was effective to improve knowledge of DOTS providers.

**Keywords:** Tuberculosis, Effectiveness, Planned Teaching Programme, DOTS providers, Quality of life

## INTRODUCTION

Tuberculosis is an ancient disease which has long been a major health challenge in the world and remains

---

### Corresponding author:

Jenifer D'Souza

Professor

Department of Community Health Nursing, Laxmi Memorial College of Nursing, A.J. Towers, Balmatta, Mangalore, Dakshina Kannada, Karnataka -575002.

Email id: jenyvd@rediffmail.com

a major public health problem in most developing countries. It ravaged mankind for centuries. Perhaps the human race has never had a deadlier enemy than tuberculosis<sup>1</sup>. Between 0.1 – 0.3% of the population in the developed world becomes infected each year. In the developing world, the annual infection rate is 20 – 50 times higher than the former. It is estimated that every year between 20-50 million developed TB and three million die. Put another way, the bacillus causes more than 5000 deaths every day or one about every 15 seconds<sup>2</sup>.



India accounts for nearly 1/5<sup>th</sup> of the global burden of tuberculosis. Every year approximately 2.2 million persons develop tuberculosis of which about 1 million are new smear positive, highly infectious cases and about five lakh people die of TB every year, which implies that every minute three persons becomes sputum positive cases and every 90 seconds one person dies due to tuberculosis<sup>3</sup>.

Tuberculosis is a chronic disease. Chronic diseases disproportionately affect persons and are associated with disability and increased costs for health care and long-term care, thus affecting the quality of life.

With the advent of chemotherapy and improved treatment since 1993, India has successfully implemented the Revised National Tuberculosis Control Programme (RNTCP) using DOTS strategy. In spite of having improvised treatment for TB, the burden of TB still exist in the country. DOTS providers are the key persons under RNTCP. Knowledge of TB and how it affects the QOL of the sufferers is of paramount importance for the DOTS providers to understand and counsel the clients as they receive DOTS.

A study carried out in Ujjain, Madhya Pradesh to assess the knowledge, attitude and practice of DOTS providers under RNTCP revealed that only 56.9% had good knowledge of TB<sup>4</sup>. Another study carried out on DOTS providers at Meerut District revealed that only 20% of DOTS providers were good in their performance at the DOTS centers<sup>5</sup>. Yet another study conducted at Tamilnadu attempted to find the feasibility of Community DOTS providers for tuberculosis treatment in HIV infected individuals, concluded that there is a need for greater health education and training on tuberculosis for community DOTS providers<sup>6</sup>.

## MATERIAL AND METHOD

The study was conducted from April 2010 to December 2012 at Mangalore Taluk of Karnataka State

in India, using a quasi experimental design with a sample of 50 DOTS providers, who were randomly assigned into the experimental and control group. The criteria for selection of the DOTS providers were that they had been trained under RNTCP, were between the age group of 20-60 years and who knew Kannada/English. The sample was approached after giving explanation and with informed consent for the study. A structured knowledge questionnaire was used to collect the Data.

The tool consisted of two parts: Part I: Baseline Performa of the DOTS provider

Part II: Structured Knowledge Questionnaire (36 items).

The tool was validated by 5 experts and was also tested for reliability. To ascertain the reliability of the tool, the tool was administered to 5 DOTS providers (Test- Retest method). Internal consistency of the questionnaire was assessed by Cronbach's Alpha. The coefficient of reliability obtained was 0.8628 (calculated by using SPSS 11.5 Version). Hence the tool was found to be reliable.

The tool was administered to the sample of both the experimental and control group at the DOTS centers to assess their pretest knowledge. A planned teaching programme was given to the DOTS providers in the experimental group after the pretest knowledge was assessed. The post test was administered after 7days, then at 30<sup>th</sup>, 90<sup>th</sup> and 180<sup>th</sup> day to the experimental group. After each post test the planned teaching was reinforced. The findings were analyzed by SPSS for windows statistical software 16.0 version.

## RESULTS

**Baseline Characteristics of the Sample:** The description of the baseline characteristics of the sample are as shown in Table 1.

Table 1: Distribution of Sample as per their Baseline Characteristics.

E=25, C=25

Baseline Characteristics	Experimental Group (E)(%)	Control group (C)(%)
<b>Age (in years)</b>		
20-30	8 (32)	9(36)
31-40	13(52)	11(44)
41-50	4(16)	4(16)
51-60	-	1(4)
<b>Gender</b>		
Male	1(4)	1(4)
Female	24(96)	24(96)
<b>Religion</b>		
Hindu	21(84)	21(84)
Muslim	3(12)	2(8)
Christian	1(4)	2(8)
<b>Educational Status</b>		
SSLC	6 (24)	12(48)
PUC	9(36)	9(36)
Diploma	7(28)	3(12)
Graduate	2(8)	1(4)
Professional	1(4)	-
<b>Marital Status</b>		
Single	4(16)	7(28)
Married	21(84)	18(72)
Divorced/ Separated	-	-
Widowed	-	-
<b>Years of experience</b>		
<1	8	10
1-3 years	7	7
3-5 years	4	2
>5	6	6
<b>Appropriate No. on patients attended to</b>		
≤10	11(44)	18(72)
11-20	8(32)	6(24)
21-30	3(12)	1(4)
31-40	2(8)	-
≥40	1(4)	-

Table 2: Range, Mean, Median, SD of pretest and post test knowledge scores of DOTS providers in the experimental and control group.

E=25, C=25

Group	Parameter	Range	Mean	Median	SD
E	Pretest	5-25	13.4	15	6.7
	Post test 1	16-34	23.8	25	4.9
	Post test 2	15-34	23.1	22	5.5
	Post test 3	15-35	24.1	24	5.2
	Post test 4	15-35	25.6	25	4.3
C	Pretest	6-30	12.9	11	6.2
	Post test 1	7-28	13.8	12	5.8
	Post test 2	7-28	14.6	13	5.5
	Post test 3	8-30	14.9	13	5.5
	Post test 4	8-28	14.9	14	5.2

The data in table 2 shows that the pretest mean in the experimental group was 13.4 and post tests mean at 7<sup>th</sup> day, and then at the 30<sup>th</sup>, 90<sup>th</sup> and 180<sup>th</sup> day was 23.8, 23.1, 24.1 and 25.6 respectively. There was however no much difference in the pretest and post test means in the control group. This indicates that the planned teaching programme was effective in improving the knowledge of DOTS providers in the experimental group on tuberculosis and its related quality of life.

### Testing of hypothesis

In order to test the significant difference in pretest and post tests knowledge scores the following null hypothesis was formulated.

H<sub>01</sub>: There is no significant difference in pretest knowledge score and post test scores at the 7<sup>th</sup>, 30<sup>th</sup>, 90<sup>th</sup> and 180<sup>th</sup> day.

The Repeated measures ANOVA test was used to test the hypothesis. The first step was to check for the sphericity.

**Table 3: Mauchly's Test of Sphericity**

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon <sup>b</sup>		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Exp_time	.308	26.419	9	.002	.617	.693	.250

The obtained p value was 0.002 which was lesser than the tabled value at 0.05 level of significance; hence the assumption of sphericity was not met. Hence the

Greenhouse-Geisser value was considered i.e., p=0.617, which is lesser than the tabled value at 0.05 level of significance.

**Table 4: Tests of Within-Subjects Effects**

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Exp_time	Sphericity Assumed	2411.440	4	602.860	103.392	.000
	Greenhouse-Geisser	2411.440	2.467	977.475	103.392	.000
	Huynh-Feldt	2411.440	2.771	870.135	103.392	.000
	Lower-bound	2411.440	1.000	2411.440	103.392	.000
Error(Exp_time)	Sphericity Assumed	559.760	96	5.831		
	Greenhouse-Geisser	559.760	59.208	9.454		
	Huynh-Feldt	559.760	66.512	8.416		
	Lower-bound	559.760	24.000	23.323		

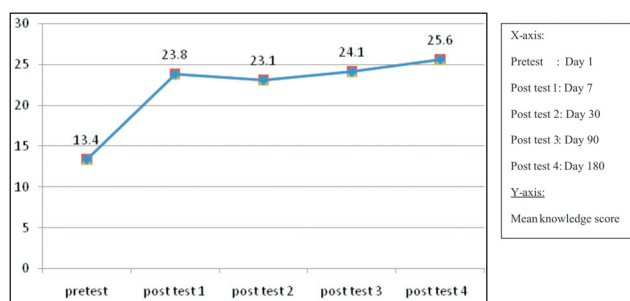
From the above table it was seen that the F value =103.392 which was greater than the tabled value at 0.05 level of significance. Hence the null hypothesis

that there was no significant difference between the post test knowledge at 7<sup>th</sup>, 30<sup>th</sup>, 90<sup>th</sup> and 180<sup>th</sup> day was rejected.

**Table 5: Tests of Between-Subjects Effects**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	60500.000	1	60500.000	484.517	.000
Error	2996.800	24	124.867		

The Obtained F value [F (4, 96)=484.517, p < 0.05] showed that the teaching programme was effective to improve knowledge of DOTS providers.



**Fig. 1.** Line Diagram showing the mean knowledge score of DOTS providers regarding TB and its related quality of life in the pretest and post tests.

In Fig 1 it is seen that there is a significant gain in knowledge from pretest to post test 1. From post test 1 to post test 2, there is a slight decrease in knowledge, and then a consistent increase from post test 3 and 4. This shows that the teaching programme was effective to improve knowledge of the DOTS provider.

## DISCUSSION

In this study, most of the DOTS providers (48%) were in the age group of 31-40 years. A contrasting finding was observed in a study to evaluate the role of DOTS providers conducted at Tamilnadu, where 44% of the DOTS providers were above 40 years<sup>6</sup>. In this study majority (98%) of DOTS providers were females. This finding is similar to a study conducted in Patiala (2012), where 74% of the DOT providers were females<sup>7</sup>.

The present study revealed that majority (38%) had average / poor knowledge on TB and its related quality of life. Only two percent had excellent knowledge. Similar findings were found in another study which showed that the DOTS providers' awareness on TB and DOTS was not satisfactory<sup>4</sup>. A study conducted at Nairobi, Kenya also revealed significant gaps in the TB knowledge among the DOTS providers<sup>8</sup>. However contrasting findings were found in a study conducted in Ujjain, Madhya Pradesh where it was found that 56.9% of DOTS providers had good knowledge of tuberculosis<sup>4</sup>.

## CONCLUSION

Tuberculosis is a growing problem in the developing world. With the impact of urbanization, overcrowding, poverty and malnutrition tuberculosis

has still a long way to go towards eradication. With the advent of RNTCP much has been done towards the control of this disease. The DOTS providers have to be adequately trained regarding different aspect of the disease and its affect on quality of life. The planned teaching programme given by the investigator was found to be effective in enhancing the knowledge of the DOTS providers on TB and its related Quality of life.

**Acknowledgement:** The authors acknowledge the cooperation of the DOTS providers who have patiently and willingly consented to be a part of this study.

**Conflict of Interest:** Nil

**Funding Sources:** Self- funding.

**Ethical Clearance:** Ethical approval was obtained from the institutional ethical committee (Yenepoya University, Mangalore, Karnataka) before the start of the study.

## REFERENCES

1. Sri, S. (1990). Textbook of Pulmonary and Extra pulmonary Tuberculosis, 2<sup>nd</sup> edition, Mehta Offset Works, New Delhi.
2. WHO, Research for action: Understanding and controlling tuberculosis in India. WHO, Regional office for South East Asia, New Delhi, 2000: 33-40.
3. Singh M.M (2000). Indian Journal of TB, 47, 127-129.
4. Jain M, Chakole SV, Pawaiya AS, Mehta SC. Knowledge Attitude and Practice Of DOTS providers under RNTCP in Ujjain, Madhya Pradesh. Natl J Community Med 2012; 3(4): 670-4.
5. Gupta S. A study of performance of DOT Providers in Meerut District. Indian Journal of clinical practice, Vol 22, No.8, Jan 2012: 400-03.
6. Suhadev M, Swaminathan S, Rajasekaran S, Thomas B, Arunkumar N, Muniyandi M, et al. Feasibility of Community DOT Providers for tuberculosis treatment in HIV infected individuals-A pilot study. Indian J Tuberc 2005;52:179-183

7. Kaur A, Balgir RS, Kaur P, Gupta V. Knowledge and attitude of DOTS Providers in tuberculosis unit of Patiala. *Online J Health Allied Scs.* 2012;11(2):3 Available at URL:<http://www.ojhas.org/issue42/2012—2-3.htm>
8. Chakaya J, Meme H, Kwamanga D, Githui W, Onyango-Ouma W, Gicheha C, et al. Planning for PPM-DOTS implementation in urban slums in Kenya: knowledge, attitude and practices of private health care providers in Kibera slum, Nairobi. *Int J Tuberculosis Lung Dis*, 2005 Apr; 9(4):403-8.

# Factors Affecting Exclusive Breastfeeding, after Counselling at a Rural Health Centre

G Sarat Chandra<sup>1</sup>, A Sri Hari<sup>2</sup>, C Susheela<sup>3</sup>

<sup>1</sup>PG, <sup>2</sup>Associate Professor, Department of Pediatrics, Sri Devaraj Urs Medical College, Kolar, Karnataka, <sup>3</sup>Professor, Department of Pediatrics, Vydehi Institute of Medical Sciences and Research Centre, Bangalore, Karnataka

## ABSTRACT

**Background:** Adequate nutrition during infancy is essential to ensure the growth, health, and development of children to their full potential. Even with its known advantages, breastfeeding rates are sub-optimal the world over. Objectives are to identify the reasons mothers give for stopping exclusive breastfeeding, to know the common breastfeeding problems and intervention factors effecting breastfeeding. Methods: a prospective survey was conducted on mothers delivered in RLJH & RC attached to SDUMC, Kolar from January 2011 to December 2011 or 500 mothers (whichever is earlier). These mothers and relatives were counselled immediately after delivery about the merits of breastfeeding. A 3-step questionnaire is followed.

**Conclusion:** Our study recorded an increasing trend towards initiation of breastfeeding. Mothers parents and in-laws were found to be influential in the decision making process of child rearing practices. Postnatal counselling brought down top feeding for the first 3 days. Timely intervention in the form of postnatal counselling to both family and the mother was found to be effective. Primigravida status was noted to significantly affect breastfeeding. Psychological factors, social beliefs, caesarean section and breast and nipple problems are significant reasons that mothers give for not breastfeeding exclusively. Cultural and traditional practices have considerable implications on breastfeeding, and in the overall well-being and health of the mother and the infant. Breastfeeding programs should take into account traditional beliefs and concepts when communicating with families about practices such as food restriction and food avoidance.

**Keywords:** Breastfeeding, Counseling

## INTRODUCTION

Breastfeeding is fundamental to the health and development of a child and important for the health of the mother. Breastfeeding is natural, natural is good but what is natural may not be easy.<sup>1</sup> However natural the process may be, a mother must still be taught what to do if her baby refuses to suckle, if her nipples hurt, or if her milk seems to be diminishing. This short,

prospective study was undertaken to identify factors that adversely affected efficient breastfeeding in the perinatal period. Based on these factors breastfeeding counseling can be more effective and focused.

## MATERIAL AND METHOD

Booked cases in RLJH received antenatal counselling about breast feeding in 3<sup>rd</sup> trimester. Being a referral tertiary care hospital, RLJH & RC, most cases were booked and counselled antenatal in PHC's or other private hospitals. These mother's relatives were counselled immediately after delivery about the merits of breastfeeding. Mothers received postnatal counselling on merits of breastfeeding in the postnatal wards till they are discharged. Study period is from

---

### Corresponding author:

G Sarat Chandra

PG in MD Pediatrics

Department of Pediatrics, Sri Devaraj Urs Medical College, Kolar, Karnataka

Email: saratgullapalli@gmail.com



January 2011 to December 2011 or 500 mothers (whichever is earlier). It's a prospective, observational survey. A 3-step questionnaire is followed: a. Early postnatal questionnaire (0-3 days). b. 3 months postnatal questionnaire. c. 6 months postnatal questionnaire.

**Exclusion criteria**

- a. IUD/ Neonatal death.
- b. Mothers of neonates that were shifted to ICU care were excluded.
- c. Mothers who are retro-viral positive.
- d. Mothers on anti-malignancy, antipsychotic or anticonvulsive drugs.

**RESULTS**

**Table 1. Reasons for improper feeding practices according to mothers at the end of 6 months period.**

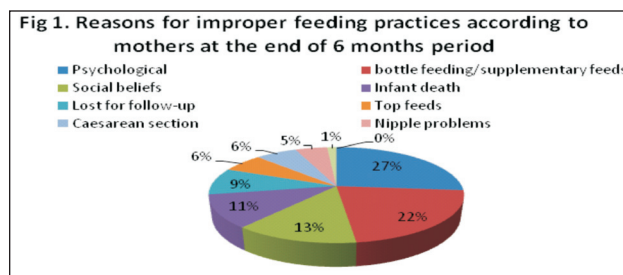
(In chronological order)

Reason	Number
Psychological	38
bottle feeding/supplementary feeds	31
Social beliefs	19
Infant death	16
Lost for follow-up	13
Top feeds	09
Caesarean section	09
Nipple problems	07
Breast engorgement	02
Total	144

**Table 2. Comparison of other similar studies on exclusive breastfeeding and its initiation.**

	Unicef India 2006-2010 statistics	Unicef India study Jharkhand (Dular program)	Our study	Leung et al (Hong Kong)
Breastfeeding initiation rate	41%	95 %	92.4 %	66.7 %
Breastfeeding according to WHO recommendation	46%	82 %	71.2 %	13.4 %

Results based on the first batch of questionnaires (0-3 days of age) comprising 500 mothers revealed a very high breastfeeding rate for the first month of age. The second batch of questionnaires (3 months of age) showed gradual decrease in breastfeeding rate. Nonetheless, the rate reached the lowest by the fourth and fifth month of age according to the third batch of



**DISCUSSION**

The evidence on the benefits of exclusive breastfeeding is unequivocal. A large fraction of the surveyed mothers were aware of these benefits. In 2001, WHO based on a systemic review of scientific evidence [19] recommends exclusive breastfeeding to newborns through to 6 months of age. [1] Breastfed infants are known to grow optimally, perform better on developmental assessment tests and have lesser allergies and infections as compared to formula fed infants [2-5]. Even with its known advantages, breastfeeding rates are sub-optimal the world over [6-8].

Despite a breastfeeding initiation rate of 92.4%, only 71.2% of our breastfeeding mothers met WHO recommendations (to practice exclusive breastfeeding for the initial 6 months). Initiation of breastfeeding is in accordance with the Dualr program in Jharkhand by UNICEF [9-11]. This can be explained as the study was conducted in a rural area whereas UNICEF INDIA 2006-2010 statistics showed a lower initiation rate as they considered both urban and rural population. Leung et al (Hong Kong) is exclusively done in an urban population, hence showed a very low initiation rate.

questionnaire (6 months). This is in contrary to a study conducted by WTK Lee et al [10], where they recorded a very low breastfeeding rate for the first month of age. This trend is attributed to the use of formula feeding which is regarded as trendy, sophisticated and convenient, especially for working mothers. [12]

**Table 3. Comparison between the Urban and Rural Populations in breastfeeding practices.**

	WTK Lee et al (urban population in Hong Kong)	Our study (rural population)
Lowest rates of breastfeeding observed	0-3 months	4-6 months
Breastfeeding percentage at the end of 3 <sup>rd</sup> month	5.8 %	89%

The focus of a large number of studies has been on factors that lead to lower breastfeeding rates. There is enough evidence to show that lack of information for mothers; poor knowledge amongst health workers; under qualified health workers providing advice and the use of didactic lectures adversely affects breastfeeding [6, 13, 14]. Increasing knowledge and counselling skills of health workers and providing additional written instructions to mothers have been shown to improve breastfeeding rates [8, 15, 16].

**Table 4. Reasons for not following the WHO recommendation. In chronological order as compared to an urban centre study**

WTK Lee et al	Our study
Restricted food varieties	Psychological
sore nipple and breast engorgement	bottle feeding/ supplementary feeds
perceived home confinement	Social beliefs
perceived inadequate milk supply	Infant death
	Top feeds
	Caesarean section
	Nipple problems
	Breast engorgement

Our study recorded an increasing trend towards breastfeeding, which is encouraging. Factors influencing these mothers to breastfeed included: Intervention in the form of counselling, knowledge about breastfeeding, feelings of responsibility and closeness to baby, and encouragement and support from the family, as seen in WTK Lee et al. Husbands were regarded the most influential on initiation and duration on breastfeeding in the study conducted by WTK Lee et al [10]. This is mainly due to the nuclear status of the families in Hong Kong. Whereas in our study parents and in laws were more influential. Counselling was the most informative about breastfeeding; despite nurses being the major source of such information, advice from doctors was evidently more popular. [10]

Discarding colostrum as “witch milk” is a common practice in the rural population of Karnataka. Postnatal counselling on colostrum have helped mothers and her family realise its importance and in turn brought down top feeding for the first 3 days. Cultural and traditional practices have considerable implications on lactation and breastfeeding, and in the overall well-being and health of mothers and infants.

Older maternal age, higher birth order, and group counselling also had a positive impact. [17] Caesarean section with delay in shift of the mother from post-operative ward for nursing the child also consists of a significant amount, in our study. Identification of maternal factors that adversely affected breastfeeding in perinatal period would help us to pay more attention to these ‘high risk’ mother-infant pairs and provide them more focused counselling and support. This would, in turn, ensure a good start for the mother-infant pair and result in better breastfeeding rates in the long run.

The perinatal period was chosen deliberately as the effect of antenatal counselling would be at maximum during this period. Apart from continuing support from hospital staff, there would be maximum peer support in the postnatal ward. Moreover, most of the cases visiting our hospital were booked and immunized at local public health centres and other private clinics.

Of 500 cases forming the final study group, 207(41.4%) were primigravida while 293 (58.6%) mothers had at least one live birth prior to the present one, as compared to *Narayan, Natarajan and Bawa* which had a smaller study group of 54 cases out of which 19(35.2%) were primigravida.

**Table 5. Percentage of primigravida included in our study, as compared with a similar smaller study**

	Narayan, Natarajan and Bawa	Our study
Primi gravid	35.2%	41.4%

Our study revealed primigravida status, maternal age <20 years to adversely affect breastfeeding which is in agreement with a study by *Narayan, Natarajan and Bawa*. Parity is a factor affecting breastfeeding. Mothers’ breastfeeding for the first time need more support as noted by other studies [18, 19, 20]. Lower maternal age and low birth weight are also mentioned

in literature as factors adversely affecting breastfeeding rates [19-21]. But Murray and co-workers reject any relationship between problems faced by breastfeeding mothers and parity [22]. In a study from Singapore, no association was found between primigravida status and exclusive breastfeeding at 6 weeks age [7].

Maternal education and sex of the infant and the birth to observation interval did not affect breastfeeding in our study. In a study of age at first breast feed in Shimla, Vatsayan and co-workers reported that maternal education did not have any influence [23]. Giovannini and co-workers evaluated 1061 mothers to determine the prevalence of breastfeeding in Italy and failed to find any association between maternal age, profession, education, rooming-in practices and breastfeeding [24]. Our study population also seems to behave similarly.

Our study has the drawback of having only a small group of mothers who received antenatal counselling at our hospital. Though primigravida status, social beliefs and customary practices emerges as factors adversely affecting breastfeeding it would be prudent to strengthen and focus our breastfeeding counselling and support services on primigravidas, younger mothers and their families till there is evidence to the contrary.

### CONCLUSION

Our study recorded an increasing trend towards initiation of breastfeeding. Mothers parents and in-laws were found to be influential in the decision making process of child rearing practices. Postnatal counselling brought down top feeding for the first 3 days. Timely intervention in the form of postnatal counselling to both family and the mother was found to be effective. Psychological factors, social beliefs, caesarean section and breast and nipple problems are significant reasons that mothers give for not breastfeeding exclusively. Cultural and traditional practices have considerable implications on lactation and breastfeeding, and in the overall well-being and health of mothers and infants. Breastfeeding programs should take into account traditional beliefs and concepts when communicating with families about practices such as food restriction and food avoidance.

A further study is merited to understand how these individual factors might lead to low initiation and early cessation of breastfeeding. Findings from the survey

serve as a cornerstone to understand the evolution of breastfeeding practice in rural areas of India.

**Acknowledgement:** The authors are thankful to Department of obstetrics and gynaecology and department of paediatrics of R L Jalappa Hospital, Kolar, for providing clinical material and follow-ups.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** Study approved by the ethical committee of Sri Devaraj Urs Medical College, Tamaka, Kolar.

### REFERENCES

1. Apple, Rima D. (1987). *Mothers and Medicine. A Social History of Infant Feeding, 1890–1950*. Wisconsin: University of Wisconsin Press. Page 3-7
2. Dewey KG, Heinig MJ, Nommsen LA, Peerson JM, Lonnerdal B. Growth of breast-fed and formula-fed infants from 0-18 months: the DARLING study. *Pediatrics* 1992;89:1035-40
3. Florey CDV, Leech AM, Blackhall A. Infant feeding and mental and motor development at 18 months of age in first born singletons. *Int J Epidemiol* 1995;24:521-6.
4. Heery LB. Exclusive breastfeeding for at least 4 months protects against otitis media. *Pediatrics* 1994;93:537-8.
5. Saarinen UM, Kajosaari M. Breastfeeding as prophylaxis against atopic disease: prospective follow-up study until 17 years old. *Lancet* 1995;346:1065-9.
6. Rasheed S, Siddiqui I, Baig LA. Decline in breast feeding, who is to be blamed ? ! ! A study of knowledge, attitude and practice of breast feeding amongst nurses. *J Pak Med Assoc.* 2000;50:108-11.
7. Chye JK, Lim CT. Breastfeeding at 6 months and effects on infection. *Singapore Med. J* 1998, 39:551-6.
8. Hoyer S, Horvat L. Successful breast-feeding as a result of a health education programme for mother. *J Adv Nurs* 2000;32:1158-67.
9. Dennis CL. Breastfeeding initiation and duration: a 1990-2000 literature review. *J Obstet Gynecol Neonatal Nurs* 2002;31:12-32.
10. Kong SK, Lee DT. Factors influencing decision to breastfeed. *J Adv Nurs* 2004;46:369-79.

11. Leung TF, Tam WH, Hung EC, Fok TF, Wong GW. Sociodemographic and atopic factors affecting breastfeeding intention in Chinese mothers. *J Paediatr Child Health* 2003;39:460-4.
12. Abada TS, Trovato F, Lalu N. Determinants of breastfeeding in the Philippines: a survival analysis. *Soc Sci Med* 2001; 52:71-81.
13. Freed GL, Clarke SJ, Cefalo RC, Sorenson JR. Breast-feeding education of obstetrics-gynecology residents and practitioners. *Am J Obstet Gynecol* 1995;173:1607-13.
14. Freed GL, Clark SJ, Sorenson J, Lohr JA, Cefalo R, Curtis P. National assessment of physician's breastfeeding knowledge, attitudes, training, and experience. *JAMA* 1995;273:472-6.
15. Rea MF, Venancio SI, Martines JC, Savage F. Counseling on breast feeding: assessing knowledge skills. *Bull World Health Organ* 1999;77:492-8.
16. Cattaneo A, Buzzetti R. Effect on rates of breast feeding of training for the baby friendly hospital initiative. *Br Med J* 2001;323:1358-62.
17. Dodgson JE, Tarrant M, Fong DY, Peng XH, Hui WH. Breastfeeding patterns of primiparous mothers in Hong Kong. *Birth* 2003;30:195-202.
18. Perez-Escamilla R, Himmelgreen D, Segura-Millan S, Gonzalez A, Ferris AM, Damio G, et al. Prenatal and perinatal factors associated with breastfeeding initiation among inner-city Puerto Rican women. *J Am Diet Assoc* 1998;98:657-63.
19. Kieffer EC, Novotny R, Welch KB, Mor JM, Thiele M. Health practitioners should consider parity when counseling mothers on decisions about infant feeding methods. *J Am Diet Assoc* 1997;97:1313-6.
20. Breast feeding in the 1990s : Review and implications for a Global Strategy. Based on the Technical Meeting, WHO/ UNICEF, Geneva 25-28 Jun 1990.
21. Protecting, promoting and supporting breastfeeding: The special role of maternity services – A joint WHO/UNICEF statement, Geneva, 1989.
22. Murray D, Ryan F, Keane E. Who's holding the baby ? – women's experience of their postnatal care. *Ir Med J* 2000; 93:148-50.
23. Vatsayan A, Gupta AK, Dhadwal D, Ahluwalia SK, Sharma R, Sood RK. Age during breast feeding and timely suckling. *Indian J Pediatr* 1996; 63:791-4.
24. Giovanni M, Banderali G, Agostoni C, Riva E. Epidemiology of breast feeding in Italy. *Adv Exp Med Biol* 2001; 501:529-33.

# Misconceptions and Beliefs Regarding Cataract Surgery and Outcome of the Cataract Surgery in a Rural Community of Uttar Pradesh

Singh A<sup>1</sup>, Dwivedi S<sup>2</sup>, Dabral S B<sup>3</sup>, Bihari V<sup>4</sup>, Rastogi A K<sup>5</sup>, Kumar D<sup>6</sup>

<sup>1</sup>Associate Professor, Department of Community Medicine, Rohilkhand Medical College and Hospital, Bareilly, UP, India, <sup>2</sup>Professor and Head, <sup>3</sup>Ex-Professor and Head, Department of Community Medicine, <sup>4</sup>Ex-Professor and Head Department of Ophthalmology, <sup>5</sup>Assistant Professor, Department of Community Medicine, MLN Medical College, Allahabad, UP, India, <sup>6</sup>Assistant Professor-cum-Statistician, Department of Community Medicine, Government Medical College and Hospital, Sector-32, Chandigarh, India

## ABSTRACT

**Background:** Misconceptions and wrong beliefs about the cataract surgery may keep away the blinds from recovery as the cataract is the major cause of the blindness in the country and as the majority of the cataract blindness cases are curable therefore with this view we had carried out the study with the following objectives.

**Objectives:** To study the misconceptions and beliefs regarding cataract surgery and to study the outcome of the surgery performed among the cases of cataract in the study area.

**Materials and method:** A cross sectional study was conducted at Jasra and Saidabad blocks, Allahabad during 2003-04 among 9736 population of total 8 villages selected by multistage random sampling technique, the data was analyzed with SPSS Software. Chi (x<sup>2</sup>) Square test was used to know the significance of the results.

**Results:** Among 9736 surveyed population 931 persons were suffering from eye diseases, out of which 390 cases were of cataract among which only 79 (20.26%) had undergone cataract surgery. Out of these majority 73 (18.72%) had surgery done by an eye surgeon. Out of total cataract cases 139 (35.64%) were afraid of surgery while 63 (16.15%) cases can not afford the cost, followed by 33 (8.46%) cases who told that it might cause total vision loss. Out of total cases 35.64% had got only symptomatic relief followed by 27.14% cases who had recovered completely. Majority of 47(59.49%) cases were not satisfied and only 18 (22.78%) were completely satisfied by cataract surgery and 58 (73.42%) underwent the surgery free of cost.

**Conclusion:** By assessing misconceptions, outcome of surgery, level of satisfaction and cost of surgery in rural community we can draw certain inferences to formulate policies and implement blindness control programme in these regions separately to achieve national goal of blindness control as earliest as possible.

**Keywords:** Cataract, Surgery, Misconceptions, Beliefs, Outcome

## INTRODUCTION

The World Health Organization (WHO) estimates that 17.6 million people are blind from cataract<sup>1</sup>. Cataract causes about 48% of all blindness<sup>1</sup>. Cataract

blindness can be easily treated, yet most sufferers are unable to afford or access treatment. The number of cataract cases is likely to double in the next 20 years due to the ageing world population. More also needs to be done to prevent and treat the disease<sup>2</sup>. In some developing countries, the rate of cataract surgery is less than 250 operations per million people per year. This compares to a rate of up to 8,000 in some developed countries<sup>3</sup>. Cataract surgery is considered to be one of the most cost-effective forms of health intervention<sup>3</sup>.

---

### Corresponding author:

**Arun Singh**

Associate Professor

Department of Community Medicine, Rohilkhand Medical College and Hospital, Bareilly, UP, India,

Email: arunspm@gmail.com

Mobile: +919956008272



The estimated number of people visually impaired in the world is 285 million, 39 million blind and 246 million having low vision; 65% of people visually impaired and 82% of all blind are 50 years and older<sup>4</sup>.

Whereas in South East Asia Region 15 million blinds are there and 0.7 million children are blind. India has 6.8 million blind out of 39 million blind present in the world<sup>5</sup>. Thus India has world's largest burden of blindness<sup>6</sup> and it may be due to its sheer population size. The cataract surgical rate in India is 3400 surgeries per one million population per year<sup>5</sup>.

Globally the principal causes of visual impairment are uncorrected refractive errors and cataracts, 43% and 33 % respectively. Other causes are glaucoma 2%, age related macular degeneration (AMD), diabetic retinopathy, trachoma and corneal opacities all about 1%. A large proportion of causes 18% are undetermined<sup>4</sup>.

The causes of blindness are cataract 51%, glaucoma 8%, AMD 5%, childhood blindness and corneal opacities 4%, uncorrected refractive errors and trachoma 3%, and diabetic retinopathy 1%, the undetermined causes are 21%<sup>4</sup>.

As per Survey conducted by National Programme for Control of Blindness in 2001-02, prevalence of blindness is estimated to be 1.1%. The prevalence of Blindness is 1% (2006-07 Survey)<sup>7</sup>.

Main causes of blindness are Cataract (62.6%) Refractive Error (19.70%) Corneal Blindness (0.90%), Glaucoma (5.80%), Surgical Complication (1.20%) Posterior Capsular Opacification (0.90%) Posterior Segment Disorder (4.70%), Others (4.19%). Estimated National Prevalence of Childhood Blindness /Low Vision is 0.80 per thousand<sup>7</sup>.

These details and data make the picture clear that major portion of blindness magnitude is due to cataract which is a curable eye health problems. But people especially from rural areas of the country are not aware about the cause of the cataract and other eye diseases they also do not know about the availability of eye health care facilities especially cataract surgery nearest to their residence. In India it is observed that blindness is more common in rural than urban areas, more in females than in males, and more amongst the poor than rich. Many people lose their eyesight because of eye

care and treatment by quacks. The basic social factors are ignorance, poverty, low standard of personal and community hygiene and inadequate health care services also affects the outcome of treatment and cataract surgery. Therefore to control blindness in the country especially in rural areas and other areas with high prevalence of blindness we can assess the magnitude of misconceptions and beliefs about cataract surgery and its outcome among the cases in which it had already performed. Carrying out such type of studies we can utilize the results and inferences drawn to formulate policies and implement programmes to control blindness and to provide health education to the under risk population. This particular type of studies will also provide vision to eradicate ignorance related with cataract surgery which will also motivate person blinded due cataract to get the proper cataract surgery from hospitals specialized with cataract management.

## MATERIALS AND METHOD

This cross-sectional study was conducted in the rural areas of district Allahabad. A multistage random sampling technique was adopted to select the study subjects. Out of three regions, trans-Ganga (rural), city (urban) and trans-Yamuna (rural) at the first stage a sample of one block from each rural region was selected randomly. A block is covered by Community Health Centre or Primary Health Centre in the district. Within each selected first stage unit (block), a sample of two PHCs or new PHCs was drawn randomly as second stage units. From each selected second stage unit, one Sub Centre was selected by random sampling in order to have a sample of four Sub Centres as third stage units. From each selected Sub Centre, a sample of two villages was drawn by random sampling technique. In this way a sample of eight villages was available as fourth and last stage units. Within villages selected at the previous stage, the entire population 9736 (1602 households) was covered by house to house survey for a period of one year from May 2003 to April 2004. All members in the households of selected villages were surveyed and comprised study unit. The study tools used for survey were measuring tape, weighing machine, torch, stethoscope, Anaeroidmeter, Snellen's chart, ophthalmoscope, and tonometer. The information was collected using predesigned, pretested questionnaires on background



characteristics like age, gender, socioeconomic status and education. The general medical history was collected and all respondents were examined clinically for eye diseases. The persons having ocular problems were referred to an ophthalmic specialty hospital (Manohar Das Eye Hospital, Allahabad) for confirmation of diagnosis and further treatment. Cataract cases were diagnosed using torch. And thus confirmed cataract cases were interviewed for misconceptions and beliefs regarding cataract surgery, person who performed surgery, degree of satisfaction with the surgery, cost of the surgery. Modified Prasad's Social classification as updated by A K Agarwal was applied for socioeconomic status<sup>8</sup>. The WHO definition for blindness i.e. social blindness (VA < 3/60 or its equivalent in the better eye with best corrected visual acuity) was used<sup>9</sup>. The data was analyzed with the help of SPSS (12.0) software and the Chi-square test was used to know the level of significance.

### RESULTS

The study was carried out among 9736 population out of which 931 person were suffering from different eye diseases and among these cases of eye diseases 390 were due cataract. In the present study out of total eye diseases 677 (72.72%) cases were blind having visual acuity less than 3/60 in the better eye. Overall blindness was 6.95%, Male blindness was 6.27%, female blindness was 7.73%. Among these 677 blind cases cataract was the commonest cause of blindness for 386 (57.02%) including 220 (57%) females and 166 (43%) males. The prevalence of cataract observed in the present study is 4.01%. In the present study out of 390 cataract cases the ocular morbidity due to cataract was higher 222(56.92%) among females than in males 168(43.08%). Prevalence of overall cataract blindness was 3.96%, female and male cataract blindness was 2.26% and 1.71%.

Among these maximum 173 (44.36%) cases were found in the age group of 60-70 years followed by 106 (27.81%) cases in 70-80 years, 39 (10%) in 50-60 years, 36 (9.23%) in 80-90 years and 4 (1.03%) in 20-30 and 30-40 years and 2 (0.51%) cases each were found in the 0-10 and 10-20 years age groups.

Out of total cases of cataract 152 (38.97%) were belonging to class V followed by class IV 107(27.44%)

class III 76(19.49%) class II 46 (11.79%) and 9 (2.31%) belonged to class I.

**Table 1: Cataract surgery**

Misconceptions and beliefs	No. of cases	Percentage
Fear of surgery	139	35.64
Not safe for health	14	3.59
Causes total vision loss	33	8.46
**Inevitable part of ageing	23	5.90
Cataract surgery is costly	63	16.15
Performed in big cities only (distance)	13	3.33
Don't know about this type of surgery	20	5.13
Against God's will	6	1.54
Already taken advantage of cataract surgery	79	20.26
Total cases of cataract	390	100

\*\*Blindness due to cataract is inevitable part of ageing

Table1 shows the misconceptions and beliefs prevalent among the cases of cataract only. Out of the total 390 cases of cataract only 79 (20.26%) had undergone cataract surgery. Among the remaining 139 (35.64%) were afraid of surgery while 63 (16.15%) cases stated that they could not afford the cost. The next group of 33 (8.46%) cases who told that it might cause total vision loss followed by 23 (5.90%) cases who thought that blindness due to cataract was inevitable part of ageing process and 20 (5.13%) cases of cataract did not know anything about this type of surgery followed by 14 (3.59%) cases who told that the surgery was unsafe for health. Next group was of 13 (3.33%) cases who told that it was performed only in big distant cities and only 6 (1.54%) cases of cataract told that it was God's will that was why we had the disease.

**Table 2: Cataract surgery performed by**

Persons doing cataract surgery		
Eye surgeon	73	18.72
General practitioner	4	1.03
Others (Jholachhap, Quacks)	2	0.51
No surgery	311	79.74
Total cases of cataract	390	100

Table2 also shows that no surgery was performed in 311 (79.74%) cases. Only 79 (20.26%) patients underwent surgery. Out of these majority 73 (18.72%) had surgery done by an eye surgeon followed by general practitioner 4 (1.03%). In 2 (0.51%) patients surgery was performed by quacks.

**Table 3: Outcome after treatment**

Outcome after treatment	No. of cases	Percentage
Full recovery	21	26.58
Partial recovery	10	12.66
Only symptomatic relief	28	35.44
No improvement	20	25.32
Total	79	100

Table 3 shows the outcome of the treatment among the cases who had taken any type of treatment. Out of total cases, 28(35.44%) had got only symptomatic relief followed by 21(26.58%) cases who had recovered completely. There were 20(25.32%) cases who told that there was no improvement from the treatment, while 10(12.66%) cases told that they had got only partial relief by the treatment.

**Table 4: Degree of satisfaction from treatment**

Satisfied by the facilities and treatment	No. of cases	Percentage
Fully satisfied	18	22.78
Partially satisfied	14	17.72
Not satisfied	47	59.49
Total	79	100

The table 4 shows the degree of satisfaction by the cases who had taken any type of treatment. Majority of 47(59.49%) cases were not satisfied and only 18 (22.78%) were completely satisfied by the treatment they had received. There were 14(17.72%) such cases who got partial satisfaction with the facilities and treatment received.

**Table 5: Cost of cataract surgery**

Cost of surgery (Rs.)	No. of cases	Percentage
1000-2000	13	16.46
500-1000	6	7.59
<500	2	2.53
Free of cost	58	73.42
Total cataract surgeries	79	100

Table 5 shows the cost of cataract surgery for the patients undergoing operation. The maximum number 58 (73.42%) got the surgery and treatment free of cost. The remaining 13 (16.46%) patients spent between Rs. 1000-2000 only for surgery and treatment, while 6 (7.59%) spent between 500-1000 and 2 (2.53%) spent less than Rs. 500 only.

## CONCLUSION

Although there have been considerable reduction in global, national, state wide blindness and even in district level blindness still the present study is

alarming for further reduction in blindness as the present study had shown that even today in the light of information technology /scientific evolution people of the study area are still following the old tradition to get treatment even for a more than 90% curable eye disease like cataract. According to the present study 79.74% cataract cases were not underwent any surgery for cataract. For this there are many misconceptions and beliefs regarding cataract surgery are prevalent in the rural community of the country like fear for surgical procedures (35.64%) in the eyes, fear for total loss of vision (8.46%) due to cataract surgery, beliefs like loss of vision is inevitable process of ageing (5.90%), the surgery is unsafe for health (3.59%), surgery is performed only in big distant cities(3.33%), cataract is God's will (1.54%). And some people (5.13%) in the present study having cataract did not know anything about such type of surgery and the availability of surgery near to their habitat which indicates that the advertisement and facilities of the cataract surgery even in modern days not reached to the needy rural population. Cost of cataract surgery (16.15%) is also a big obstacle on the way of cataract surgery itself. Due to which people with cataract are not approaching to the eye health care facilities near to them to get cured from cataract as these cases can not afford the cost of cataract surgery. In the presence of these misconceptions and beliefs in the minds of cataract cases even in the areas where eye health care institutions are equipped with the facilities of cataract surgery people will not be benefitted. Therefore central government should formulate policies to implement health education regarding eye diseases to make aware people with eye problems also to sensitize them with eye care facilities and cataract surgeries and other surgeries useful and capable to restore their vision. So that they can utilize available resources and eye health care facilities/eye hospitals fully. This will also increase coverage of population by institutions. Thus success of national blindness control programme guaranteed.

**Acknowledgement:** I am thankful to Resident doctors, Pharmacists and paramedical staff of Manohar Das Eye Hospital, Allahabad for their continuous support for making diagnoses and for providing treatment to the cases of eye diseases of the present study.

**Conflicts of Interest:** None declared

**Source of Support:** Nil

**Ethical Clearance:** Ethical clearance was taken from Institutional Ethics Committee (IEC) of MLN Medical College & Hospital, Allahabad, UP, India

## REFERENCES

1. Eye Disease Information, VISION 2020, 2007 [www.v2020.org/Eye\\_disease/index2.asp](http://www.v2020.org/Eye_disease/index2.asp)
2. Cataract Blindness: Challenges for the 21st Century, WHO Bulletin, 2001,79 (3), pp 249-250 [http://www.who.int/ncd/vision2020\\_actionplan/documents/vol79.no.3.249-256.pdf](http://www.who.int/ncd/vision2020_actionplan/documents/vol79.no.3.249-256.pdf)
3. State of the World's Sight, Vision 2020: The Right to Sight, VISION 2020,2005, Executive summary, pp 9-10, full report, pp 27-30 [http://www.v2020la.org/english/docs/State% 20of% 20the%20World's%20Sight.pdf](http://www.v2020la.org/english/docs/State%20of%20the%20World's%20Sight.pdf)
4. World Health Organization. Global Data on Visual Impairments 2010. accessed on 22-04-2013 from [http://www.who.int/blindness/GLOBAL DATAFINALforweb.pdf](http://www.who.int/blindness/GLOBALDATAFINALforweb.pdf)
5. World Health Organization (WHO 2002). Health Situation in the South-East Asia Region 1998-2000, New Delhi.
6. National Programme for Control of Blindness. Childhood Blindness NPCB India. accessed on 22-04-2013 from <http://npcb.nic.in/writereaddata/mainlinkfile/File240.pdf>
7. National Programme for Control of Blindness accessed on 22-04-2013 from <http://www.npcb.nic.in/index.asp>
8. Agarwal AK. Social classification: The need to update in the present scenario. Indian J Community Med. 2008;33:50-1 accessed on 22-04-2013 from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2782230/>
9. World Health Organization. Vision 2020. Global Initiative for the Elimination of Avoidable Blindness : action plan 2006-2011 accessed on 22-04-2013 from [http://www.who.int/blindness/Vision2020\\_report.pdf](http://www.who.int/blindness/Vision2020_report.pdf)

# Effect of National Rural Health Mission on Rural Mothers and Community Leaders

Veena M Chandavri<sup>1</sup>, Chhaya Badiger<sup>2</sup>

<sup>1</sup>Department of Extension and Communication Management, <sup>2</sup>Professor in Department of Extension and Communication Management. University of Agricultural Science, Dharwad College of Rural Home Science, Dharwad

## ABSTRACT

Health is fundamental to national progress in any sphere. In terms to resources for economic development, nothing can be considered of higher importance than the health of the people. The present study was conducted during the year 2010-2011 in Dhrwad block of Karnataka state. Purposive random sampling technique was used for selection of four blocks in Dharwad taluk i.e Garag, Mugad, Alnavar and Hebballi where the Primary Health Centres are located. Random sampling procedure was used for selection of 210 respondents, which includes 150 mothers of below poverty line, 30 community leaders and 30 block level health official. Community leaders had most favourable opinion about polio vaccine, polio disease, benefits of hospital delivery, immunization for children and pregnant women (100%). Majority of the mothers facing problem in Prasooti Araike Programme (96.66%) like they are not getting incentives in time. Majority of the community leaders faced problems were untimely implementation of the programmes and no improvement in the infrastructure of PHC neglecting the patients by the staff (90.00%). Cent per cent of the officials faced the problem of lack of knowledge and awareness. Amongst all independent variables caste was significant with knowledge at 5% level. Education was significant with awareness at 5% & knowledge at 1% level, while size of land holding was negatively significant with opinion at 5% and adoption at 1% level.

**Keywords:** ANM : Axillary Nurse Midwife PHC: Primary Health Center CHC: Community Health Center

## INTRODUCTION

The recent incentive of the government in direction to enhance the service delivery of the health care is 'National Rural health Mission(2005-2012)', which seeks to provide effective healthcare to rural population throughout the country with special focus on 18 states, which have weak public health indicators and/or weak infrastructure. These 18 states are Arunachal Pradesh, Assam, Bihar. Chhattisgarh, Himachal Pradesh, Jharkhand, Jammu & Kashmir, Manipur, Mizoram, Meghalaya, Madhya Pradesh, Nagaland, Orisa, Rajasthan, Sikkim, Tripura, Uttaranchal and Uttar Pradesh. Also it seeks to address the inter-state and inter-district disparities, especially among the 18 high focus states, including unmet needs for public health infrastructure. For the efficiency of industry and agriculture, the health of the work is an

essential consideration; however the loss caused by morbidity is enormous. To this must be added the expenditure to the individual and the state in the provision of medical care. The causes of this low state of health are many including lack of a hygienic environment conducive to healthful living. The causes of this low state of health are many including lack of a hygienic environment conducive to healthful living, low resistance to infections primarily due to poor nutrition.

In a developing country like India maternal morbidity and maternal mortality existing since a long period of time and as a result of these the Government has taken various steps to fight with these deep-rooted problems. India was the first country to adopt the family planning programme in the world. In late 1960s family planning was integrated with public health

programme and known as family welfare programme. One fifth of the world's shares diseases are in India, there are huge regional disparities in health standards in the country and huge gaps in health care infrastructure, in rural areas a lot therefore, need to be done in these areas. India committed to achieve the millennium health development goals set for 2012 which includes reducing infant and child mortality rate by two thirds and reduction of maternal mortality rates by three quarters.

The National Rural Health Mission to carry out necessary architectural correction in the basic health care delivery system. The mission adopts a synergist approaches by relating health to determinants of good health viz, segments of nutrition, sanitation, hygiene and safe drinking water it also aims at mainstreaming the Indian systems of medicine to facilitate health care. The plan of action includes increasing public expenditure on health, reducing regional imbalance in health infrastructure, pooling resources, integration of organizational structure, optimization of health manpower, decentralization and district management of health programmes, community participation and ownership of assets, induction of management and financial personnel into district health system and operationalizing community health centres into functional hospitals meeting Indian Public Health Standards in each Blocks of the country.

The goal of the mission is improve the availability and access to quality health care by people, especially for those residing rural areas, the poor, women and children. While monitoring frame work under National Rural Health Mission is being developed. Efforts have made strengthening Indian Public Health Standards. In view of the above mentioned facts, the present study on impact of National Rural Health Mission on rural mothers and children has been taken up with the following objectives.

1. To know the awareness and opinion level of community leaders.
2. To know the extent of Participation of community leaders in different health programmes
3. To study the problems and suggestions for effective execution of the programmes by rural mother, community leader and health officials.

## MATERIALS AND METHODOLOGY

List of villages and Primary Health Centers were selected in consultation with the District Health Officer (DHO) and with other Health Departments. Four Primary Health centers were selected randomly from Dharwad block viz., Garag, Mugad, Hebballi and Alnavar. The study was carried out in 4 villages of Dharwad block and total 210 samples were selected randomly. Total stakeholders included 150 rural mother beneficiary, 30 community leaders and 30 block level officials and field level functionaries.

## RESULT AND DISCUSSION

Table 1 indicates that awareness about the health programmes by community leaders and implementation of the programmes. Cent per cent of the community leaders knew about family planning, immunization for mother and pulse polio vaccine followed by 86.66 per cent madilu kit, 80.00 per cent Janani Suraksha Yojana (80.00%) and Prasooti Araiike (73.33%). Reasons might be family Planning polio and immunizations for babies are very old and popular programmes. Hence the cent per cent awareness. All other programmes are new and officials making these programmes popular through personnel group and mass approach. The findings of the present study were similar to those of Kansal *et al* (2009).

Table 2 indicates that opinion of community leaders about selected health programmes. Community leaders had most favourable opinion about polio vaccine, polio disease, benefits of hospital delivery, immunization for children and pregnant women (100%). Community leaders also opined 83.33 per cent that birth rate has increased and death rate has decreased in their villages. Community leaders had favourable opinion towards control of iodine and iron deficiency diseases followed by the noticeable services of PHCs. They are not happy with the services of vans 108 as it is misused by the villagers. The total opinion index was 81.11. The overall index is quite high i.e. 81.11 per cent.

Table 3 indicates that Participation of community leaders in different health programmes. It is clear that majority of community leaders were participated in financial assistance for extension and maintenance of



hospital (90.00%) followed by 86.66 per cent conducting meeting for staffs (86.66%) and 80.00 per cent helping people who do not get incentives in time. Participation of community leaders was high in financial assistance for extension and maintenance of hospital, conducting meeting for PHC staff, helping people to get incentives in time followed by informing the village people about immunization by announcing issuing the BPL card to the people and financial assistance to PHC. Community leaders participation in different stages of health programmes is very much appraisable. The findings of the present study were similar to those of Kumar *et al.* (2009)

Table 4 depicts that suggestions for the effective execution of programme by rural mothers. Majority of the mothers suggested that improvement in Janani Suraksha Yojana, Family planning programme (94.66%) followed by Iodine and vitamin A (90.00%) and 66.00 per cent Prasooti Arai ke Programme. In family planning mothers said proper education is essential for the whole family. While in Janani Suraksha Yojana mothers suggested to provide well equipped labour room, timely monitoring and supervision by the staff. To avoid Iodine and Vitamin A deficiency individual contacts are very essential along with mass media. Provide incentives at the right time, well equipped labour room, timely monitoring and supervision followed by they also suggested the incentives of these programmes for the 3<sup>rd</sup> and 4<sup>th</sup> delivery also.

Table -5 gives details about suggestions given by community leaders. Majority of the community leader's suggested under Madilu Kit programme, give

the kit in time was their main (96.00%) suggestion followed by educating the villagers for small family norms (93.00%) also they suggested that more staff members are to be provided to the PHC as it is need of the day (83%). Further they suggested that incentives should be provided at the right time before and after delivery as well as all deliveries. They suggested more staff members to PHC providing incentives at right time, starting the programme in right time service of doctors and staff. They suggested proper awareness for mothers with respect to IDD and Vitamin A prophylaxis

The data projected in Table 6 shows that community leaders were given I rank for Janani Suraksha Yojana, II Madilu Kit and III rank for Prasooti Arai ke. Last ranks were given to family planning, iodine deficiency disorder and vitamin A prophylaxis programme. because of the incentives, good service and safety to the life. Least rank was given to IDD and Vitamin A prophylaxis as they need more awareness in the rural communities.

The Panchayat bodies with the help of institution should collect health information on health and morbidity patterns in all three tiers of PRIs. In addition, there should also be a system of continuous collection of health data and disease surveillance, both community based and health sector based that help to monitor and improve upon programme outcomes. The existing Government health infrastructure at sub centre and PHCs are to be improved to meet the demand of the people so as to provide health services to a satisfactory level.

**Table 1: Awareness about implementation of health programmes by community leaders**

**N=30**

Sl. No.	Programmes	Yes		No	
		F	%	F	%
1	Prasooti Arai ke	22	73.33	6	26.66
2	Janani Suraksha Yojane	24	80.00	8	26.00
3	Madilu Kit	26	86.66	4	13.34
4	Family Planning	30	100.00	-	-
5	Iodine Deficiency Disorder	18	60.00	12	40.00
6	Vitamin A	16	53.33	14	46.67
7	Polio vaccine	30	100.00	-	-
8	Immunisation for mothers	30	100.00	-	-



**Table 2 : Opinion of community leaders about the selected health programmes**

N=30

Sl. No.	Areas	Most favourable	Favourable	Unfavourable
1	All children & pregnant women in the village are immunized in time	30(100.00)	-	-
2	Now all the village families prefer hospital deliveries	30(100.00)	-	-
3	Visiting the PHC is business of women	-	-	30(100.00)
4	The services done by the medical staff of PHC is noticeable	09(30.00)	18(60.00)	03(10.00)
5	In the village nobody is suffering from polio diseases	30(100.00)	-	-
6	In the village no mother is suffering from iodine and iron deficiency	09(30.00)	20(66.67)	01(03.00)
7	In the village birth rate has increased& death rate has decreased	25(83.33)	05(16.67)	-
8	The contractual staff of ASHA are contributing for the health improvement of the mothers	22(73.34)	08(26.66)	-
9	Anganwadi workers participate actively in the immunization schedule of the mother & children	19(63.34)	11(36.66)	-
10	Small family norms are becoming popular in the village	15(50.00)	08(26.66)	07(23.34)
11	Field level functionaries give education to young mothers about birth control methods	19(63.33)	11(36.67)	-
12	FPAI provides tablets though the anganwadi worker to the married young women for the birth control	13(43.34)	12(40.00)	05(16.66)
13	During the emergency 108 van is always available	20(66.66)	10(33.34)	-
14	Many a times services of 108 van are misused by the villagers	-	-	30(100.00)
15	Polio vaccine has reached all the children of the village	30(100.00)	-	-
	Overall opinion index	81.11		

Values in parenthesis indicate percentage

**Table 3: Participation of community leaders in different health programmes**

N=30

Sl. No.	Different health stages	Frequency	Percentage
1	Financial assistance to purchase needy items for PHC	21	70.00
2	Conducting meeting for PHC staff	26	86.66
3	Supervision of doctor and taking action on staffs	13	43.33
4	Financial assistance for extension and maintenance of hospitals.	27	90.00
5	The community leaders identify the BPL people and help them to issue the card	21	70.00
6	They help the people who didn't get incentives in time	24	80.00
7	In the day of immunization they will inform the people by announcing,	21	70.00

**Table 4: Suggestions for the effective execution of programmes by rural mothers**

N=150

Sl. No.	Programmes	Suggestions	F	%
1	Prasooti Arai ke	Implementation of these programmes for all deliveries	99	66.00
		The quality aspects of institutional deliveries are far from desired level	67	44.66
2	Janani Suraksha Yojana	Provide incentives at the right time	114	76.00
		Well equipped labour room, timely monitoring and supervision.	142	94.66
3	Madilu Kit	These programmes must be done timely, properly and effectively.	123	82.00
4	Family Planning	Village level workers have to provide proper Awareness	91	60.00
		Give counselling and guidelines for adoption	94	62.66
		Give proper education	142	94.66
5	Iodine and Vitamin A	Awareness should be given to mothers through TV, Radio and print.	106	70.66
		Educate the mother through face to face contact	135	90.00
		Exhibitions with photographs are essential	94	62.66
		Health check-up by experts to identify the deficiencies	65	43.00
6	Polio vaccine	Awareness and education are essential for future mothers	25	16.00

**Table 5: Suggestions given by community leaders**

N=30

Sl. No.	Programmes	Suggestions	F	%
1	Prasooti Araiike & Janani Surksha Yojana	Implement the programmes in our village at right time	23	76.66
		Provide incentives at the right time for all deliveries	24	80.00
		Improvement of the Primary health centre is essential	21	70.00
		Providing more staff members to the Primary health centre is need of the day	25	83.33
		Doctors and staff have to stay in the village for essential service	22	73.00
		Treat the villagers properly and respectfully	14	46.00
2	Madilu Kit	1. Give the kit in time	29	96.00
3	Family Planning	2. Educate the villager for small family norms	28	93.00
		3. Village level workers have to be create awareness	14	46.00
		4. Give counselling and guidelines for adoption	23	76.00
			14	46.00
4	Iodine Deficiency Disorder	1. Proper awareness 2. Education for mother 3. Awareness	12	40.00
5	Vitamin A			
6	Pulse Polio vaccines			
7	Immunization for mother			

**Table 6: Ranks given by community leaders about the health programmes**

N=30

Sl. No.	Programmes	Garrett score	Average	Garrett Rank
1	Prasooti Araiike	1788	59.00	3
2	Janani Suraksha Yojane	2430	81.00	1
3	Madilu Kit	2070	69.00	2
4	Family Planning	1242	41.40	6
5	Iodine Deficiency Disorder	1142	38.00	7
6	Vitamin A prophylaxis programme	1049	34.90	8
7	Polio vaccine	1602	53.40	4
8	Immunisation	1422	47.40	5

## CONCLUSION

The Panchayat bodies with the help of institution should collect health information on health and morbidity patterns in all three tiers of PRIs. In addition, there should also be a system of continuous collection of health data and disease surveillance, both community based and health sector based that help to monitor and improve upon programme outcomes. The existing Government health infrastructure at sub centre and PHCs are to be improved to meet the demand of the people so as to provide health services to a satisfactory level.

**Acknowledgement:** I am Ms Veena Chandavri University of Agricultural Science, Dharwad Collage of Rural Home Science, Dharwad I Have completed Master of Home Science in Extnsion and

Communication Management in the Department of Extension and Communication Management here with submitting the my Research article to the Indian Journal of Public Health Research &Development.

**Conflict of Interest:** Conflict of interest in Rural health and community development areas

**Source of Support:** University of Agricultural Sciences, Dharwad. Collage of Rural Home Science, Dharwad. Department of Extension and Communication Management and my Guid Dr. Chhya A Badiger

**Ethical Clearance:** This is one of the my Research part in Masters degree. I have taken Research topic in Research work so I am submitting the one the health article to the Indian Journal of Public Health Research & Development.

#### REFERENCES

1. Dutta, P.K 2005, Need of Training for health Professional on National Rural Health Mission. *Indian Journal of Public Health*, 50(3):133-137.
2. Dwivedi S., Singh R., Piang, L. K., Dhar, N., Adhish,V. and Deoki Nandan., 2009, Indigenous System of medicine Lady Doctors and General Nurse Midwives in operation of 27x7 Services under NRHM in Selected District of Uttar Pradesh. *Indian Journal of Public Health*, 53(3): 161-165.
3. Kansal. S., Srivastava, R. K., Tiwari<sup>3</sup>, V. K., Piang, L., Chand, R. and Deoki Nandan., 2009, Assessment of utilization of RCH services and client satisfaction at different level of health facilities in Varnasi District. *Indian Journal of Public Health*, 53(3):163-160.
4. Kumar, A., Khattar<sup>2</sup> P., Tiwari, V. K., Shivdasani, J. P., Dhar, N. and Deoki, Nandan, 2009, An Assessment of Mobile Medical Units in Jarkhand. *Indian Journal of Public Health*, 53(3): 157-176.

# Role of Intramedullary Titanium Elastic Nails in the Paediatric Femoral Diaphyseal Fractures

Shrinivas Kalliguddi<sup>1</sup>, Arun K N<sup>2</sup>, Anirudh Kulkarni<sup>3</sup>, Chandrakanth V Rathod<sup>4</sup>, Praveen Reddy<sup>5</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor, <sup>3</sup>Senior Resident, Dept. of Orthopaedics, <sup>4</sup>Associate Professor, Dept. of Pathology, <sup>5</sup>Senior Resident, Dept. of Orthopaedics, Navodaya Medical College, Raichur, Karnataka

## ABSTRACT

**Background and Objective:** Femoral shaft fractures account for 1.6% of all pediatric bony injuries. Angulation, malrotation and shortening are not always corrected effectively. Fixation of femur fractures in children and adolescents by elastic stable intramedullary nailing is becoming widely accepted because of the lower chance of iatrogenic infection and prohibitive cost of in-hospital traction and spica cast care.

The objective of the study was to study the functional outcome, duration of union and the complications following the use of elastic nail for femoral shaft fractures in children & adolescents.

**Method:** Children and adolescents between the age group of 5-16 years with femoral shaft fractures were admitted to Navodaya Medical College and Research, Raichur from August 2011 to August 2012. All patients underwent elastic stable intramedullary nailing fixation for the sustained fracture. Patients were followed up from 3 weeks to 6 months after surgery. Total number of cases included in this study were 30.

**Result:** The study comprised 19 male patients and 11 female patients aged from 5 to 16 years with mean of 10.5 years. The commonest duration from date of injury to date of surgery was 2 to 4 days. The follow-up ranged from 3 weeks to 6 months.

**Interpretation And Conclusion:** Elastic stable intramedullary nail leads to rapid fracture union by preservation of fracture hematoma and limited soft tissue exposure. It also helps in preventing damage to the distal femoral physis. Hence we conclude that flexible intramedullary nailing is an excellent technique for the treatment of diaphyseal fractures of the femur in children and adolescents aged 5 to 16 years.

**Keywords:** Femoral Shaft, Intra medullary, Diaphyseal, Elastic Stable, Flexible Nail

## INTRODUCTION

Femoral shaft fractures account for 1.6% of all pediatric bony injuries.<sup>1</sup> There is little controversy over the treatment of adult femoral shaft fractures with intramedullary nail fixation<sup>2</sup>. Similarly, there is little controversy over the treatment of infants and toddlers with femoral shaft fractures by using spica casting, but the treatment of pediatric and adolescent (age 5 to 16 years) femur fractures remains controversial. Differences of opinion about treatment are greatest for patients who are too old for early spica casting and yet too young for adult type of treatment with a reamed

nail. Current treatment options include early spica casting, traction, external fixation, ORIF with plating, elastic stable intramedullary nails and reamed intramedullary nails.<sup>3</sup>

In children, fractures of the femoral shaft are commonly treated by various types of traction for about 3 weeks, followed by plaster cast immobilization. The two major drawbacks with this treatment are prolonged bed rest leading to separation of the child from routine activities and the expenditure incurred on the treatment during the stay in the hospital.<sup>4</sup>

Time and experience of many clinicians have shown that children with diaphyseal femur fractures do not always recover with conservative treatment.

Angulation, malrotation and shortening are not always corrected effectively.<sup>5</sup>

The management of paediatric femoral shaft fractures gradually has evolved towards a more operative approach in the past decade. This is because of a more rapid recovery and reintegration of the patients and a recognition that prolonged immobilization can have a negative effect even in children.<sup>6</sup>

Plating of femoral shaft fracture offers rigid fixation, it requires a larger exposure with the potential for increased blood loss and scarring. It is a load bearing device and refracture is a risk. Antegrade nailing techniques have shown a risk of proximal femoral deformities and avascular necrosis of the femoral head.<sup>7,8,9</sup>

Elastic stable intramedullary nail fixation provides a healthy environment for fracture healing with some motion leading to increased callus formation.<sup>9</sup>

Elastic stable intramedullary nail fixation in the paediatric population is simple, effective and minimally invasive. It allows stable fixation, rapid healing and a prompt return of the child to normal activity. Functional results are excellent and complications are minor.<sup>9</sup>

## RESULTS

All the patients were followed until fracture union occurred. The follow up period ranged from 3 weeks to 6 months. Results were analyzed both clinically and radiologically.

**Table 1: Age Incidence**

Age in years	No. of cases	Percentage
5 - 8	7	23.33
9 - 12	15	50
13 - 16	8	26.66

**Table 2: Sex Incidence**

Sex	No. of cases	Percentage
Male	19	63.33
Female	11	36.66

**Table 3: Nature of trauma**

Nature of trauma	No. of cases	Percentage
RTA	21	70
Fall while playing	7	23.33
Fall from height	2	06.66

**Table 4: Side affected**

Side affected	No. of cases	Percentage
Left	14	47
Right	16	53

**Table 5: Pattern of Fracture**

Pattern of fracture	No. of cases	Percentage
Transverse	17	56.66
Oblique	5	16.66
Spiral	8	26.66

**Table 6: Level of the Fracture**

Level of fracture	No. of cases	Percentage
Proximal	5	16.66
Middle	25	83.33

**Table 7: Type of Fracture**

Type of fracture	No. of cases	Percentage
Closed	27	90
Open	3	10

**Table 8: Time interval between trauma and surgery**

Duration in days	No. of cases	Percentage
< 24 hours	2	6.66
2 - 4 days	24	80
5 - 7 days	2	6.66
>7 days	2	6.66

**Table 9: Type of Reduction**

Reduction	No. of cases	Percentage
Closed	25	83.33
Open	5	16.66

**Table 10: Size of nail**

Size of nail	No. of cases	Percentage
2 mm	5	16.66
2.5 mm	13	43.33
3 mm	8	26.66
3.5 mm	4	13.33

**Table 11: Stay in Hospital**

Hospital stay in days	No. of cases	Percentage
6 - 9	1	03.33
10 -12	21	70
>12	8	26.66

**Table 12: Time for union**

Time for union	No. of cases	Percentage
8 weeks	6	20
10 weeks	10	33.33
12 weeks	14	46.66

Fracture union was defined as the period between operation and full weight bearing without external support and a radiographically healed fracture. In our series, time to union ranged from 10 to 12 weeks average being 10.53 weeks.

### Post operative Immobilization

Post operative immobilization was not done in all cases. All patients were allowed to walk with the help of walker from the 1<sup>st</sup> post operative day, not bearing weight on the operated limb.

### Complications

Complications	No. of cases	Percentage
> 5mm	2	6.66
≤ 5mm	2	6.66
Limb shortening		
> 5mm	1	3.33
≤ 5mm	2	6.66
Infection	5	16.66
Delayed union and	-	-
Non union		
Nail impingement at entry point	5	16.66
<b>Mal alignment</b>		
a. Varus angulation	-	-
b. Valgus angulation	-	-
c. Anterior angulation	-	-
d. Posterior angulation	-	-
e. Rotational malalignment	-	-

## DISCUSSION

The treatment of femoral shaft fractures in children, particularly those who are between 5 to 16 years of age is controversial. Operative treatment is becoming more well accepted. Each of the surgical methods described have specific advantages and potential complications that must be appreciated by the treating surgeon.

The present study was conducted to assess the results of elastic stable intramedullary nail fixation of femoral shaft fractures in children and adolescent patients.

Because of the increasing costs of health care, surgical fixation of children's fractures with resultant

early mobilization and discharge from the hospital have become increasingly popular.

Recognizing the relative safety and efficacy of the femoral shaft fracture fixation with flexible intramedullary nails, several large medical centres in the United States and Europe have reported on series of femoral fractures in children and adolescents, proving the value of this method.

### Age incidence

In the present study 15 (50%) of the patients were 9-12 years old, the average age being 10.5 years.

Fabiano Prata Nascimento, et al,<sup>10</sup> treated femoral shaft fractures in age range 5 to 14 yrs with average age being 9.6 yrs.

Alenjandro Uribe Rios, et al,<sup>11</sup> conducted a prospective study regarding effects of stainless steel flexible nails in children aged between 5 and 12 yrs, in a study group of 48 patients. The average age was 8.6 years.

### Sex incidence

There were 11 (36.66%) girls and 19 (63.33%) boys in the present study. The sex incidence is comparable to other studies in the literature.

Fabiano Prata Nascimento, et al,<sup>10</sup> reported that there were 16 (53.3%) male patients and 14 (46.66%) female patients.

This male preponderance can be explained as boys are more active and are more prone for accidents and falls.

### Mechanism of Injury

In the present study RTA was the most common mode of injury accounting for 21 (70%) cases and fall while playing accounted for 7 (23.33%) cases.

In the study conducted by Alenjandro Uribe Rios, et al,<sup>11</sup> the commonest mechanism of injury was road traffic accidents in 37 (77%) patients and 8 (16.7%) patients had fall from height.

In the study conducted by Fabiano Prata Nascimento, et al,<sup>10</sup> RTA was the most common mechanism and was seen in 19 (63.3%) patients.

### Pattern of Fracture

In our study, Transverse fractures accounted for 17 (56.66%) cases, Oblique fractures accounted for 5



(16.66%) cases and spiral fractures accounted for 8 (26.66%) cases.

In the study conducted by Fabiano Prata Nascimento, et al,<sup>10</sup> they noted transverse fracture in 18 patients, oblique fracture in 8 patients, spiral fracture in 2 patients and comminuted fracture in 2 patients.

### Level of Fracture

Fractures involving the middle 1/3<sup>rd</sup> of the femoral shaft accounted for 25 (83.33%) cases and those involving the proximal 1/3<sup>rd</sup> accounted for 5 (16.66%) cases in our study.

Ozturkman Y, et al,<sup>12</sup> noted 18 (69.23%) fractures in the middle 1/3<sup>rd</sup> and 3 (11.53%) fractures in the proximal 1/3<sup>rd</sup> of the shaft

### Type of fracture

Most of the femoral shaft fractures in children are closed injuries. In our study 27 (90%) cases were closed fractures and 3 (10%) cases were open fractures of Gustilo type I.

Fabiano Prata Nascimento, et al<sup>10</sup>, reported 28 (93.3%) closed and 2 (6.7%) open fractures.

Time interval between trauma and surgery:

In the present series, commonest duration between trauma and surgery was 2 to 4 days. 24 (80%) underwent surgery within 2 to 4 days after trauma.

Average duration between trauma and surgery was 4.5 days in the study done by Kalenderer O, et al.<sup>13</sup>

In our study 2 (6.66%) patients were operated within 24 hours.

In the study conducted by Alenjandrouribe Rios, et al,<sup>12</sup> the average time elapsed from initial injury to surgery was 4 days.

### Type of Reduction

In our study, closed reduction was done in all cases.

Closed nailing was done in all cases in a study conducted by Fabiano Prata Nascimento, et al.<sup>11</sup>

### Post operative mobilization/immobilization

In our study, no post operative immobilization was done in most of the cases, however above knee slab was applied in 3 patients.

In the study conducted by Alenjandro Uribe Rios, et al,<sup>12</sup> no other immobilization treatments like plaster or orthosis were used. In the study conducted by Fabiano Prata Nascimento, et al,<sup>11</sup> no casts for supplementary immobilization were used. The advantage of the present study was early mobilization of the patients.

### Stay in the hospital

The average duration of hospital stay in the present study is 11.73 days.

The mean hospital stay was 12 days in Kalenderer O, et al,<sup>13</sup> study.

Compared to the above studies conducted on conservative methods and cast bracing, the average duration of hospital stay was less in our study i.e., 11.73 days. The reduced hospital stay in our series is because of proper selection of patients, stable fixation and less incidence of complications.

### Time to union

In the present study, average time to union was 10.53 weeks.

In the study conducted by Fabiano Prata Nascimento, et al,<sup>11</sup> average healing time was 7.73 weeks.

In our study, closed reduction of the fracture, leading to preservation of fracture hematoma and minimal soft tissue dissection led to rapid union of the fracture compared to compression plate fixation.

## COMPLICATIONS

### Range of motion

All patients had full range of hip motion in the present study, 3 (10%) patients had 10 degree restriction of knee movements (flexion) which was corrected by rigorous physiotherapy, while 1 (3.33%) patient had terminal 45° restriction in knee flexion at 2 months, but normal range of knee flexion was achieved at six months.

### Limb length discrepancy

This is the most common sequelae after femoral shaft fractures in children and adolescents.

In the present study, average limb lengthening was 0.5 cm and average limb shortening was also 0.5 cm.

No patient in our study had significant limb length discrepancy (i.e.  $> \pm 2$  cm).

In the study conducted by Alenjandro uribe Rios, et al,<sup>12</sup> there were five cases of length discrepancy, two cases of 1 cm lengthening, and three cases of shortening (two of 1.5 cm, one of 1 cm).

Fabiano Prata Nascimento, et al,<sup>11</sup> showed the final shortening of the limb, after a follow-up period of at least 24 months, occurred in 6.7% of the cases (two patients), with 0.25 cm on average.

Comparing to limb length discrepancy in conservative methods, limb length discrepancy in our study was within the acceptable limits.

### **Infection**

Superficial infection was seen in 5 of the cases which was controlled by antibiotics.

Alenjandro Uribe Rios, et al,<sup>12</sup> observed that there were two cases of superficial infection which were treated with oral antibiotics with no subsequent hospitalization, and without their final results being affected.

### **Nail impingement at the insertion site**

In the present series, nail impingement was seen in 5 (16.66%) patients.

In the study conducted by Fabiano Prata Nascimento, et al,<sup>11</sup> acute complications were seen in two patients (6.7%). One had a migration of a nail and the other had a soft tissue irritation. The first patient needed a second intervention in order to have the tip of the nail cut. One felt pain during the first week post-operatively and needed another surgery to correct the loss of reduction of the fracture.

### **Malalignment**

Some degree of angular deformity is frequent after femoral shaft fractures in children, but this usually remodels after growth.

### **Varus/valgus malalignment**

In our study there was no varus/valgus malalignment.

Alenjandro Uribe Rios, et al,<sup>12</sup> observed two angular deformities in the valgus.

Fabiano Prata Nascimento, et al,<sup>11</sup> noticed valgus in 12 (40%) and varus in 3 (10%) patients.

The varus and valgus malalignments that occurred in our study are within the acceptable limits.

### **Antero posterior angulation**

In the present study, there were no antero posterior angulations.

Fabiano Prata Nascimento, et al,<sup>11</sup> noticed anterior angulation in 23 (76.7%) patients and posterior angulation in 5 (16.6%) patients.

**Acknowledgement:** I am thankful to Principal, Navodaya Medical College and Research Centre, Raichur for permitting me to do this study.

**Conflict of Interest:** None

**Sources of support:** None

**Ethical clearance obtained.**

## **REFERENCES**

1. Scherl SA, Miller L, Lively N, Russinof S, Sullivan M, Tornetta P III. "Accidental and non accidental femur fractures in children". *Clin Orthop and Rel Research* 2000;376:96-105.
2. Momberger N., Stevens P., Smith J., Santora S, Scott S and Anderson J. "Intramedullary nailing of femoral fractures in adolescents". *J Pediatr Orthop* 2000; Vol. 20: 482-484.
3. Lee SS, Mahar AT and Newton PO. "Ender nail fixation of pediatric femur fractures. A biomechanical analysis". *J Pediatr Orthop* 2001; Vol. 21: 442-445.
4. Ligier JN., Metaizeau JP., Prevot J. and Lascombes P. "Elastic stable intramedullary nailing of femur shaft fracture in children". *J Bone & Joint Surg (Br)* 1988; Vol. 70B: 74-7.
5. Heinrich SD., Drvaric DM., Karr K. and Macevan GD. "The operative stabilization of pediatric diaphyseal femur fractures with flexible intramedullary nails: A prospective analysis". *J Pediatr Orthop* 1994; Vol. 14: 501-507.
6. Carey TP. and Galpin RD. "Flexible intramedullary nail fixation of femoral fractures". *Clin Orthop and Rel Research* 1996; 332: 110-118.
7. Cramer KE., Tornetta P. III, Spero CR, Alter S, Miraliakbar H, Teefey J. "Ender rod fixation of

- femoral shaft fracture in children". *Clin Orthop and Rel Research* 2000; 376: 119-123.
8. Townsend DR and Hoffinger S. "Intramedullary nailing of femoral shaft fractures in children via the trochanteric tip". *Clin Orthop and Rel Research* 2000; 376: 113-118.
  9. Kasser JR. and Beaty JH. "Femoral shaft fractures". In: Beaty JH. And Kasser JR eds. *Rockwood and Wilkin's fractures in children*, 5th edition, Philadelphia, Lippincott, Williams and Wilkins, 2001; 941-980pp.
  10. Fabiano Prata Nascimento, Claudio Santili, Miguel Akkari Gilberto Waisberg, Susana dos Reis Braga, Patrícia Maria Moraes de Barros Fucs. "Short hospitalization period with elastic stable intramedullary nails in the treatment of femoral shaft fractures in school children. *J Child Orthop* 2010; 4:53-6.
  11. Alenjandro Uribe Rios, Diego Fernando Sanm Arango, Carlos Oliver Valderrama Molina and Alvaro de Jesus Toro Posada. "Femoral shaft fracture treated with stainless steel flexible nails in children aged between 5 and 12 yrs at the HUSVP. *J Child Orthop* 2009; 3:129-135.
  12. Ozturkman Y. Dogrul C, Balioglu MB. and Karli M. "Intramedullary stabilization of pediatric diaphyseal femur fracture with elastic ender nails". *Acta Orthop Traumatol Jure* 2002; 36 (3): 220-7.
  13. Kalenderer O., Agus H and Sanli C. 'Open reduction and intramedullary fixation through minimal incision with ender nails in femoral fractures of children aged 6 to 16 years". *Acta Orthop Traumatol Jure* 2002; 36 (4): 303-9.

# Perceptions about Smoking and Tobacco Control Measures among College Students of Visakhapatnam City, India - a Cross-Sectional Study

Devi M Bhimarasetty<sup>1</sup>, Srikanth Gopi<sup>2</sup>, Srikanth Koyyana<sup>2</sup>, Shefali Vishnoi<sup>3</sup>

<sup>1</sup>Professor Dept. of Community Medicine, <sup>2</sup>Undergraduate Students, <sup>3</sup>Postgraduate, Dept. of Community Medicine, Andhra Medical College, Visakhapatnam, Andhra Pradesh

## ABSTRACT

**Background:** Tobacco use is the single largest cause of preventable death in the world today. Global Youth Tobacco Survey reports an average prevalence of about 10 % of ever smoking among the school going youth of age 13-15 years in India.

**Research question:** What are the factors influencing cigarette smoking among youth and their perceptions about anti-smoking measures.

**Methodology:** A cross-sectional study was conducted among 359 male college students of Visakhapatnam city selected through convenience sampling using a self administered questionnaire. Data was analyzed using MS excel.

**Results:** The overall prevalence of smoking was found to be 12.8%. Smoking was most prevalent (17.4%) among medical students. Influence by friends (47.3%) was the most common cited response for initiation of smoking. Around 72% of smokers expressed willingness to quit smoking. Nearly 73% of students felt that there was not enough publicity about hazards of smoking. Teaching harmful effects of smoking in schools itself and video-campaigns showing harmful effects, having counseling centers for smoking-prevention were given high scores by the students when asked to suggest effective tobacco control measures.

**Conclusion:** The study findings indicate that smoking is prevalent among youth in Visakhapatnam and highlights the need for strengthening tobacco control measures.

**Keywords:** College Students, India, Male Smoking, Tobacco Control Measures, Visakhapatnam, Youth

## INTRODUCTION

Tobacco use is the single largest cause of preventable death in the world today. On an average, every user of tobacco loses 15 years of life. Total tobacco attributable deaths are projected to rise from 5.4 million to 8.3 million in 2030, almost 10% of all deaths

worldwide.<sup>[1]</sup> The WHO framework convention was developed in response to the globalization of the tobacco epidemic. It includes a strategic tool called MPOWER. There are 174 parties to the framework convention including India.<sup>[2]</sup> The six components which stand for MPOWER are 1. Monitor tobacco use and prevention policies. 2. Protect people from tobacco smoke. 3. Offer help to quit tobacco use. 4. Warn about the dangers of tobacco. 5. Enforce ban on tobacco advertising, promotion and sponsorship. 6. Raise taxes on tobacco.<sup>[3]</sup> Global Adult Tobacco Survey conducted in India reported that prevalence of current tobacco use is more common among males than females ranging from 19% in males to 8.3% in females.<sup>[4]</sup> Tobacco use as both chewable form and smoke form is observed in India. Young people are more vulnerable

---

### Corresponding author:

**B Devi Madhavi**

Professor & Head

Dept. of Community Medicine, Rajiv Gandhi Institute of Medical Sciences, Srikakulam, Andhra Pradesh.

Phone: 08942279977 (office) Mobile: 09885193506

Fax: 08942279033

Email: drdevimadhavi@redifmail.com

to develop the habit of tobacco use. Studies from India document tobacco use from a young age. A study done among street children reported ever use of tobacco of 56.7%.<sup>[5]</sup> Global Youth Tobacco Survey (GYTS) conducted in India reported that current use of tobacco products among students of 13-15 years of age is 14.1% with 4.2% being current smokers.<sup>[6]</sup> Current smoking rates of 29.9% among males and 5.9% among females was reported among youth (15-24 years).<sup>[7]</sup> Documented studies on tobacco use from Visakhapatnam are limited. This study was taken up to measure the prevalence of smoking among college students, to identify the correlates of smoking and also to know the perceptions of young adults about tobacco control strategies.

### METHODOLOGY

A community based cross-sectional study was conducted in colleges of Visakhapatnam, a city located in North Coastal Andhra Pradesh during October and November 2009. Three colleges were selected randomly from the list of colleges in the city to include one engineering college, one medical college and one college offering other non professional degree courses. Prior permission was obtained from the Principal of respective colleges. Study subjects were male students of final and pre-final years. Inclusion criterion was those students present in the selected classes on the day of visits. Exclusion criteria were female students, 1<sup>st</sup> year students and male students who did not give permission. The students were explained the purpose of study and administered a pre- tested, semi structured questionnaire after obtaining informed consent. As it was a self report, anonymity and confidentiality was assured. Information was gathered from the respondents about their socio-demographic characteristics, practice of smoking, reasons for initiating and continuing smoking, attitude towards tobacco use and towards tobacco control measures. Students who reported use of cigarettes in last one month were considered as smokers for assessing prevalence of smoking. Response was obtained from 362 students. Data was entered and analyzed using MS excel. Responses of three students were removed in the data cleaning process leaving a final sample of 359. Since data was mostly qualitative, proportions were computed and chi-square test was applied for testing association. Significance was set at 95% confidence limits (p value=0.05). Institutional Ethics Committee clearance was obtained for carrying out the study.

### RESULTS

The study had 161 students from medical college, 108 students from engineering college and 90 students from other college (B.Sc course). There were 46 smokers among the 359 students which amounted to 12.8% prevalence of smoking. Smoking was more prevalent among medical students (17.3%) compared to 10% among B.Sc students and 8.3% among engineering students. However this difference was not statistically significant. Thirty two of the two hundred and fourteen students (15%) who resided in hostels smoked compared to fourteen of the one hundred and forty five students (9.7%) who resided at home. Nearly one-third, i.e. one hundred and five students out of the three fifty nine students reported that a family member was a smoker. Twenty of the one hundred and five students (19%) were smokers when a family member was a smoker compared to twenty six of two hundred fifty four students (10.2%) when there was no smoker among family members. The association between students smoking practice to family members smoking practice was of statistical significance ( $p < 0.02$ ). About 23.3% (43/186) of students who reported having a smoker as a close friend were smokers in contrast to 1.9% (3/173) of students who were observed to be smokers even in the absence of a smoker as a close friend. This difference was statistically significant ( $p < 0.002$ ). Among students who take alcohol, 36.4% were smokers compared to 2.8% being smokers among students who do not take alcohol. Use of alcohol was significantly higher among smokers than non smokers ( $p < 0.001$ ).

Multiple reasons were given for initiation of smoking. Friends influence (47.3%) was the most common response, followed by other reasons such as relaxation (42.1%), for thrill (36.8%), for style (29.2%) and fun (23.6%).

Reasons cited for continuing smoking were insistence of friends (51.6%), for pleasure (41.9%) and habituation (16.1%). Thirty three of the forty six smokers (71.7%) expressed willingness to quit smoking. About 60% of the smokers had made one or more attempts to quit smoking earlier.

Regarding the health hazards of smoking, more than 80% of smokers as well as non-smokers were aware that smoking can cause cancers. Also 36.5% of smokers were aware of respiratory ill effects of smoking compared to 33.2% of non smokers. However



awareness of cardiovascular hazards of tobacco use was known to 24% of smokers compared to 27% among non smokers. More non smokers (46.4%) were aware of other health hazards compared to 29.2% of smokers.

About 72.7% of students opined that there was not enough publicity about the hazards of smoking and only 25.6% (92/359) of students said that they had seen messages on TV showing dangers of smoking.

When asked to score the measures for smoking prevention among youth, the highest scores were given for following measures in descending order 1. Teaching harmful effects of smoking in schools itself 2. Video campaigns showing harmful effects 3. Encouragement from family and friends to quit smoking 4. Having non smoking family members 5. Having counseling centers for smoking prevention. Measures such as increase in price, keeping away from smokers, complete ban on smoking in movies and other entertainment programs, use of nicotine patches received low scores.

**Table 1: Correlates for smoking among male college students**

Characteristic	Number of non-smokers N=313	%	Number of smokers N=46	%	Test of significance
<b>Education</b>					
Degree	81	90.0	9	10.0	N.S
Engineering	99	90.8	9	8.2	
Medical	133	82.6	28	17.4	
<b>Place of stay</b>					
Hostel	182	85.0	32	15.0	N.S
Home	131	90.3	14	9.7	
<b>Use of alcohol</b>					
Yes	68	63.6	39	36.4	P<0.001
No	245	97.2	7	2.8	
<b>Family member is smoker</b>					
Yes	85	81.0	20	19.0	p<0.02
No	228	89.8	26	10.2	
<b>Close friend is a smoker</b>					
Yes	143	76.9	43	23.1	P<0.002
No	170	98.3	3	1.7	

## DISCUSSION

The prevalence of smoking among male college students in our study was 12.8%. A previous study among students from Visakhapatnam also estimated the prevalence to be 12.4%.<sup>[8]</sup> Contrary to the general opinion that those in health field practice healthy lifestyles, the prevalence of smoking in medical students was higher than in students from other streams in our study. This may be due partially to the fact that medical course is perceived as a tough course and students are under stress to do well. Hence they may resort to practices such as smoking which is considered as a stress buster. Also more students from medical stream are likely to be staying away from home and are more susceptible to the influence of friends. However, both the overall prevalence of smoking as well as prevalence among medical students in our study was lower than that reported in

from studies elsewhere. Current smoking among male medical student of 25.5% was reported in a study from Lucknow.<sup>[9]</sup> Another study from Karachi, Pakistan reported a prevalence of 24% among male college students.<sup>[10]</sup> 28.3% or 1.38 million Canadians aged 18–29 were reported to be current smokers.<sup>[11]</sup> It was observed in our study that smoking was more common among students who had i) a family member who smoked ii) a close friend who smoked iii), stayed in hostel and iv) used alcohol. Similar findings were reported in earlier studies. Tobacco use was found to be considerably higher among students who had seen their brother/sister or their best friend smoke in a study conducted in schools of South Delhi.<sup>[12]</sup> A study done in urban slums of Sambalpur reported 46.7% of substance abuse among family members of adolescent substance abusers.<sup>[13]</sup> Our study findings for the most common reasons for initiation of smoking are consistent with previous studies from New Delhi.<sup>[5]</sup> <sup>[14]</sup>



Influence of friends also appears to have a major role in continuation of smoking with 42% smokers citing insistence of friends as the main reason. This is in contrast to the study from New Delhi which observed that pleasure(24.5%) and release of stress(18.3%) as the common reasons for continuing smoking. <sup>[14]</sup> Our study findings indicate that smokers perceived smoking as a tool for relaxation as well as a tool for obtaining thrill. There is a need to change the perception of youth about smoking

Majority of students were aware that smoking can cause cancers. However awareness about respiratory ill effects or of cardiovascular hazards from smoking was poor. This is in contrast to a study from Mangalore among arts student of a college reported higher levels of awareness about hazards of smoking. It was reported in their study that 67% knew that smoking was a risk factor for heart attack. 93.2% knew that it could induce lung cancer. <sup>[15]</sup>

Though there is awareness about ill-effects about smoking on respiratory health, it does not appear to deter youth from smoking. There is an increasing need to create awareness about other health hazards such as risk of habituation, risk for coronary heart diseases etc which may be perceived as affecting them in near future. Also the common perception among the students is that there is not enough publicity about hazards of smoking. Only a quarter of the students reported having seen any advertisement on TV showing dangers of smoking. Health messages about hazards of smoking should be aired more frequently. All TV and radio channels including private channels should show commitment in airing such messages.

About 70% of the smokers expressed willingness to quit smoking. More than half have made previous attempts to quit. One theory suggested by researchers as to how and why do people stop smoking was "stages of changes" model. According to this there are various stages in the behavior changes related to smoking which occur in a continuum. They range from pre-contemplation stage where the smoker is not even thinking about quitting now, contemplation stage where the smoker is actively thinking of quitting but is not ready to make a serious attempt, a preparation stage where the smoker seriously plans to quit and had tried to quit earlier, an action stage in which the smoker has taken action to quit and is in first six months of being smoke-free and finally maintenance stage where the new non-smoker is actively engaged in taking steps to avoid smoking again. <sup>[16]</sup> This model

of "stages of changes" indicates the need for creating a supporting environment and suitable amenities for helping college students who wish to quit smoking and also for not resuming the habit.

The opinions of young adults about preventive measures to be adopted for control of tobacco use suggest a multi-pronged approach. The students have opined that school based programs, creating smoke free environment at home/ with friends and making cigarettes more unaffordable would all contribute to tobacco control. Surprisingly legislation did not figure high in the list of control measures as perceived by students, perhaps because of weak public awareness as well as weak enforcement of tobacco control legislations.

Government of India has enacted the cigarettes and other tobacco products (prohibition of advertisement and regulation of trade and commerce, production, supply and distribution) Act(COPTA)in 2003. The National Tobacco Control Program has been piloted in 2007-2008 which includes district level strategies such as training of health and social workers, local IEC activities, setting up tobacco cessation facilities, school program and monitoring tobacco control measures. <sup>[17]</sup> The challenge lies in implementation of the various activities. A well planned public education campaign integrated into school curriculum and other community programs, facilities for tobacco users who want to quit and strong enforcement of legislations can successfully slow the tobacco epidemic. Universal coverage of above activities and community participation is pivotal for the success of the program.

## CONCLUSION

The findings of the study indicate indicates that smoking is prevalent among youth in Visakhapatnam. The study also identifies areas for strengthening, such as need for more intensive Behavior Change Communication about hazards of smoking, creating smoke free environment at home and at college and facilities for tobacco cessation etc. Hence there is a need to step up control measures to reduce tobacco use in the community through a multi-pronged approach.

Limitations of the study: The study does not address the issue of all forms of tobacco use but only that of smoke form. It does not address the issue of smoking among female students which is also reported from a few studies in India

**Acknowledgement:** None

**Conflict of Interest:** NIL

**Source of Funding:** NIL

### REFERENCES

1. World Health Statistics 2008 Geneva
2. Narain J.P, Sinha D.N. Tobacco epidemic in South-East Asia region: Challenges and progress in its control. *Indian J Public Health* 2011; 55: 151-4
3. who.int [homepage on the internet], Geneva cited on 2012 Jan 23. Available from <http://www.who.int/tobacco/mpower/en> accessed on 1/23/12
4. who.int [homepage on the internet], Geneva cited 2012 sep 06 available from [http://www.who.int/tobacco/surveillance/en\\_tfi\\_india\\_gats\\_fact\\_sheet.pdf](http://www.who.int/tobacco/surveillance/en_tfi_india_gats_fact_sheet.pdf)
5. Malhotra C, Malhotra R, Singh MM, Garg S, Ingle GK. A Study of tobacco use amongst street children of Delhi. *Indian J Community Med* 2007; 32:58-9
6. Ministry of Health [homepage on the internet], New Delhi: cited on 2012 Jan 23. Available from: [http://www.mohfw.nic.in/write\\_read\\_data/1892s/file\\_18-13193849.pdf](http://www.mohfw.nic.in/write_read_data/1892s/file_18-13193849.pdf) (GYTS), 2006.
7. Thakur JS. Chandigarh: The first smoke-free city in India. *Indian J Community Med* 2007; 32: 169-70
8. Satyanarayana Gavarasana, Vijayaprasad Doddi, Gort V.S.N.R Prasad, Apparao Allam and Bellana S.R.Murthy. A smoking survey of college students in India: Implications for designing an Antismoking policy: *Jpn J.CancerRes*, 1991 vol:82,142-145.
9. Kumari R, Nath B. Study on the use of tobacco among male medical students in Lucknow, India. *Indian J Community Med* 2008; 33: 100-3
10. Shafquat Rozi, Zahid A Butt and Saeed Akhtar – Correlates of cigarette smoking among male college students in Karachi, Pakistan *BMC Public Health* 2007, 7:312doi:10.1186/1471-2458-7-312. Cited on 2012, Aug 21. Available from: <http://www.biomedcentral.com/1471-2458/7/312>.
11. D Hammond: Smoking behavior among young adults: beyond youth prevention. *Tob Control* 2005; 14:181-185. doi:10.1136/tc.2004.009621. Cited on 2012, Aug 21. Available from: <http://tobaccocontrol.bmj.com/content/14/3.toc>.
12. Sharma R, Grover VL, Chaturvedi S. Tobacco use among adolescent students and the influence of role models. *Indian J Community Med* 2010;35:272-5
13. Sarangi L, Acharya HP, Panigrahi OP. Substance abuse among adolescents in urban slums of Sambalpur. *Indian J Community Med* 2008; 33:265-7
14. Sharma N, Singh MM, Ingle GK, Jiloha RC. An epidemiological study of cigarette smoking among male college students of Delhi University. *Indian J Community Med* 2006;31:35
15. Sajjan BS, Chacko J, Asha K. Smoking behaviour among arts student of a college in Mangalore, Dakshina Kannada. *Indian J Med Sci* 2003;57:290.
16. Tobacco freeu.org (homepage on the internet), Denver : cited 2012, Oct 13. Available from: [http://www.tobaccofreeu.org/cessation/preparing\\_toquit.asp](http://www.tobaccofreeu.org/cessation/preparing_toquit.asp)
17. Kaur J, Jain DC. Tobacco Control Policies in India: Implementation and Challenges. *Indian J Public Health* 2011;55:220-7.

# Comparitive Study Between 2% and 4% Lignocaine Nebulisation on Pressor Response to Laryngoscopy and Intubation

Vishalakshi Patil<sup>1</sup>, Anirudh Kulkarni<sup>2</sup>, Chandrakanth V Rathod<sup>3</sup>, Sanjivani C R<sup>4</sup>

<sup>1</sup>Senior Resident, Dept. of Anaesthesiology, Raichur Institute of Medical Sciences, Raichur, Karnataka, <sup>2</sup>Senior Resident, Dept. of Orthopaedics, <sup>3</sup>Associate Professor, Dept. of Pathology, <sup>4</sup>Dept. of Pschiatry, Navodaya Medical College, Raichur, Karnataka

## ABSTRACT

**Background and Objective:** Direct laryngoscopy and endotracheal intubation following induction of anaesthesia is associated with hemodynamic changes, due to reflex sympathetic discharge caused by epipharyngeal and laryngopharyngeal stimulation. This increased sympatho-adrenal activity may result in hypertension, tachycardia and arrhythmias. This increase in blood pressure and heart rate are usually transient, variable and unpredictable.

To study the cardiovascular changes following direct laryngoscopy and endotracheal intubation using the standard anaesthesia technique of induction with Thiopentone sodium and muscle relaxation with succinylcholine.

To compare the efficiency of 2% and 4% lignocaine nebulisation in attenuating the cardiovascular response to direct laryngoscopy and intubation.

**Method:** The patients are selected from Pre Anesthetic Clinic of Kidwai Memorial Institute of Oncology, Bangalore.

**Study:** Prospective, randomised, double blinded and placebo controlled clinical study.

**Source of Data:** Inpatients of Kidwai Memorial Institute of Oncology aged between 17yrs to 65yrs scheduled for elective surgery under GA with ASA I and ASA II after approval from ethics committee and Consent from patients.

**Result:** A Comparative controlled randomized clinical anesthesia study with three groups, with 90 patients randomized in to three groups , 30 patients in Group I (Control), 30 patients in Group II (2% Lignocaine Nebulisation), 30 patients in Group III (4% Lignocaine Nebulisation) is undertaken to study cardiovascular changes(HR-heart rate, SBP-systolic blood pressure,DBP -diastolic blood pressure ,MAP(mean arterial pressure) following direct laryngoscopy and endotracheal intubation using standard anaesthesia technique, to compare efficiency of 2% and 4 % lignocaine nebulisation.

**Interpretation And Conclusion:** Laryngoscopy and intubation caused a significant increase in heart rate and blood pressure.

4% lignocaine nebulisation was found to be more effect than 2% lignocaine nebulisation to attenuate the pressor response to laryngoscopy and intubation.

**Keywords:** Lignocaine, Laryngoscopy,Intubation

---

## Corresponding author:

Vishalakshi Patil

Senior Resident

Dept. of Anaesthesiology, Raichur Institute of Medical Sciences, Raichur, Karnataka

Email: drvishalakshi\_patil@yahoo.co.in

Mobile Number: 099008399299

## INTRODUCTION

Direct laryngoscopy and endotracheal intubation following induction of anaesthesia is associated with hemodynamic changes, due to reflex sympathetic discharge caused by epipharyngeal and laryngopharyngeal stimulation.<sup>4</sup> This increased

sympatho-adrenal activity may result in hypertension, tachycardia and arrhythmias. This increase in blood pressure and heart rate are usually transient, variable and unpredictable.<sup>4,9</sup> Transitory hypertension and tachycardia are probably of no consequence in healthy individuals but either or both may be hazardous to those with hypertension, myocardial insufficiency or cerebrovascular diseases<sup>5,11</sup>.

The complications resulting from these hemodynamic responses from laryngoscopy and intubation include left ventricular dysfunction, hypertensive crisis, cardiac dysrhythmias, myocardial ischemia and cerebral hemorrhage<sup>5</sup>.

Different techniques have been shown to modify the pressor response. Many pharmacological methods have been devised to reduce the extent of hemodynamic events such as use of local anaesthetics like IV lignocaine,<sup>2,8,10,20</sup> adrenergic blockers,<sup>7,8</sup> calcium channel blockers<sup>6</sup>. Other methods like using deep planes of anesthesia<sup>9</sup> and nerve blocks<sup>21</sup>. Topical anaesthesia with lignocaine as spray<sup>2,12,22</sup> or nebulisation<sup>1,3,15</sup> applied to the larynx and trachea in a variety of ways remains a popular method used alone or in combination with other techniques.

## REVIEW OF LITERATURE

The hemodynamic effects of laryngoscopy and tracheal intubation were first reported by Reid and Brac (1940)<sup>14</sup> they concluded that these cardiac reflexes could originate in trachea, larynx, bronchi or lungs and effect a response by a sudden increase in vagal tone. These reflexes were termed 'vagovagal' since both the afferent and efferent paths of the reflex were assumed

to be the vagus nerve.

The post intubation response is potentially harmful in patients with preoperative hypertension, cardiovascular disease and raised intracranial pressure<sup>19</sup>. In an attempt to attenuate this response, various maneuvers and techniques have been recommend like use of i.v Lignocaine<sup>18,10</sup>.

Cocaine hydrochloride spray of 10% was used to attenuate pressor response by Takeshima et al (1964)<sup>17</sup>. They also found ECG disturbances in 45 patients out of 50 patients and pulse rate changes in 36 patients and have concluded that the cause of cardiovascular changes were due to pressure caused by the laryngoscope blade on deep soft tissues adjacent to epiglottis. Richard Ward (1965)<sup>18</sup> used Halothane for the same but only partial attenuation was reported.

## RESULTS

**Study Design:** A Comparative controlled randomized clinical anesthesia study with three groups, with 90 patients randomized in to three groups , 30 patients in Group I (Control), 30 patients in Group II (2% Lignocaine Nebulisation), 30 patients in Group III (4% Lignocaine Nebulisation) is undertaken to study cardiovascular changes(HR-heart rate, SBP-systolic blood pressure,DBP -diastolic blood pressure ,MAP(mean arterial pressure) following direct laryngoscopy and endotracheal intubation using standard anaesthesia technique, to compare efficiency of 2% and 4 % lignocaine nebulisation.

All the three groups were comparable as far as age,body weight and gender were compared.

**Table 1: Age distribution of patients studied**

Age in years	Group I		Group II		Group III	
	No	%	No	%	No	%
17-20	0	0.0	1	3.3	2	6.7
21-30	5	16.7	2	6.7	9	30.0
31-40	8	26.7	8	26.7	4	13.3
41-50	13	43.3	11	36.7	10	33.3
51-60	4	13.3	5	16.7	5	16.7
>60	0	0.0	3	10.0	0	0.0
Total	30	100.0	30	100.0	30	100.0

**Table 2: Gender distribution of patients studied**

Gender	Group I		Group II		Group III	
	No	%	No	%	No	%
Male	15	50.0	15	50.0	15	50.0
Female	15	50.0	15	50.0	15	50.0
Total	30	100.0	30	100.0	30	100.0

**Table 3: Age and weight of patients studied**

	Group I	Group II	Group III	P value
Age in years	41.37±10.12	45.17±11.72	38.87±12.49	0.103
Weight kg	53.33±9.73	53.30±9.67	53.00±9.91	0.989

**Table 4: Comparison of Heart rate (bpm) between three groups of patients**

Study points	Group I	Group II	Group III	P value
Baseline	80.93±8.63	84.63±12.34	82.63±6.82	F= 1.130; p=0.328
Post induction	88.27±7.96	93.07±12.8	82.13±7.05	F= 9.765; p<0.001**
30 sec after Laryngoscopy	100.80±8.77	101.20±13.33	87.83±5.67	F= 18.154; p<0.001**
1 min after Laryngoscopy	107.67±8.83	103.93±14.49	89.53±5.53	F= 25.910; p<0.001**
3 min after Laryngoscopy	109.83±7.79	103.60±13.8	89.30±5.96	F= 34.802; p<0.001**
5 min after Laryngoscopy	108.90±9.18	100.53±14.37	86.37±6.03	F= 35.685; p<0.001**
10 min after Laryngoscopy	104.83±9.07	95.33±14.4	83.53±6.14	F= 31.308; p<0.001**
P value (Baseline vs 10 min after Laryngoscopy)	<0.001**	<0.001**	0.437	-

**Table 5: Comparison of Systolic BP (mm Hg) between three groups of patients.**

Study points	Group I	Group II	Group III	P value
Baseline	124.6±11.52	120.87±24.76	123.93±11.76	F= 0.404; p=0.669
Post induction	119.53±11.01	118.20±11.55	120.07±19.81	F= 0.129; p=0.880
30 sec after Laryngoscopy	136.13±9.17	132.47±10.81	126.27±10.26	F= 7.308; p=0.001**
1 min after Laryngoscopy	140.60±8.93	133.90±10.98	128.4±10.28	F= 10.976; p<0.001**
3 min after Laryngoscopy	144.00±8.87	136.37±11.75	128.87±10.33	F= 15.941; p<0.001**
5 min after Laryngoscopy	144.20±9.04	134.73±10.85	124.97±9.56	F= 28.629; p<0.001**
10 min after Laryngoscopy	140.73±8.84	130.33±11.29	123.4±10.21	F= 22.098; p<0.001**
P value (Baseline vs 10 min after Laryngoscopy)	<0.001**	0.035*	0.459	-

**Table 6: Comparison of Diastolic BP (mmHg) between three groups of patients.**

Study points	Group I	Group II	Group III	P value
Baseline	79.00±6.94	78.87±6.96	77.13±6.64	F= 0.694; p=0.503
Post induction	76.33±6.71	75.47±6.28	72.67±5.64	F= 2.844; p=0.064+
30 sec after Laryngoscopy	88.33±6.22	85.17±5.55	79.87±5.68	F= 16.201; p<0.001**



**Table 6: Comparison of Diastolic BP (mmHg) between three groups of patients. (Contd.)**

Study points	Group I	Group II	Group III	P value
1 min after Laryngoscopy	91.60±6.42	86.27±4.42	81.13±5.6	F= 26.770; p<0.001**
3 min after Laryngoscopy	93.13±5.84	86.53±4.58	80.33±6.26	F= 39.121; p<0.001**
5 min after Laryngoscopy	92.53±6.19	84.27±5.22	78.87±6.45	F= 39.803; p<0.001**
10 min after Laryngoscopy	88.67±5.47	81.3±5.48	76.87±6.03	F= 33.23; p<0.001**
P value (Baseline vs 10 min after Laryngoscopy)	<0.001**	0.058+	0.738	-

## DISCUSSION

Laryngoscopy and tracheal intubation is often associated with hypertension and tachycardia<sup>1,2,4,5,11</sup>. Many pharmacological interventions like beta blockers<sup>7,8</sup>, opioids<sup>23,24,25</sup> Ca channel blockers<sup>6</sup> and deep anesthesia<sup>9</sup> have been used with varying success. Lignocaine preparations have been used as IV lignocaine<sup>2,8,10,20</sup> and for topical anaesthesia as lignocaine spray<sup>2,12,22</sup> and nebulisation<sup>1,3,15</sup>, which have been suggested to attenuate pressor response to laryngoscopy and intubation.

In the present study we have compared the effect of 2% and 4% lignocaine nebulisation on pressor response to direct laryngoscopy and intubation. Ninety patients belonging to ASA I and II status were randomly allocated in to three groups of 30 each in Group I: The patients received nebulisation with 4ml of normal saline as control, Group II: patients received nebulisation with 4ml of 2% lignocaine, Group III: this group received nebulisation with 4ml of 4% lignocaine. All patients received nebulisation in sitting position for 10 minutes via a nebuliser with oxygen flow of 8liters/min. All the parameters like heart rate, oxygen saturation, systolic, diastolic and mean arterial blood pressure, ECG was monitored in all patients. All the three groups were comparable as far as age, sex and weight of the patients was concerned. Descriptive statistical analysis was carried out in the present study.

We observed in our study that the values in group III were low as compared to group I and II at all intervals for all the haemodynamic variables(HR, SBP, DBP and MAP). The maximum response was noted at 1min and 3min intervals after laryngoscopy. The values in group III (4% lignocaine nebulisation) returned to baseline by 10 mins where as in group I and II the values were more than the baseline. 4% lignocaine nebulisation attenuates the intubation response when compared to 2% lignocaine nebulisation. Our study is comparable with the studies

by Abou Madi(1975)<sup>1</sup>, Bahman Venus and Venugopal Polassani(1984)<sup>3</sup>, Laurito CE et al (1988)<sup>26</sup>, R.K.Stoelting et al (1977)<sup>16</sup> and Sklar B Z et al(1992).<sup>15</sup>

Duration of laryngoscopy was based on the study done by R.K.Stoelting et al (1977)<sup>16</sup> where they demonstrated near maximal pressor response at 45 sec of laryngoscopy, with little to no additional increase with sustained laryngoscopy. They concluded that attempts to attenuate pressor responses to laryngoscopy and intubation would seem to be most appropriate when intubation is more than 30secs. Laryngoscopy for 60secs provides maximum intubation response as per Bahman Venus and Venugopal Polassani(1984)<sup>3</sup>.

Abou Madi(1975)<sup>1</sup> carried out a study in 20 patients divided in to two groups: The 10 pretreated patients were allowed to inhale 6-8 ml of a mixture containing 1/3 of 2 % viscous lignocaine and 2/3 of 4% aqueous Lignocaine (nebulising lignocaine) and in 10 patients normal saline was used for nebulisation as control. In pre treated patients average rise in systolic blood pressure was 10.3% the pulse rate increased 16.8% whereas in the control group blood pressure was 56% and the pulse rate increased by 38.8%. In our study the average rise in HR in group III(4% lignocaine nebulisation) was 8.5% in group II(2% lignocaine nebulisation) was 10.7% and in control the rise was 23.75%. the average rise in SBP in group III was 4% in group II was 13.3% and in control 16.1% was noted the results were comparable with the above study.

A similar study by Bahman Venus and Venugopal Polassani(1984)<sup>3</sup> studied the effects of aerolised lignocaine 6ml of 4% (240mg) lignocaine was given for 5mins before attempting laryngoscopy and intubation and in control group, saline aerosol was used prior to induction and intubation. Lignocaine nebulisation prevented tachycardia and hypertension during laryngoscopy and intubation while in the control group there was a significant increase in heart



rate and systolic blood pressure. In our study we used 4ml of either 2% or 4% of lignocaine and normal saline as control, nebulised for 10mins. In lignocaine nebulised group there was decrease in heart rate and blood pressures compared to the control group. Cardiovascular changes were monitored in all the groups till 10mins post intubation at interval of 1min, 3min, 5min and 10mins. The difference in p value between 2% lignocaine group and 4% lignocaine nebulisation group was strongly significant ( $p \leq 0.01$ ) at all intervals for HR, DBP and MAP, but SBP was strongly significant ( $p \leq 0.01$ ) at 5min interval and moderately significant ( $p \leq 0.05$ ) at 3min and 10min.

Sklar B Z et al (1992)<sup>15</sup> have shown that inhalation of lidocaine 120 mg prior to induction of anesthesia is an effective, safe, and convenient method to attenuate the circulatory response to laryngoscopy and endotracheal intubation. They carried out a study where in 40 patients were randomly assigned to receive inhalation of either lidocaine 40 mg or a 0.9% solution of sodium chloride (placebo). The next 20 consecutive patients received inhalation of lidocaine 120 mg, and another 20 consecutive patients received intravenous (IV) lidocaine 1 mg/kg. Mean arterial pressure rose significantly in the IV lidocaine group (21.2 mmHg;  $p < 0.05$ ), the saline inhalation group (29.2 mmHg;  $p < 0.05$ ), and the lidocaine 40 mg inhalation group (22.9 mmHg;  $p < 0.05$ ), but not in the lidocaine 120 mg inhalation group (10.1 mmHg). The heart rate (HR) response to intubation with lidocaine inhalation was dose dependent. In the saline inhalation group, HR increased by 15.6 beats per minute (bpm) ( $p < 0.05$ ); in the lidocaine 40 mg inhalation group, HR increased by 9.1 bpm ( $p < 0.05$ ); and in the lidocaine 120 mg inhalation group, HR increased by only 3.1 bpm. In Our study in 2% lignocaine nebulisation group the increase in mean arterial pressure was moderately significant ( $p \leq 0.05$ ), in 4% nebulisation group it was comparable with baseline and in control group it was strongly significant ( $p \leq 0.01$ ). The heart rate increased by 9 bpm in 2% lignocaine nebulisation group and 19 bpm in control group but in 4% nebulisation group the heart rate increase was 7 bpm.

Gupta A, Kaul H L (1991)<sup>24</sup> studied effects of nebulised lignocaine on cardiovascular response to laryngoscopy and intubation in 55 patients of ASA grade I/II. Pt of group I (n=15) received 6mg/kg lignocaine nebulised completely, group II (n=10) nebulised for 10mins irrespective of dose of lignocaine. This was compared with group III (n=15) IV lignocaine 2mg/kg administered 2mins before intubation and

control group IV (n=15) in which no lignocaine was given. They showed that all the hemodynamic variables increased significantly after intubation over the corresponding baseline value for that group.

In our study none of the patients developed arrhythmic changes. In Venus et al<sup>3</sup> study 4 out of 10 patients in control group developed premature ventricular contractions. In our study there was no incidence of patients coughing or bucking at any time of endotracheal intubation. Abou Madi<sup>1</sup> observed 40% incidence of arrhythmias and no arrhythmias in lignocaine nebulisation group.

**Acknowledgement:** I am thankful to Director, Kidwai Institute of Oncology, Bangalore for permitting me to do this study.

**Conflict of Interest:** None

**Sources of Support:** None

**Ethical Clearance obtained.**

## REFERENCES

1. Abou Madi M, Kelzler H, Yacoub O: A Method of prevention of cardiovascular reactions to laryngoscopy and intubation. Canadian Anesthesia Society Journal 1975; 22:316.
2. Asfar S N Abdulla Wythe the effects of various administration routes of lignocaine on the haemodynamic and ECG rhythm during endotracheal intubation. Acta anesthesiologica Belgica 1990;41:17-24
3. Bahman Venus, Venugopal Polassani, Con Gial Pham: Effects of aerolized lignocaine on circulatory responses to laryngoscopy and tracheal intubation. critical care medicine 1984;12:391-4.
4. Burstein C L, Lo Pinto F J, Newman: Electrocardiographic studies during endotracheal intubation; Effects during usual routine techniques; Anesthesiology 1950;11:224.
5. Fox E J Sklar G S, Hill C H, et al: complications related to pressor response to endotracheal intubation. Anesthesiology 1977; 47:524-25
6. G D Puri, Y.K. Batra: Effects of Nifedepine on the cardiovascular responses to laryngoscopy and intubation. British Journal of anaesthesia 1988;60:579
7. Gold M, Brown Mand Selem J: The effects of Esmolol on haemodynamic after ketamine induction and intubation Anesthesiology 1982;61;119.

8. Helfman SM,Gold M I,Delisser E A,Herrington CA:Which drug prevents tachycardia and hypertension associated with tracheal intubation ;Lignocaine ,Fentanyl or Esmolol? *Anesthesia and Analgesia* 1991;72 :482-6
9. King B D,Elder J D ,Procter D F ,et al :Reflex circulatory responses to tracheal intubation performed during general anesthesia.*Anesthesiology* 1951;12:556
10. Lev R,Rosen P:Prophylactic lignocaine use preintubation :a review :*Journal of Emergency Medicine* 1994;12(4):499-506
11. Miller Forbes and F G Dally :Acute hypertension during induction of anesthesia and endotracheal intubation in normotensive men.*British Journal of Anesthesia*1970;42:618
12. Mostafa SM ,Murthy B V,Barett P J,McHugh P:Comparision of the effects of lignocaine spray applied before or after induction of anesthesia on the pressor response to direct laryngoscopy and inubation .*European Journal of Anaesthesiology* 1999;16(1)7-10
13. Prys Roberts C,Green L T,Meloche R et al:Studies of Anesthsial in relation to hypertension.Haemodynamic consequences of induction and endotracheal intubation .*British Journal of Anaesthesia* 1973;43:531.
14. Reid LC, Brac D E:Irritation of the respiratory tract and its reflex effect on heart rate.*Surgery Gynecology Obstetris* 1940;70:157.
15. Sklar B Z,Lurie S ,Krichelli D,Savir I,Soroker D:Lignocaine inhalation attenuates the circulatory response to laryngoscopy and endotracheal intubation .*Journal of Clinical Anesthesia* 1992 ;4(5):382-5
16. Stoelting R K :Circulatory changes during direct laryngoscopy and tracheal intubation :Influence of duration of laryngoscopy with or without prior lignocaine .*Anesthesiology* 1977;47:381
17. Takeshima K,Noda K,Higaki M;Cardiovascular response to rapid anesthesia induction and endotracheal intubation. *Anesthesia Analgesia* 1964; 43:201
18. Ward R J, Allen G D, Deveny L J, et al: Halothane and cardiovascular response to endotracheal intubation. *Anesthesia and Analgesia* 1965; 44:248.
19. Dr Liaquath Ali, Dr Raja Mushtaq Laryngoscopy and tracheal intubation; Efficacy of IV Lignocaine in attenuating Hemodynamic responses. *Professional med J sep* 2005:267-272.
20. James F Hamill, Robert F Bedford, David C Weaver, Austin colohan.Lignocaine before endotracheal intubation: Intravenous or laryngotracheal. *Anesthesiology* 1982(55): 578-581.
21. Nibedita Pani, Shovan kumar Rath .Regional and Topical Anaesthesia of upper Airways. *Indian Journal of An aesthesia* 2009(53):61-648
22. Donald Martin et al: low dose fentanyl blunts circulatory responses to tracheal intubation. *Anesthesia and Analgesia* 1982(61):680.
23. Kay B, Nolan D, Mayall R: The effects of sufentanyl on the cardiovascular responses to tracheal intubation. *Anesthesia* 1987(42):382.
24. Black T E, Kay B, Healy Tej: Reducing the hemodynamic responses to laryngoscopy and intubation; A comparison of alfentanyl with fentanyl. *Anesthesia*1984 (39)883.
25. Laurito CE, Baughman VL, Becker GL, Polek WV, Riegler FX, VadeBoncouer TR: Effects of aerosolized and/or intravenous lidocaine on hemodynamic responses to laryngoscopy and intubation in outpatients. *Anesthesia and Analgesia* 1988; 64:389-92.

# Knowledge on Dengue in a Section of Medical Students of Rajahmundry, Andhra Pradesh

**S K Patnaik**

*Assistant Professor, Department of Community Medicine, G.S.L. Medical College, Rajahmundry, Andhra Pradesh*

## ABSTRACT

A study was conducted on students of 150 batch (MBBS second semester) & 119 batch (MBBS sixth semester) of GSL medical college, Rajahmundry to assess overall knowledge regarding Dengue fever among these medical students. By random sampling technique, 50 students from 150 batch and an equal number of 50 students from 119 batch were selected and interviewed on a pre-designed questionnaire. Students of 150 batch had no exposure whatsoever to the subject whereas the students of 119 batch had been taught the subject in their class in the recent past and had also clinical exposure in the hospital. Thus, the data emanating from the study indicated overall common knowledge on dengue and in these two different groups of students for comparison. As said earlier, the juniors had not been taught the subject and had no clinical exposure. Hence their knowledge could be more or less compared with any other student of biological sciences. The seniors although have been taught the subject and have clinical exposure, they lacked knowledge on entomological aspects particularly mosquito bionomics, clinical manifestations, clinical staging, criteria for diagnosis and management of cases. There is a need to refresh their knowledge because of the rapid geographic expansion of both the virus and the mosquito, regularity of epidemics, and the increasing occurrence of Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) all causing great concern.

**Keywords:** *Dengue, Dengue Hemorrhagic Fever, Dengue Shock Syndrome, Aedes Aegypti, Tourniquet Test, Thrombocytopenia*

## INTRODUCTION

Dengue/Dengue Hemorrhagic Fever (DHF) is an emergent disease in India. It is endemic in some parts of country and contributes annual outbreaks of dengue/ DHF. Dengue virus infection is an escalating health problem throughout the world because of increasing mortality and morbidity and is currently endemic in over 100 countries<sup>1,2</sup>. Dengue is transmitted by the bite of an *Aedes* mosquito infected with any one of the four dengue viruses. It occurs in tropical and sub-tropical areas of the world. Symptoms appear 3—14 days after the infective bite. Dengue fever is a febrile illness that affects infants, young children and adults. Symptoms range from a mild fever, to incapacitating high fever, with severe headache, pain behind the eyes, muscle and joint pain, and rash. There are no specific antiviral medicines for dengue. It is important to maintain hydration. Use of acetylsalicylic acid (e.g. aspirin) and non steroidal anti-inflammatory drugs (e.g. Ibuprofen) is not recommended. Dengue haemorrhagic fever (fever, abdominal pain, vomiting,

bleeding) is a potentially lethal complication, affecting mainly children. Early clinical diagnosis and careful clinical management by experienced physicians and nurses increase survival of patients.<sup>3</sup> The present study was carried out in GSL medical college, Rajahmundry with the following aims and objectives.

## AIMS AND OBJECTIVES

1. To assess overall knowledge regarding Dengue fever among some medical students – one group comprising of junior students without any exposure to the subject and another group of senior students who had been taught the subject in their class in the recent past and had also clinical exposure in the hospital
2. To compare the knowledge between two groups.
3. To ascertain as to how much knowledge the senior batch students could gain from their clinical exposure and teachings with a view to plan for further improvement in their knowledge.

## MATERIAL AND METHOD

The study was conducted on students of 150 batch (MBBS second semester) & 119 batch (MBBS sixth semester) of GSL medical college, Rajahmundry. Randomly, 50 students from 150 batch and an equal number of 50 students from 119 batch were selected and interviewed on a pre-designed questionnaire. Students of 150 batch had no exposure whatsoever to the subject whereas the students of 119 batch had been taught the subject in their class in the recent past and had also clinical exposure in the hospital. Thus, the data emanating from the study indicated their overall common knowledge on dengue and the data was used for comparison of the knowledge in two different groups of students. The study also showed as to how much knowledge the senior batch students could gain from their clinical exposure and teachings. The data were manually analyzed.

## RESULTS AND DISCUSSION

**Table 1: Knowledge about causative agent:**

Knowledge about dengue	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
Bacterial	2 (4%)	2(4%)	4
Viral	42 (84%)	40(80%)	82
Fungal	0(0%)	0(0%)	0
Parasitic	6(12%)	8(16%)	14
Total	50 (100%)	50 (100%)	100

**Table 2: Knowledge on Mode of transmission:**

Transmitted by	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
Direct contact	0(0%)	0(0%)	0
Vector borne	36(72%)	50(100%)	86
Droplet infection	4(8%)	0(0%)	4
Blood transfusion	10(20%)	0(0%)	10
Total	50 (100%)	50 (100%)	100

**Table 3: Knowledge on Vector involved for transmission:**

Vector	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
Fleas	0(0%)	0(0%)	0
Mosquitoes	39(78%)	50(100%)	89
Ticks	8(16%)	0(0%)	8
Flies	3(6%)	0(0%)	3
Total	50 (100%)	50 (100%)	100

**Table 4: Knowledge on Species of mosquito involved in transmission:**

Species	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
<i>Culex quinquefasciatus</i>	5(10%)	0(0%)	5
<i>Anopheles fluviatilis</i>	9(18%)	0(0%)	9
<i>Aedes aegypti</i>	36(72%)	50(100%)	86
<i>Mansoniun annulifera</i>	0(0%)	0(0%)	0
Total	50 (100%)	50 (100%)	100

**Table 5: Knowledge on breeding places of vectors:**

Breeding place	Batch		Total (%)
	150 (n=50)	119 (n=50)	
Fresh water	7(14%)	6(12%)	13
Water storage containers	31(62%)	40(80%)	71
Running waters	4(8%)	0(0%)	4
Paddy fields	8(16%)	4(8%)	12
Total	50 (100%)	50 (100%)	100

**Table 6: Vector biting habits:**

Biting time	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
Day time	32(64%)	28(56%)	60
Night time	18(36%)	22(44%)	40
Total	50 (100%)	50 (100%)	100

It may be seen from tables 1-6 that overall, 82% of the students knew that dengue is a viral disease. The knowledge of senior and junior students was more or less similar. All the students (100%) of the senior batch knew that the disease was vector borne involving the mosquitoes *Aedes aegypti* whereas 78% of juniors knew that it was a mosquito borne disease and 72% said that it was transmitted by *Aedes mosquitoes*. Overall, 71% of respondents (80% seniors and 62% juniors) said that the mosquitoes bred in water storage containers. Others said that it bred in fresh water, running water and paddy fields. Regarding biting habit of *Aedes aegypti*, 60% of the respondents told that it bites during day time. Surprisingly, knowledge of juniors (64%) was slightly better than that of seniors (56%). In an earlier study, overall 82.4 percent respondents knew that dengue fever is transmitted by mosquito & 54 persons associated Dengue with flies/person to person transmission<sup>4</sup>. A field-based study from Thailand<sup>5</sup> also had similar findings. Another study from Delhi<sup>6</sup> concluded that 71 and 89 percent respondents from rural and urban areas respectively had the knowledge regarding mosquito transmission. Regarding knowledge about breeding, 79.8 % respondents knew



about breeding places of mosquitoes.<sup>4</sup> In another study, while 93% people knew that the vector for dengue is a mosquito, almost half of them 51.5% were aware that dengue is specifically caused by the *Aedes* mosquito.<sup>7</sup>

**Table 7: Important clinical manifestations of Dengue:**

Knowledge	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
No knowledge	30(60%)	7(14%)	37
Partial knowledge	17(34%)	30(60%)	47
Complete knowledge	3(6%)	13(26%)	16
Total	50 (100%)	50 (100%)	100

**Table 8: Knowledge on clinical stages of Dengue:**

Knowledge	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
No knowledge	42(84%)	16(32%)	58
Partial knowledge	8(16%)	30(60%)	38
Complete knowledge	0(0%)	4(8%)	4
Total	50 (100%)	50 (100%)	100

**Table 9: Serotypes involved in dengue:**

Serotypes	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
1	0(0%)	0(0%)	0
2	5(10%)	0(0%)	5
3	20(40%)	5(10%)	25
4	20(40%)	41(82%)	61
5	5(10%)	4(8%)	9
Total	50 (100%)	50 (100%)	100

**Table 10: Criteria for diagnosis of DHF:**

Criteria	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
Hemodilution	2(4%)	0(0%)	2
Thrombocytopenia	23(46%)	40(80%)	63
Hemoconcentration	17(34%)	2(4%)	19
Decrease in ESR	8(16%)	8(16%)	16
Tourniquet test	8(16%)	22(44%)	30

**Table 11: Management of Dengue case:**

Management method	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
Anti viral drugs	10(20%)	10(20%)	20
Aspirin to keep temp < 40°C	9(18%)	0(0%)	9
Conservative therapy with fluid management	27(54%)	34(68%)	61
Isolation of patient	4(8%)	6(12%)	10

Total	50 (100%)	50 (100%)	100
-------	-----------	-----------	-----

**Table 12: Knowledge about prevention of Dengue:**

Method	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
Immunization	8(16%)	0(0%)	8
Vector control	26(52%)	48(96%)	74
Personal hygiene	13(26%)	0(0%)	13
Screening of blood before transfusion	3(6%)	2(4%)	5
Total	50 (100%)	50 (100%)	100

**Table 13: Availability of vaccine against Dengue:**

Availability	Batch		Total (%)
	150 batch (N=50)	119 batch (N=50)	
Available	21 (42%)	3(6%)	24
Not available	29(58%)	47(94%)	76
Total	50 (100%)	50 (100%)	100

It may be seen from tables 7-13 that overall, 37% of the students had no knowledge about Important clinical manifestations of dengue whilst 47% had partial knowledge and only 16% had complete knowledge (26% seniors and 6% juniors). Regarding clinical staging, 58% had no knowledge (juniors 100%), 38% had partial knowledge and only 4% had complete knowledge.

In an earlier study regarding knowledge about signs and symptoms of dengue, 61.8 % persons could enumerate one symptom (fever), 20.6% persons could enumerate 2 symptoms (fever, bleeding) and 11.2% persons could enumerate 3 symptoms of Dengue (fever, headache & bleeding)<sup>4</sup>. Similar findings were also reported by another study<sup>6</sup>. In another study, fever (74.5%), headaches (45.6%), bleeding (35.1%), rash (28.2%), abdominal pain (25.4%) and nausea/vomiting (22.7%) were associated with dengue.<sup>7</sup>

Overall, 61% of the students knew that there were 4 serotypes of dengue virus of which 82% were from the senior batch. Regarding criteria for diagnosis, over all, 63% of students (80% seniors) said thrombocytopenia, 19% haemoconcentration and 30% positive tourniquet test. Regarding management of cases, overall, 61% of respondents said conservative therapy with fluid management, 20% antiviral drugs, 9% aspirin and 10% isolation of cases. All the senior students knew that aspirin should not be given; however, 12% of the seniors suggested isolation of the patients.

As regards prevention, 74% of the respondents advocated vector control (Seniors 96%). About vaccine availability, 76% of the students said that no vaccine was available against dengue of which 94% were seniors. In an earlier study<sup>7</sup> with regards to the knowledge of the preventive practices, people were generally aware of spraying (62%), mosquito nets (49%), repellents (38.6%) and disposal of garbage (20.4%). Frequently changing stored water and using fish in stored water were reported by 18% and 5% of the respondents respectively.

### CONCLUSION

This study provided an overview of the knowledge of junior and senior medical students in dengue. The juniors have not been taught the subject and have no clinical exposure. Hence their knowledge could be more or less compared with any other student of biological sciences. The seniors although have been taught the subject and have clinical exposure, they lacked knowledge on entomological aspects particularly mosquito bionomics, clinical manifestations, clinical staging, criteria for diagnosis and management of cases. There is a need to refresh their knowledge because of the rapid geographic expansion of both the virus and the mosquito, regularity of epidemics, and the increasing occurrence of Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) all causing great concern.

### ACKNOWLEDGEMENT

The author is thankful to the 7<sup>th</sup> semester (Group K) students of GSL Medical College, Rajahmundry who participated in this study.

The author wishes to confirm that there are no known conflicts of interest associated with this publication and there has been no financial support for this work that could have influenced its outcome. Ethical clearance was obtained from the institutional ethical committee before the study.

### REFERENCES

1. Guzmán MG, Kourí G. Dengue: an update. *Lancet Infect Dis* 2002; 2: 33-42.
2. Gubler DJ. Epidemic dengue/dengue hemorrhagic fever as a public health, social and economic problem in the 21st century. *Trends Microbiol* 2002; 10: 100-3.
3. World Health Organization (2013) web site [www.who.int](http://www.who.int)
4. S Matta, S Bhalla, D Singh, S K Rasania, S Singh- Knowledge, Attitude & Practice (KAP) on Dengue fever: A Hospital Based Study: *Indian Journal of Community Medicine* Vol. 31, No. 3, July-September, 2006
5. Swaddiwudhipong W, Lerdlukanavong P, Khumklam P, Koonchote S, Nguntra P, Chaovakiratipong C. A survey of knowledge, attitude and practice of the prevention of dengue hemorrhagic fever in an urban community of Thailand. *Southeast Asian J Trop Med Public Health*. 1992; 23(2):207-11.
6. Gupta P, Kumar P, Aggarwal OP., Knowledge, attitude and practices related to dengue in rural and slum areas of Delhi after the dengue epidemic of 1996. *J Commun Dis*. 1998 Jun; 30(2): 107 -12.
7. Madiha Syed, Umme-Rubab Syeda, Manal Habib, Rehan Zahid, Atif Bashir, Madiha Rabbani, et al: Knowledge, attitudes and practices regarding dengue fever among adults of high and low socioeconomic groups: *Journal of Pakistan Medical Association* Mar 2010



# Factors Affecting the Acceptance of Abortion Services in Rural Area of Central India

Meenakshi Khapre<sup>1</sup>, Raviprakash Meshram<sup>2</sup>, Abhay Mudey<sup>3</sup>, Vasant Wagh<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Community Medicine, Jawaharlal Nehru Medical College, Sawangi (M), Wardha, Maharashtra, India, <sup>2</sup>Asst. Prof., Shri Vasantroa Naik Govt medical College, Yavatmal, Maharashtra, India, <sup>3</sup>Professor and Head, <sup>4</sup>Professor, Department of Community Medicine, Jawaharlal Nehru Medical College, Sawangi (M), Wardha, Maharashtra, India

## ABSTRACT

**Introduction:** Approximately 46 million abortions performed worldwide in 1995, about 20 million were illegal. There is a great paucity on status of knowledge of community regarding MTP. Therefore, the present study was carried out in rural area to highlight some reasons for under-utilization of MTP service.

**Method:** Study was carried in a PHC, attached to tertiary care hospital consisting of ten. After systematic random sampling of household, 1271 women gave consent, 113 who undergone safe abortion was identified and both the groups were compared for social, psychological, economic, cognitive and affective factors related to abortion.

**Result:** Young age, marital status, literacy, parity >2, higher social class were significantly associated with abortion service seekers. Significant difference was found in awareness and attitude towards abortion in above two groups. 85% women felt abortion should be accepted socially. 8.8% abortees had made the self decision, 40.7% and 43% got the social and economic support respectively.

**Conclusion:** Unawareness about the MTP services and its legal status is basic hindrance for acceptance of service along with illiteracy, low socio-economic status, fear of disapproval, lack of privacy and complication related anxiety attached to it.

**Keywords:** Abortion, Legislation, Right of Women, Unmet-Needs

## INTRODUCTION

Approximately 46 million abortions were performed worldwide in 1995 of which 20 million were illegal. The abortion rate worldwide was about 35 per 1,000 women aged 15–44. Of all pregnancies (excluding miscarriages and stillbirths) 26% were terminated by abortion. <sup>[1]</sup> Latest estimate also reports 20 million of unsafe abortions worldwide. <sup>[2]</sup> Since time immemorial,

due to social restrictions, women have been resorting to abortion to terminate their unwanted pregnancies by the hands of quacks and risk their life. The developing areas of World where 79% World people lies account 64% legal and 95% illegal abortion. <sup>[1]</sup> Considering the high mortality, several countries along with India has legalized the abortion under certain circumstances. In India legal abortion rate for 1995 was just 2.7, as only 10% was conducted by qualified personnel in approved institution and that too were grossly under-reported so this represent only fraction of total number of induced abortions taking place in country. <sup>[2,3]</sup>

MTP act does not encompasses the fundamental right to induced abortion but limited to liberalization of condition under which women may perform abortion provided by Registered Medical Practitioner

---

### Corresponding author:

Meenakshi Khapre

Assistant Professor

Department of Community Medicine, Jawaharlal Nehru Medical College, Sawangi (M), Wardha, Maharashtra, India

Mob no : 8275395006

Email: drmeenaxi15@ymail.com

as stated by *Jesani and Iyer*.<sup>[4]</sup> Thus from medical angle, termination of pregnancy is therapeutic intervention to save life of mother rather than right. Abortion is not just a medical or legal issue but has various moral, ethical, political, cultural impositions that make it difficult for women to access the abortion service. Abortion is recognized as traumatic experience for women both physically and psychologically.

On analysis of data from 1971 – 91, the average number of MTP per centre decreased from 130 to 85.

<sup>[4]</sup> The latest estimate contends a rate of 3 illegal abortions to one legal in rural area and corresponding ratio of 4-5:1 in urban.<sup>[5]</sup>

Despite predominantly rural location of population a majority of the studies are conducted in urban area. There is great paucity on status of knowledge of community regarding MTP. So the present study was carried out in rural area of Wardha district to highlight some points on reason for under-utilization of MTP service even after five decade of liberalization. The study was carried out with the further objective to know the demographic characteristic of abortion service seekers, knowledge about MTP and attitude of women towards abortion practices and at last the experience of abortion service seeker. Different issues related to social factor (age, sex, marital status, parity, education and social class), psychological factor (social support, counseling), economic factor (affordability, transport), cognitive (lack of information) and affective factors (perception toward abortion practices) were included in study.

## MATERIAL AND METHOD

The present study was carried in a field practice area of a teaching medical institute in a district of central India. It consists of ten villages with total population of 14,722 that includes 3843 households. Awareness about medical termination of pregnancy (MTP) was found to be 26% among the women of reproductive age group (15-44) on basis of pilot study. In view of that sample size with 95% of confidence limit is calculated to be 1138 and considering 10% non response rate it is almost 1251.

In each villages house listing was done and from first three houses one was randomly selected, then by systematic random sampling every third house was selected until total villages were covered. From one household only one women in 15-44 yrs age group was selected for assessing the knowledge of MTP and

attitude towards abortion, then she was asked for whether herself or any one in same household had history of safe abortion anytime in past. Safe abortion here is defined as procedure for terminating unintended pregnancy either by person with necessary skill or in an environment that confirm to minimum medical standard or both as per the MTP act.<sup>[6]</sup>

Confidentiality of response was maintained. Along with knowledge and attitude towards abortion, questionnaire regarding her experience with abortion was administered. If no woman in 15-44 yrs was found in household or not willing to give consent then next third house was selected. Therefore, from 1281 houses, women from 1249 gave consent. From 22 houses two women were selected as women other than randomly selected for assessing the knowledge and attitude had history of abortion. So total 1271, women were included in study. Pretested structured questionnaire was administered in local language by face-to-face interview. Women who had safe abortions (113) were further enquired for their experience. Univariate analysis was done by chi square test.

## RESULTS

12% of women in 15-24 yrs of age group had a safe abortion, which is higher than other age groups. Almost all the abortion seekers were married except five. Abortion service is more utilized among those who had secondary (12%) or higher education (12.5%) and whose husbands also had secondary (12%) or higher education (15%). 12.5% of women with more than two children had seek the abortion against only 3.5% of nulliparous. Comparatively more MTP's were reported among higher social class III (19%) and II (15%). (Table 1)

39.8% of abortion seekers know the legal status of abortion against 22% of others. 32.7% of abortion seekers aware of MTP while only 20% knows the method use for abortion, 16% know the exact time upto which abortion is permitted. 28% were aware of place where service is available. Only 12.4% perceived the negative side effect of abortion and 40.7% had positive feeling about support by husband or family. 98% of abortion seekers and 83% of others felt that abortion should be accepted by society. However, there was significant difference of awareness and attitude towards abortion in above two groups. (Table 2)

Only 8.8% had made the self decision while 20% were forced by family or husband. 40.7% and 43% got

the social and economic support respectively. Transport facility was only available for 22% of abortees. 34.8% felt the cost was too high. 37% received the pre-counseling, 23.8% of abortee at one or other

time felt like hiding the abortion from family and society. Positive findings were about 63% felt that their confidentiality was maintained and only 8% had some minor complications. (Table 3)

**Table 1: Demographic characteristic of study participants**

Demographic characteristic		Had abortion (113)	No attempt of abortion (1158)	Total (1271)	P value
Age	15- 24	47(12.27%)	336(88.51%)	383(30.13%)	$\chi^2 - 11.3 p= 0.004$
	25- 34	43(9.13%)	428(90.88%)	471(37.06%)	
	35-44	23(5.51%)	394(94.49%)	417(32.81%)	
Marital status	Married	108(9.58%)	1019(90.41%)	1127(88.67%)	$\chi^2- 5.15p= 0.023$
	Unmarried	5(3.47%)	139(96.52%)	144(11.33%)	
Wife educational status	Illiterate	21(8.26%)	233(91.73%)	254(20%)	$\chi^2- 9.066p = 0.037$
	1 <sup>st</sup> – 4 <sup>th</sup>	37(6.78%)	509(93.22%)	546(42.96%)	
	5 <sup>th</sup> – 9 <sup>th</sup>	43(12.12%)	312(87.89%)	355(27.93%)	
	>10 <sup>th</sup>	12(12.5%)	84(87.5%)	96(7.55%)	
Husband educational status	Illiterate	12(5.8%)	195(94.2%)	207(16.29%)	$\chi^2- 18.4 p = 0.0001$
	1 <sup>st</sup> – 4 <sup>th</sup>	31(6.05%)	481(93.94%)	512(40.28%)	
	5 <sup>th</sup> – 9 <sup>th</sup>	53(12.04%)	387(87.95%)	440(34.62%)	
	>10 <sup>th</sup>	17(15.17%)	95(84.82%)	112(8.81%)	
Parity	0	6 (3.57%)	162(96.43%)	168(13.22%)	$\chi^2- 11.9p = 0.01$
	1	29(10.24%)	254(89.75%)	283(22.26%)	
	2	42(7.88%)	491(92.12%)	533(41.93%)	
	>2	36(12.54%)	251(87.46%)	287(22.58%)	
Social class	II	6(15.38%)	33(84.6%)	39(3.07%)	$\chi^2- 32.12 p = 0.00001$
	III	32(19.28%)	134(80.72%)	166(13.06%)	
	IV	64(7.96%)	740(92.04%)	804(63.26%)	
	V	11(4.2%)	251(95.8%)	262(20.61%)	

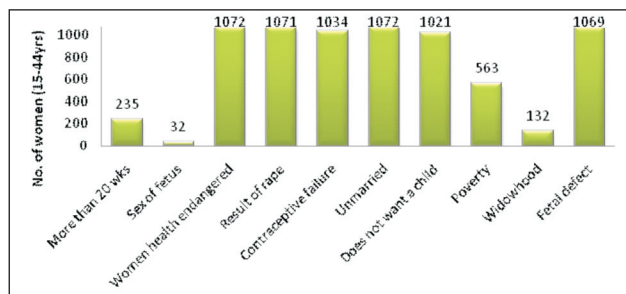
**Table 2: Awareness about MTP and attitude towards abortion of study participants**

Question	Had abortion (113)	No attempt of abortion (1158)	Total (1271)	P value
1	45(39.82%)	254(21.93%)	299(23.52%)	$\chi^2= 17.3 p- 0.0001$
2	37(32.74%)	219(18.91%)	256(20.14%)	$\chi^2= 11.4 p- 0.000$
3	23 (20.35%)	26(2.24%)	49(3.85%)	$\chi^2= 86.24 p- 0.000$
4	18 (15.93%)	82(7.081%)	100(7.87%)	$\chi^2= 9.932 p- 0.002$
5	32(28.32%)	131(11.31%)	163(12.82%)	$\chi^2= 25.13 p- 0.000$
6	14 (12.39%)	396(34.2%)	410(32.26%)	$\chi^2= 21.4 p- 0.000$
7	46(40.71%)	254(21.93%)	300(23.6%)	$\chi^2= 19.09 p- 0.000$
8	111(98.23%)	961(82.99%)	1072(84.34%)	$\chi^2= 16.9 p- 0.000$

1. What is Legal status of abortion?
2. What is MTP?
3. Any one method use in MTP?
4. Month upto which MTP can be done?
5. Name atleast one place where service is available?
6. Do you perceive any major negative side effects of abortion?
7. Will you be supported by husband or family if you done it?
8. Should abortion be accepted?

**Table 3: Experience of 113 Women undergone legal abortion**

	Positive answer	Percentage
Decision by self	10	8.84%
Decision by husband /family	23	20.35%
Decision by both	73	64.6%
Decision by doctor	7	6.19%
Got social support	46	40.71%
Got economic support	49	43.36%
Transport available	25	22.12%
High cost a problem	39	34.82%
Pre-counseling done	42	37.16%
Talk to doctor confidentially	71	62.8%
Any complications experience	9	7.96%
Anytime felt like hiding abortion	27	23.89%

**Fig. 1. Response of the 1072 study participants on question: On which grounds according to you abortion should be allowed?**

## DISCUSSION

According to Ministry of health and family welfare (MOHFW) in 1996-97, only 4.6 lacs MTP were performed in country against 6.7 million abortions per year are performed in other than registered institute by untrained person in unhygienic condition.<sup>[7]</sup> In the present study 113 women (8.81%) were the abortion service seekers. The number of abortees was very low as many had the illegal abortion. Mainly young women seek the abortion service (41.5%) similar to findings in other studies.<sup>[8,9]</sup>

Early marriage is common in India and most of the women have one or two children by time they are 25 yrs old, thus they now opt for MTP to limit the family size. Almost husbands of majority of those who seek abortion were literate. Among illiterate women only 8% had used the service. Patel et al also showed that number of illiterate were very less as compared to primary and secondary educated (21% v/s 79%) whereas in present study it was 18.5% v/s 81.5%.<sup>[10]</sup> 95.5 % of them were married which is similar to other

studies.<sup>[8,9]</sup> Ganatra (2000) also reported majority of married abortion seekers against 2-3 % unmarried.<sup>[9]</sup> Pregnancy out of wedlock is considered a crime that forces them to abort privately at distant place by untrained person. According to Jeejabhoy, half of unmarried women seeking abortion are adolescent similar to present study where three out of five were adolescent.<sup>[11]</sup> Those among parity 2 and >2, 7.8% and 12.5% had safe abortion mainly for limiting their family size. As first pregnancy is highly valued, only 3.5% of nulliparous women had induced abortion. Among parity 1, 10% had safe abortion for spacing. Thus, there is an unmet need of family planning methods in community and deficit knowledge about contraceptive methods. Higher social status women (class I&II) mostly used MTP services. Lower class were either unaware of service or had limited access to it. According to Khan et al in UP in 2001 only quarter of PHCs provide abortion services as they are plagued by inadequate facilities, infrastructure and inappropriate utilization of money and manpower.<sup>[12]</sup>

39.8% and 32.7% of service seekers were aware of legal status of abortion and MTPs as against 21.9% and 18.9% of remaining women respectively. As present study is mainly carried out in rural area so awareness is less than ICMR study (38%) but the later study had also reported very low awareness among the villagers.<sup>[13]</sup> A study carried by CORT in Bihar (1995) revealed that 28% were aware among this, 37% approved MTP against 10% who consider it illegal.<sup>[14]</sup> Awareness of MTP and its legal status has positive impact on approval of abortion. In addition, there is significant knowledge gap among the service seekers and non-service seekers about the method used, month upto which it can be done and approved place for it. Other studies also showed that only 9% knew the correct timing when abortion is permitted and many were unaware of registered facility.<sup>[13,15]</sup> Among those who had safe abortion only 14% perceived major negative side effect while 34% in other group. 40% of service seekers perceived the support of husband and family as against only 22% of remaining women. Such fear about the side effects and non-acceptance by family is a barrier to utilization of service. Available evidences show that sex selective abortion is vastly increasing and indirect estimate from latest census that estimated decline in sex ratio from 945 in 1991 to 927 in 2001 but its positive finding in present study that only 2% said abortion be done on basis of sex.<sup>[9]</sup>



Only 8.8% made self-decision to abort while 20% were forced by their husband / family. More difficult is decision process and if it's against the will then more likely is negative response after termination leading to depression or psychosis. Though full liberty is given to women for abortion still gender norms play important role. 40% and 43% of women got social and economic support respectively. *Boyle 1997* showed the importance of role of social support for post abortion adjustment. <sup>[16]</sup> Transport facility was a problem for 22% and cost for 34%. Thus, the service is not accessible and affordable to many. Public facility provides service free of cost still there are many hidden cost in form of medicine and illegal fees to staff. <sup>[13]</sup> Though abortion is a stressful life event, their subsequent emotional effect depend on emotional stability prior to abortion, decision making process and perceived social support. Pre-counseling was done in very few abortees. 32% said that providers disregard the need to respect their privacy and confidentiality. CORT study also revealed that in public clinic the modesty and privacy was not well-maintained. <sup>[14]</sup> Due to fear of disapproval by family and taboos attached to it, 17% women felt like hiding the abortion, which further adds to guilt. Still abortion done as per act had proved to reduce the abortion related mortality and morbidity as only 7.96% had some minor complication like abdominal cramp, bleeding etc, none had fatal complication while complications due to unsafe abortion procedure account for 13% of maternal death worldwide. <sup>[1]</sup>

### CONCLUSION

Unawareness about the MTP services and its legal status is basic hindrance for acceptance of service along with illiteracy, low socio-economic status, fear of disapproval, lack of privacy and complication related anxiety attached to it. Abortion centers are insensitive to women psychological need. For liberalized law to be effective it needs to be accompanied by women empowerment, making her aware of reproductive health rights. Emphasis should be more on awareness campaign and making service accessible and affordable to all. Socio-psychological support for a women undergoing abortion should be integral part of service.

**Acknowledgment:** I am thankful to Dr Dawale Asso Prof, JNMC for his expert advice.

**Source of Funding:** None

**Ethical Clearance:** From "DMIMS" Institutional ethical committee

**Conflict of Interest:** None

### REFERENCES

1. Stanley K. Henshaw, Susheela Singh and Taylor Haas , January 1999, The Incidence of Abortion Worldwide, International family planning perspectives Volume 25, Supplement,
2. WHO, 2003, Unsafe Abortion: Global and Regional Estimates of Incidence and Mortality from Unsafe Abortion, third edition, Geneva: WHO.
3. Khan, M.E., S. Barge and G. Philip. 1996 Abortion in India: An overview. *Social Change*, 26(3-4): 208-25.
4. Jesani, Amar and Aditi Iyer. Abortion: Who is responsible for our Rights in Karkal Malini (ed.) *Our lives Our Health*, New Delhi, Co-ordination Unit, World Conference on Women, Beijing, August 1995.
5. Karkal Malini 1991 , Abortion Laws and the Abortion Situation in India' in *Issues in Reproductive and Genetic Engineering*, Vol.4 No.3, pp.223-30.
6. Fact on induced abortion, , Geneva, WHO, Oct 2007.
7. Khan, M.E., S. Rajagopal, S. Barge and N. Kumar, 1998. Situational Analysis of Medical Termination of Pregnancy Services in Gujarat, Maharashtra, Tamil Nadu and Uttar Pradesh, Paper read at International Workshop on Abortion Facilities and Post-Abortion Care and Operations Research, New York, January 19-21.
8. Sarkar N.N, 1993, Legally induced abortion in India, *Health and Population perspective and issues*, 16(384), pg 142-150.
9. Ganatra B.R., S.S. Hirve and V.N. Rao. 2000. Sex-selective abortions: Evidence from a community-based study in Western India, *Asia Pacific Population Journal*, 16(2): 109-24.
10. Patel Tejal, Leuva Bakul, 2006, A 17 year review of voluntary termination of pregnancy (MTP), *Journal of Obstetrics & Gynecology India* Vol. 56, No. 6, November / December : Pg 522-528.
11. Jejeebhoy S. 1996. Adolescent Sexual and Reproductive Behavior: A review of the evidence from India. Washington, D.C.: International Centre for Research on Women.

12. Khan ME, Barge S, Kumar N. Availability and access to abortion services in India: Myths and Realities: Baroda centre for operations research and training, 2001.
13. Illegal abortion in rural areas: A task force study. New Delhi, Indian Council of Medical Research (ICMR). 1989
14. Centre for Operations Research and Training, Situational Analysis of Medical Termination of Pregnancy (MTP) Services in Bihar, CORT, Baroda, 1996.
15. Malhotra A., S. Parasuraman, L. Nyblade et al.. Realizing Reproductive Choices and Rights: Abortion and Contraception in India. International Centre for Research on Women (ICRW), 2003.
16. Boyle M , Rethinking abortion: Psychology, Gender, and the law, New York, Routledge publishers, 1997.



# Post Pubertal Cryptorchidism in Developing Countries: Fertility Outcomes and Challenges in Management

Vikram Singh Chauhan<sup>1</sup>, Ashutosh Niranjana<sup>2</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor & Head, Department of Surgery, School of Medical Sciences, Sharda University, Greater Noida, U.P., India

## ABSTRACT

**Objective:** Most cases of undescended testis are diagnosed and treated in childhood with excellent post-operative results and minimal morbidity. However its presentation in adults provides an opportunity to study its spontaneous course and the challenges associated with its diagnosis, management and outcome.

**Patients and method:** We conducted a prospective study of 62 consecutive patients who were managed for undescended testes above the age of 18 years from February 2008 to October 2012 at Sharda Hospital, Greater Noida.

**Results:** A total of 62 patients, mean age 29 years, range 18-55 years were managed. Only 6.4 % ( 4 cases) presented with primary complaint of undescended testis. Twenty two, 28, 12 were right, left sided and bilateral respectively. Inguinal hernia (45.2%) was the most common associated anomaly, 14 cases (22.25%) had infertility, and ignorance (41.9%) was the commonest reason for delay in presentation. Thirty four cases were intra-canalicular, 8 were intra-abdominal, 3 cases required laparoscopy for detection, and 2 cases were of vanishing testis. Orchiopexy was completed in 28 unilateral and 4 bilateral cases, 10 cases underwent bilateral orchiectomy. Semen parameters did not improve in any case of infertility following orchiopexy.

**Conclusions:** Management of adult cryptorchidism is more challenging due to the absolute and irreversible nature of the changes and significantly poor outcomes, both surgical and psychological in a large proportion of patients. Increasing awareness and education of primary health care workers can help reduce the presentation of cryptorchidism in adults and its attendant complications.

**Keywords:** Cryptorchidism, Fertility, Orchiopexy, Post pubertal

## INTRODUCTION

Undescended testis (UDT) is one of the most common congenital anomaly at birth<sup>1</sup>. Current consensus is that it should be corrected before one year of age<sup>2</sup>. Acquired descent has been proposed in isolated reports<sup>3</sup>. We believe that this is a congenital problem encountered due to late presentation of the cases due to a variety of causes like unsupervised home births, lack of medical facilities, poverty, shyness, and ignorance, general apathy of the patient till the

condition causes significant bother etc. Malignancy and infertility are the most severe complications of UDT. Orchiectomies done in post pubertal males presenting with UDT rarely show normal spermatogenesis with mature spermatozoa and almost all show incomplete maturation<sup>4</sup>. The relative risk of testicular cancer in a cryptorchid testis is 40 times greater than the general population<sup>5</sup>.

We performed this study to analyse the causes, presentation, challenges in management and complications of this condition in this age of information overload.

---

**Corresponding author:**

**Vikram Singh Chauhan**

Flat No.203, Old Staff Quarters, Sharda Hospital Campus, Knowledge Park - 3, Plot No.32-34, Greater Noida-201306, Uttar Pradesh, India

Patients and Methods

This is a prospective study, conducted in department of surgery at Sharda Hospital, School of Medical Sciences & Research, which is located about 35 km from New Delhi. This study was started only after obtaining approval from institutional ethical committee and written informed consent was taken from all patients after full explanation of procedure. All the patients above the age of 18 years with UDT were included in this study. We analysed 62 patients who presented with UDT from February 2008 to October 2012. Age at presentation, laterality, location, presenting complaints, associated anomalies, and type of surgery performed, hospital course and morbidity were analysed.

Ultrasonography (USG) and Computed tomography scan (CT scan) were used to localize clinically impalpable testes. We attempted single stage orchiopexy in all cases where ever it was surgically feasible, where the testis was of normal or near normal size and at least on one side in patients with bilateral UDT. Biopsy was taken from all patients who presented with infertility and all orchiectomy specimens were sent for histo-pathological examination. Pre-operative semen analyses was performed in infertile cases and followed up six weeks after the surgery.

## RESULTS

A total of 74 UDT in 62 patients were evaluated, only 4 patients (1 with bilateral and 3 unilateral UDT) presented with primary complaint of an impalpable testis. Data was tabulated and analysed (Tables 1 & 2). Mean age at time of surgery was 29 years (range 18-55 years). A significant 58 % (36/62) were aware of the condition from childhood, but did not present earlier because of shyness (10/44), poverty (12/44), and because UDT did not cause problems (14/44). Remaining 26 patients were completely ignorant of their condition and sought medical advice for other symptoms. Of the 24 patients whose UDT was impalpable, USG was able to detect only 4 and CT scan added only 6 more to the diagnosis. In 3 cases laparoscopy was done to localize the intra-abdominal testis and in 2 cases, the vas and vessels were found to end blindly (vanishing testis syndrome), in the third case we found a nubbin of residual testicular tissue that was excised. In rest 11 cases testes were detected on inguinal exploration.

Twelve cases of bilateral and 2 unilateral UDT presented with infertility. Semen analyses in all 12

cases with bilateral UDT with infertility revealed complete azoospermia. Both cases with unilateral UDT and infertility also had azoospermia. Per operative biopsy findings in cases with unilateral UDT and infertility showed distorted seminiferous tubules, thickened basement membrane and tunica albugenia with no spermatogenesis. None of the cases of azoospermia showed any improvement in semen parameters following orchiopexy. None of the biopsy specimen revealed malignant or premalignant changes. All the specimen following orchiectomy showed uniform seminiferous tubule hyalinization, testicular atrophy and fibrosis.

Associated inguinal hernia was repaired by Bassini's technique in cases who underwent orchiopexy and by complete canal closure by prolene 1-0 in those who had orchiectomy. Wound infection in inguinal incision occurred in 1 case, 2 cases reported progressive decrease in testicular size at 6 & 9 months following surgery.

**Table 1: Distribution of patient parameters**

Patient Characteristic	No. of patients (%)
<b>Age Distribution in years</b>	
18-30	36 (58.1)
31-40	16 (25.8)
41-50	7 (11.3)
>50	3 (04.8)
<b>Laterality</b>	
Right	22 (35.5)
Left	28 (45.2)
Bilateral	12 (19.4)
<b>Location</b>	
Superficial inguinal Ring	14 (18.9)
Deep inguinal ring	18 (27.4)
Intra-canalicular	34 (51.6)
Intra-abdominal	08 (12.9)
<b>Clinically palpable testis</b>	
Yes	50 (67.6)
No	24(32.4)
<b>Presentation</b>	
Self-awareness	04 (06.5)
Groin pain	16 (25.8)
Inguinal hernia	28 (45.2)
Infertility	14 (22.3)
<b>Reason for delay</b>	
Ignorance	26 (41.9)
Inhibition	10 (16.1)
Poverty	12 (19.4)
Not bothered	14 (22.6)

**Table 1: Distribution of patient parameters (Contd.)**

Patient Characteristic	No. of patients (%)
<b>Marital Status</b>	
Married	38 (61.3)
Unmarried	24 (38.7)
<b>Associated anomalies</b>	
Inguinal Hernia	37 (50.0)
Hypospadias	02 (03.2)
Chordee without hypospadias	01 (01.6)

**Table 2: Procedure performed by laterality of UDT**

Procedure	Unilateral (No. of patients)	Bilateral (No. of patients)
Orchiopexy	28	04
Orchiectomy	18	10
Vanishing testis	00	02

## DISCUSSION

Cryptorchidism is diagnosed and treated in the first two years of life and even in the antenatal period in the western world<sup>6,7,8</sup>, but in our study up to 42% of patients presented after 30 years of age, when the management becomes more challenging and its results less fruitful. An UDT does not require any specific test to arouse suspicion regarding the diagnosis, any trained health worker can point to the condition at birth, still a variety of disturbing causes popped up for delayed presentation in our study. Amazingly ignorance about the condition formed the highest (42%) reported reason for delay, three of these had bilateral UDT and were married and presented to us when the gynaecologist while evaluating the wife for infertility suggested the husband's examination as well. Poverty and inhibition regarding medical examination were the reason in 19.4 % and 16.1 % respectively. Fourteen cases did not present early due to lack of any specific symptoms and sought medical opinion only when they experienced pain or other symptoms. Mandhani .A et al reported similar findings for late presentation of cases of UDT<sup>9</sup>. This is an embarrassing and sad reflection on the government programs promoting free hospitalized delivery and child health.

Of the 24 cases with clinically impalpable testis, USG and CT scan were able to detect only 16.6 % and 25 % of cases respectively. This is less than that reported by C S Desai et al (33.3 %), Sexton et al reported 8 of 14 (57.1%), Sataa Sallami et al were able to detect only 4 out of 10 impalpable testes<sup>10,11,12</sup>. It may be that in adults increased muscle mass and tone along with a soft flabby, smaller atrophied testis may prevent

detection. In the search for an intra-abdominal testicle, CT localization is usually easier if the diameter of the testis is greater than or equal to 1 cm<sup>13</sup>. For us CT scan added six more patients who had impalpable testes. MRI can be expected to provide a correct classification (accuracy) of 85% with a sensitivity of 86% and a specificity of 79%<sup>14</sup>. However the method now preferred for the localization of non-palpable testicle is laparoscopy<sup>14</sup>. Three of our patients required laparoscopy for localization, two such cases demonstrated a blind ending vas and vessels (in 1 case it was bilateral) and in 1 case we found a nubbin of testicular tissue intra-abdominally that was excised. Laparoscopy with its diagnostic and therapeutic value is now the standard of care in an impalpable testis<sup>10,11,15,16,17,18</sup>.

None of the per-operative or orchiectomy biopsy specimens in our series showed either premalignant changes or malignancy. This is similar to findings of Ozen H, et al and Mahmoudreza Moradi et al, who concluded that owing to no report of any malignancy in their series of 100 cases, substitution of intraoperative testicular biopsy with long-time follow up can be utilized to reduce expenses and surgical trauma<sup>19,20</sup>. Jack S. Elder et al in their review of literature regarding the association of cryptorchidism with testicular cancer concluded that while 5% to 15% of scrotal testicular remnants contain germinal tissue, only 1 case of carcinoma in situ has been reported, suggesting that the risk of malignancy in these remnants is extremely low<sup>21</sup>. Although orchiectomy is advocated in post pubertal males due to the inherent risk of cancer, above findings suggest that those testes that are not overtly atrophic can be safely brought down and subsequent observation poses no greater risk as was also reported in a series of adult cryptorchidism by Ben Jeddou F et al<sup>22</sup>. In this study although the period of follow up of about 3-3.5 years is relatively short, nothing pointed against orchiopexy in preference to orchiectomy for post pubertal cases, when possible with regards to risk for future malignancy.

We performed per operative biopsy only in 2 cases who presented with infertility, a total of 22.3 % (14 cases, 12 bilateral & 2 unilateral) presented with infertility, ten bilateral cases had small fibrotic atretic testes requiring orchiectomy and 2 cases demonstrated vanishing testes on laparoscopy. Two cases with unilateral UDT and infertility also had azoospermia, with flabby and soft contralateral testis. They showed no improvement in semen parameters on follow-up

after orchiopexy. This merely confirms the findings of other authors that a cryptorchid testis undergoes changes comprising hypoplasia of Lydig cells, Sertoli cells degeneration, delaying both in gonocytes disappearance and adult dark (Ad) spermatogonia appearance, failure of primary spermatocytes to develop, and reduced total germ cell counts (Miningberg *et al.*, Huff *et al.*, and Rune *et al.*)<sup>23,24,25</sup>

Abnormal histology is frequent in UDT and both severity and frequency of changes increase with a higher placed testis<sup>26</sup>. Semen parameters are often disrupted in patients with a history of cryptorchidism and are more frequent in cases of bilateral cryptorchidism<sup>27,28</sup>. In our series all cases of bilateral UDT had azoospermia and severe degenerative changes on histopathology. This suggests that cryptorchidism is an important cause of infertility and subfertility in adults and its severity increases with bilaterality as demonstrated by a very high number (45.2%) of patients who ended up with orchiectomy in our series. Bellas *et al* similarly observed that the rate of paternity in cryptorchid is 63.9% for unilateral cryptorchidism whereas this figure was only 30.6% in case of bilateral cryptorchidism<sup>29</sup>.

### CONCLUSION

Adult cryptorchidism is a reflection of the failure of health care delivery in paediatric population in the developing world. Careful physical examination at birth by the attending physician and advice for early corrective surgery will prevent morbidity due to cryptorchidism presenting in adults. Health care programs raising awareness about the condition in general public and educating the health workers in peripheral hospitals will go a long way in decreasing its late presentation and associated complications.

Owing to the absolute and irreversible nature of the complications, the management of adult cryptorchidism becomes that much more difficult due to the ablative nature of interventions, its psychological effects and overall poor outcome of treatment with regards to infertility. Orchiopexy should be attempted even for unilateral UDT, with orchiectomy being an option in cases with overtly atrophied testis or those with significant shortening of vas and vessels.

**Acknowledgement:** We have not received any substantial contributions from non-authors.

**Conflict of Interest:** The authors have none to declare.

**Source of Funding:** No external grants or other financial aid was taken from any outside source.

The study included patients that were admitted consecutively for treatment in the general ward of department of Surgery, School of Medical Sciences & Research, Sharda University, Greater Noida.

### REFERENCES

1. Thong M, Lim C, Fatimah H. Undescended testis: Incidence in 1,002 consecutive male infants and outcome at 1 year of age. *Pediatr Surg Int* 1998;13:37-41.
2. Leitlinie der Deutschen Gesellschaft für Kinderchirurgie, der Deutschen Gesellschaft für Urologie und der Deutschen Gesellschaft für Kinder und Jugendmedizin, vertreten durch die Arbeitsgemeinschaft für pädiatrische Endokrinologie (APE) (2008): Hodenhochstand – Maleszensus testis. [www.uni-duesseldorf.de/AWMF/II/006-022.htm](http://www.uni-duesseldorf.de/AWMF/II/006-022.htm)
3. Donaldson KM, Steven YC, Hutson JM. Prevalence of late orchidopexy is consistent with some undescended testis being acquired. *Indian J Pediatr* 1996;63:725-9.
4. Rogers E, Teahan S, Gallagher H, Butler MR, Grainger R, McDermott TED, *et al.* The role of orchiectomy in the management of postpubertal cryptorchidism. *J Urol* 1998;159:851-4.
5. Farrer JH, Walker AH, Rajfer J. Management of the postpubertal cryptorchid testis: A statistical review. *J Urol* 1985;134:1071-6.
6. Hutson JM. Undescended testis, torsion and varicocele. In: O'Neill JA, Rowe MI, Grosfeld JL, Fonkalsrud EW, Coran GA, editors. *Pediatric surgery*. 5th ed., St. Louis: Mosby-Year Book; 1998; 2. pp. 1087-109.
7. MacLellan DL, Diamond DA. Recent advances in external genitalia. *Pediatr. Clin.North Am.* 2006; Jun;53(3):449-64.
8. Teyschl O, Tuma J. Vyuziti laparoskopie pri diagnostice, klasifikaci a lecbe nehmatneho nesestoupleho varlete.[Laparoscopy in the diagnosis, classification and therapy of nonpalpable undescended testes]. *Rozhl.Chir.*2000; Nov;79(11):557-60.
9. Raghavendran M, Mandhani A, Kumar A, Chaudary H, Srivastava A, Bhandari M, *et al.*



- Adult cryptorchidism: Unrevealing the cryptic facts. *Indian J Surg* 2004;66:160-3.
10. Desai CS, Prabhu RY, Supe AN. Laparoscopic orchidectomy for undescended testis in adults. *J Postgrad Med* 2002;48:25
  11. Sexton WJ, Assimios DG. Diagnostic and therapeutic laparoscopy for the adult cryptorchid testicle. *Tech Urol* 1999;5:24-8.
  12. Sataa Sallami , Sami Ben Rhouma , Monia Tangour , Sabeur Rebai , Karim Cherif , Nidhammedine Kchir , Nouira Yassine , Ali Horchani. Adult's cryptorchidism: clinical and therapeutic aspects About 100 cases. *Medical Tunisia - 2011, Vol 89 (No. 03): 254-257*
  13. Nguyen HT, Coakley F, Hricak H. Cryptorchidism: strategies in detection. *Eur Radiol.* 1999, 9: 336-43.
  14. De Filippo RE, Barthold JS, Gonzales R. The application of magnetic resonance imaging for the preoperative localisation of non-palpable testis in obese children: an alternative to laparoscopy. *J Urol* 2000;164:154-5
  15. Merguerian PA, Mevorach RA, Shortliffe LD, Cendron M. Laparoscopy for the evaluation and management of the nonpalpable testicle. *Urology* 1998;51(Suppl 5A ):3-6
  16. Cortes D, Thorup JM, Lenz K, Beck BL, Nielsen OH. Laparoscopy in 100 consecutive patients with 128 impalpable testes. *Br J Urol* 1995;75: 281-7.
  17. Merguerian PA, Mevorach RA, Shortliffe LD, Cendron M. Laparoscopy for the evaluation and management of the nonpalpable testicle. *Urology* 1998;51(Suppl 5A ):3-6
  18. Baker LA, Docimo SG, Surer I, Peters C, Cisek L, Diamond DA, et al. A multi-institutional analysis of laparoscopic orchidopexy. *BJU Int* 2001;6: 484-9
  19. Ozen H, Ayhan A, Esen A, Ergen A, Dogan A, Ruacan S, Remzi D. Histopathological changes in adult cryptorchid testes. *Br J Urol.* 1989 May;63(5):520-1.
  20. Moradi M, Karimian B, Moradi A. Adult orchidopexy: A survey on necessity of intraoperative testicular biopsy. *Nephro-Urol Mon.* 2011;3(3):196-200.
  21. Hadley M. Wood and Jack S. Elder. Cryptorchidism and Testicular Cancer: Separating Fact From Fiction. *J Urol* Vol. 181, 452-461, February 2009
  22. Ben Jeddou F, Ghozzi S, Rais NB. Cryptorchidism in adults. About 81 cases. *La Tunisie Medicale.* 2005, 83(12):742-745
  23. Mininberg DT, Rodger JC, Bedford JM. Ultrastructural evidence of the onset of testicular pathological conditions in the cryptorchid human testis within the first year of life. *J Urol.* 1982 Oct;128(4):782-4.
  24. Huff DS, Fenig DM, Canning DA, Carr MG, Zderic SA, Snyder HM, 3rd. Abnormal germ cell development in cryptorchidism. *Horm Res.* 2001;55(1):11-7.
  25. Rune GM, Mayr J, Neugebauer H, Anders C, Sauer H. Pattern of Sertoli cell degeneration in cryptorchid prepubertal testes. *Int J Androl.* 1992 Feb;15(1):19-31.
  26. Debre B. Cryptorchid testis tumors on. *Ann Urol.* 1984, 18: 253-5.
  27. Hadziselimovic F. Cryptorchidism, icts impact on male fertility. *Eur Urol.* 2002, 41:121-3.
  28. Caroppo E, Niederberger C, Elhanbly S, Schoor R, Ross L, D'Amato G. Effect of cryptorchidism and retractile testes on male factor infertility: a multicenter, retrospective, chart review. *Fertil Steril.* 2005, 83: 1581-4.
  29. Mr. Belas Sterility and cryptorchidism. *Chir Pediatr.* 1989, 30: 148-50.

# A Study of Knowledge, Attitude & Practices Regarding Preconception & Prenatal Diagnostic Techniques Act among Antenatal Women Attending a Tertiary Hospital of Andhra Pradesh

Anindita Mishra<sup>1</sup>, S K Mishra<sup>2</sup>, Sipra Komal Jena<sup>3</sup>, Ch. Ganapathy Swamy<sup>4</sup>, K S Suneetha<sup>5</sup>

<sup>1</sup>Associate Professor in the Dept. of Radio-diagnosis, <sup>2</sup>Professor & HOD, <sup>3</sup>Associate Professor, <sup>4</sup>Assistant Professor in Statistics in the Dept. of Community Medicine, <sup>5</sup>Post Graduate student in the Department of Radio-diagnosis at GSL Medical College, Rajahmundry, Andhra Pradesh

## ABSTRACT

**Background:** The advances in technology & diagnostic facilities have opened up avenue for girl haters & those preferring male child, leading to serious disturbances in sex ratio resulting in decline of child sex ratio. This has led to enforcement of Preconception & Prenatal diagnostic Techniques (PNDT) Act since 1994 & its amendment in 2002 & 2003 (PC- PNDT) act. The PC & PNDT act is very helpful for reducing the rate of female foeticide which is the root cause for this disturbance. Hence the present study is an effort to assess the knowledge, attitude and practice related to PC & PNDT Act among the pregnant women so that the various reasons of declining sex ratio can be known.

**Objectives:** To assess the knowledge, attitude & practice related to PC & PNDT act among the pregnant women & to study their socio-demographic profile.

**Materials And Method:** About 2000 antenatal women who came for ultrasonography examination to the department of Radio-diagnosis from 1st April 2011 to 31st March 2012 were interviewed with the help of a pretested questionnaire & data was analyzed.

**Results:** Out of 2000, antenatal women, 43.08% had knowledge about PC & PNDT act & 56.2% did not have any knowledge about it. The more the literacy status, the more was the knowledge about PC & PNDT act. Illiterates had more preference for male child. The attitude regarding PC & PNDT act was more positive in the lower middle class. About 85% of antenatal women say that they will contribute to prevent female foeticides.

**Conclusions:** There is a need to educate women, particularly from under privileged population about the PC & PNDT act through intensive Information, Education & Communication Campaigns.

**Keywords:** PC & PNDT Act; Gender discrimination; Sex ratio, Knowledge, attitude, practice

## INTRODUCTION

Modern technology & advances in diagnostic facilities & procedures, have opened up avenue for

---

### Corresponding author:

**Anindita Mishra**

Associate Professor

Department of Radio-diagnosis.

G.S.L. Medical College, Rajahmundry, Andhrapradesh

Cell no. +91 9441011723

E-mail: dr.aninditamishra@gmail.com

girl haters & those preferring male child, leading to serious disturbances in sex ratio as a result of female foeticide which in turn has resulted in decline of child sex ratio<sup>1,2</sup>. Changes in sex ratio reflect underlying cultural & socioeconomic pattern of a society & there is a strong preference for sons in many societies<sup>3</sup>. On a national level, the sex ratio (per 1000 male) in the age group 0-6 yrs has declined drastically from 945 in 1991 to 914 in 2011<sup>4</sup>. If this trend continues, there would be further reduction in the number of girls and women in future leading to serious socio-cultural problems



including population imbalance and violence. Sex selective abortion is found to be a major factor responsible for this. This has led to enforcement of preconception & prenatal diagnostic techniques act since 1994 & its amendment in 2002 & 2003 (PC & PNDT) act<sup>5,6</sup>. It is an act to provide for the regulation of the use of pre-natal diagnostic techniques for the purpose of detecting genetic or metabolic disorders or chromosomal abnormalities or certain congenital malformations or sex linked disorders and for the prevention of the misuse of such techniques for the purpose of pre-natal sex determination leading to female foeticide; and, for matters connected there with or incidental thereto. Contravening the provisions of the act can lead to a fine of Rs 10,000 and up to three years imprisonment for a first offence, with greater fines and longer terms of imprisonment for repeat offender<sup>7</sup>.

Most of the female feticide cases in India are preventable and the PC & PNDT act is very helpful for reducing the rate of female feticide. Hence the present study is an effort to assess the knowledge, attitude & practice related to PC & PNDT act among the pregnant women so that the various reasons of declining sex ratio can be known and also education & information about PC & PNDT act can be imparted to them in order to prevent female foeticide thereby preventing gender imbalance which is necessary for the overall socioeconomic progress our country.

## MATERIALS AND METHOD

Hospital based cross-sectional study was conducted in the Department of Radio - diagnosis, G.S.L Medical College, Rajahmundry between 1<sup>st</sup> April 2011 to 31<sup>st</sup> March 2012. All the antenatal women who reported for ultrasonography examination (foetal profile) during this period for the first time irrespective of their gestational age were considered for the study. Women who are in active labour and those women with poor clinical condition were excluded from this study. One to one interview was conducted in a congenial atmosphere after developing rapport with the participants and after obtaining their consent. The entire interview was conducted by trained personnel with the help of a pre-designed and pre-tested questionnaire having both open & closed ended questions. Out of total 2123 antenatal women who reported during this period, 2017 were selected for the study and after data validation, total 2000 questionnaire were analyzed for our study. Variables taken for this study were socio-demographic profile,

knowledge, attitude and practice regarding PC & PNDT act. Statistical analysis was done using MS Excel 2007 software. The number and percentage distribution was calculated. The level of significance was set at  $p < 0.05$ .

## RESULTS

Out of 2000, antenatal women, about 1048 (52.4%) were Hindus, followed by 580 (29.0%), who were Christians & remaining 468 (23.4%) were Muslims. Around 1200 (60%) belonged to backward caste & about 332 (16%) belonged to either SC or ST. Most of the antenatal women were housewives (1026 i.e. 51.3%), 486 (24.3%) worked for daily wages i.e. were unskilled laborers. Out of 2000, antenatal women, 876 (43.08%) had knowledge about PC & PNDT act & 1124 (56.2%) did not have any knowledge about it. About 900 (45%) knew that sex determination can be done & out of them 450 (50%) knew it can be done by ultrasound examination. Out of the 876 women who had knowledge about PC & PNDT act, 436 (50%) had acquired it through mass media.

It is shown in Table 1 that illiterates i.e. 870 of them had no knowledge about PC & PNDT act. The more the literacy status, the more was the knowledge about PC & PNDT act & this was found to be statistically highly significant ( $p < 0.0001$ ). It was observed regarding socio economic status as per Modified Kuppaswamy classification<sup>8</sup>, maximum i.e. 370 (42.23%) of antenatal women who had knowledge regarding PC & PNDT act belonged to lower middle class followed by 264 (30.13%) who belonged to upper lower class. Table 2 shows that 572 (65.5%) of the antenatal women who had knowledge regarding PC & PNDT act were multi or grand multipara. Less number of primipara i.e. 304 (34.70%) had knowledge regarding it & the difference is statistically highly significant ( $p < 0.00001$ ). It is also observed in Table 3 that 540 (39.82%) who were illiterates had preference for male child followed by primary or middle (564 i.e. 41.59%) & the difference is statistically significant ( $P = 0.005$ ). The preference for male child is more in the multipara i.e. 896 (66.07%) Out of 876 women who had knowledge regarding PC & PNDT act maximum, 600 (68.49%) belong to 32-38 yrs followed by 25-31 yrs. i.e. 100 (11.41%).

Regarding age wise attitude the age group 32-38 yrs had positive attitude towards PC & PNDT act i.e. 550 (70.33%). Maximum negative attitude was seen in 18 - 24 yrs. i.e. 526 (43.18%) & the difference is statistically significant ( $p < 0.0001$ ). About 216 (27.62%)

of them who were educated with primary school centre certificate & had positive attitude towards PC & PNDDT act & 324 (26.60%) had negative attitude. However the association between literacy and attitude was not significant. It is seen in table 4 that 464 (59.33%) had positive attitude & 668(54.84%) had negative attitude. About 439 (56.13%) having positive attitude, belonged to lower middle class & 639 (52.46%) who had negative attitude towards PC & PNDDT act, belonged to the same. The attitude was more positive in the lower middle class & above than the lower class which is statistically highly significant ( $p < 0.0001$ ).

It was observed that 260 out of 2000 had undergone MTP, Out of which 48 (18.46%) had already a daughter & 124 (47.69%) had 2 daughter already 85 (32.69%) had pressure by husband or in laws. Out of total 2000, 1700 (85%) said that they will contribute to prevent female foeticides. About 143 (17.15%) said that they will go sex determination before delivery but 1857 (92.85%) out of 2000 will not. About 1760 (88%) will provide equal opportunities for son and daughter. Around 1975 (98.75%) of them have promised to help for increasing the awareness about PC & PNDDT act in community.

**Table 1: Association of knowledge about PC & PNDDT act with literacy status**

Literacy status	Knowledge about PCPNDDT Act					
	Yes		No		Total	
	No.	%	No.	%	No.	%
Professional	0	0	0	0	0	0
Graduate/PG	53	6.05	22	1.96	75	3.75
Inter	31	3.54	26	2.31	57	2.85
High School Certificate	106	12.10	88	7.82	194	9.70
Middle School Certificate	96	10.96	118	10.49	214	10.70
Primary	210	23.97	330	29.35	540	27.00
Illiterate	380	43.38	540	48.04	920	46.00
Total	876	100.00	1124	100.00	2000	100.00

**Table 2: Parity Vs Knowledge about PC & PNDDT act**

Knowledge						
Parity	Yes	%	No	%	Total	%
Primipara	304	34.70	514	45.72	818	40.9
Multipara	532	60.74	600	53.38	1132	56.6
Grand Multipara	40	4.56	10	0.88	50	2.50
Total	876	100.00	1124	100.00	2000	100.00

**Table 3: Literacy status & preference for male child**

Preference for male child						
Literacy	Yes	%	No	%	Total	%
Graduate & above	38	2.80	50	7.76	88	4.40
Secondary & Higher secondary	214	15.78	304	47.21	518	25.90
Primary & Middle	564	41.60	110	17.08	674	33.70
Illiterate	540	39.82	180	27.95	720	36.00
Total	1356	100.00	644	100.00	2000	100.00

**Table 4: Parity & Attitude towards PC & PNDDT act**

Attitude						
Parity	Positive	%	Negative	%	Total	%
Primipara	312	39.90	500	41.05	812	40.60
Multipara	464	59.34	668	54.84	1132	56.60
Grand Multipara	6	0.76	50	4.11	56	2.80
Total	782	100.00	1218	100.00	2000	100.00

## DISCUSSION

Around 45% of the antenatal women were aware that sex determination can be done which is different from the findings by Chavada M et al<sup>9</sup> where 91.1% of urban and 96.4% of rural women were aware of sex determination. The overall knowledge about PC & PNDT act among the antenatal women attending the Department of Radio-diagnosis for ultrasonography examination was 43.8% which is higher than the Srivastava study<sup>10</sup>. However the study by Mahendra Khatri et al<sup>11</sup> reveals 52% of antenatal women having knowledge about PC & PNDT act which is slightly higher than the present study as there may be variation in the region wise knowledge status. About 50% of them got information through electronic media which plays great role in increasing awareness & knowledge. This is similar to the study by Srivastava & a study conducted at Mumbai by Pallavi et al<sup>12</sup>. In the present study, the knowledge is more above 25 yrs age group than those below 25 yrs age group. The difference is statistically significant unlike the study by S.Ghose et al<sup>13</sup> where maximum knowledge regarding PC & PNDT act was seen in the age group 20-25 yrs. It is seen in the present study that the knowledge about PC & PNDT act increases significantly with the literacy status which is similar to the study by Pallavi et al where knowledge varied from 41.9% among illiterates to 86.5% among graduates.

Education improves the status of women in society and freedom to think & have a positive outlook. It was also seen that 42% of the study subjects who had knowledge regarding PC & PNDT act belonged to lower middle class. The maximum number who did not have knowledge also belongs to the same class. This is because the participants belong more to lower middle class. This is different from study conducted by Khatri et al and similar to study in Mumbai by Pallavi et al where 70% of subjects having knowledge belonged to lower middle class. There was high significant deference in knowledge about PC & PNDT act with parity status which is again similar to the study by Khatri et al. It is seen that 68% had preference for male child which is similar to the study by Khatri et al where 67.8% of the study population gave preference to male child. In a study by B.N. Vadera et al<sup>14</sup>, 58.5% of women gave preference to male child and in a study by S. Puri et al<sup>15</sup>, 56% women in slums of Chandigarh showed preference to male child. It was found that male preference decreased with increase literacy status As well as parity which is statistically significant. This is similar to the study by Khatri et al.

It was seen in the present study that there was no significant association between literacy status and positive attitude regarding PC & PNDT act which is again similar to the study by Khatri et al whereas Ghose et al revealed a greater proportion of multipara (74%) had positive attitude as compared to primipara (67.2%) and also there was significant association between literacy status and positive attitude. In the present study, the women from class III and above had significant positive attitude than those with class IV and below (P=0.000).

The commonest reason for MTP was that 47.69% already had 2 daughters and 32.69% had pressure from their husbands. Snehlata Tandon et al<sup>11</sup> in a study found that most of the MTP was due to pressure from their husbands. Around 50% of them had pressure from family for sex determination of foetus which is much higher than study by Khatri et al where it is only 25.9%.

Around 11% of study subjects would go for female foeticide which is similar to the study by Khatri et al and slightly different from B. N. Vadera et al. The present findings suggest the need to educate women from under privileged population about gender equality in order to improve the declining sex ratio in our country & also to make them aware about the PC & PNDT act so that they do not go for sex determination & know the importance of gender equality, thereby contributing to the prevention of female foeticide.

## CONCLUSION AND RECOMMENDATIONS

There is a need to educate women, particularly from under privileged population about the PC & PNDT act through intensive Information, Education & Communication Campaigns & also emphasis to be paid for women empowerment. The implementation of laws & regulations for preventing female foeticide should be strengthened & the strictness regarding it to be maintained. There is an urgent need to strengthen this PC & PNDT act to bring the skewed sex ratio to normal.

**Acknowledgment:** The authors sincerely thank the management of G.S.L Medical College in granting us permission & encouragement to conduct this study.

**Conflict of Interest:** None

**Ethical Clearance:** Obtained from the institutional ethical committee prior to the study.

**Source of Funding:** Nil

## REFERENCES

1. R.Kansal, Khan Amir, R.Bansal. A Hospital based study on Knowledge, Attitude & Practice of Pregnant Women, on gender preference, prenatal sex determination & female foeticide, *Indian Journal of Public Health*, volume 54, issue 4, Oct-Dec 2010.
2. Assessment of Sex-Ratio & Perception of PCPNDT, SIHFW, Oct. 2008.
3. Khanna S.K. Prenatal Sex determination, A new family building strategy, *Manushi*, 1995, 86:23-9.
4. <http://www.censusindia.gov.in/2011-prov-results/indiaatglance.html>.
5. PCPNDT workshop-Report. Oct. 23-24, 2008, State Institute of Health & Family Welfare, Jaipur.
6. Implementation of the PCPNDT Act in India: Perspectives and Challenges, Public Health Foundation of India, April 2010.
7. [http://www.medindia.net/indian\\_health\\_act/pre-natal-diagnostic-techniques-act-1994-definitions.htm#ixzz2IrcW8Ho7](http://www.medindia.net/indian_health_act/pre-natal-diagnostic-techniques-act-1994-definitions.htm#ixzz2IrcW8Ho7).
8. Neeta kumar et al, Letter to the Editor, *Indian Journal of Public health*, Volume 56, Issue 1, Jan-March, 2012.
9. Chavada M, Bhagyalakshmi A. Knowledge, Attitude and Practice regarding sex determination among married women- a comparative study between urban and rural area. *Indian J Matern Child Health* 2011; 13:1-8.
10. Shrivastava S, Kariwal P, Kapilasrami MC. A community based study on awareness and perception on gender discrimination and sex preference among married women (in reproductive age group) in a rural population of district Bareilly, Uttar Pradesh. *Nat J Commun Med* 2011;2: 273-6.
11. Khatri M, Acharya R, Sharma G (2012) Knowledge, Attitude and Practices (KAP) Related to Pre-Conception & Pre-Natal Diagnostic Techniques (PC & PNDT) Act Among the Antenatal Women in Bikaner. 1: 121. doi:10.4172/scientificreports.121.
12. Shidhaye PR, Giri PA, Nagaonkar SN, Shidhaye RR. Study of knowledge and attitude regarding prenatal diagnostic techniques act among the pregnant women at a tertiary care teaching hospital in Mumbai. *J Edu Health Promot* 2012 [cited 2013 Jan 24];1:36.
13. Ghose S, Sarkar S. Knowledge and attitude of Prenatal Diagnostics techniques Act among the antenatal women- a hospital based study. *J Community Med* 2009;5:1-6.
14. Vadera BN, Joshi UK, Unadakat SV, Yadav BS, Yadav S. Study on Knowledge, attitude and practices regarding gender preference and female foeticide among pregnant women. *Indian J Community Med* 2007;32:300-1
15. Puri S, Bhatia V, Swami HM. Gender Preference and Awareness Regarding Sex Determination among Married Women in Slums of Chandigarh. *Indian J Community Med* 2007;32:60-2.

# Pyrethroid Based Mosquito Repellent Inhalation Induced Changes in Physical Activity in Albino Rats after Chronic Exposure

Saim Hasan<sup>1</sup>, Maheshwari T P<sup>2</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Senior resident, Department of Anatomy, SHKM GMC, Nalhar, Mewat, Haryana

## ABSTRACT

**Introduction:** The liquid vaporizers are very commonly used as residential insecticides in developing countries. Neurotoxic effects of pyrethroids have been reported earlier but study regarding its direct effect on physical activity of albino rats are scanty. So the present study was planned to assess and compare the effects of long term prallethrin (a Pyrethroid) exposure on albino rats.

**Method:** Twenty albino rats were divided into two groups of control and experimental. Rats in experimental group were exposed to 3.2% w/v prallethrin vapours 12 hours daily for 180 days. Control animals were kept under identical conditions without exposure to said repellent.

The albino rats in experimental group were subjected to Spontaneous Motor Activity, Forced Locomotor Activity and Swimming endurance test to record their physical activity.

**Result:** Significant changes in Spontaneous Motor Activity, Forced Locomotor Activity and Swimming Endurance Test were not recorded in prallethrin exposed rats as compared to control ones throughout the study.

**Conclusion:** Lack of changes in the behavioural parameters as seen in our study may be due to difference in the route adopted and perhaps due to limited duration of exposure and high degree of adaptability of the animal to adverse insults.

**Keywords:** *Pyrethroids, Liquid Vaporizers, Albino Rats, Physical Activity, Adaptability*

## INTRODUCTION

The major types of residential insecticidal products include aerosols, mosquito coils and vaporizing mats among which the liquid vaporizers have outnumbered others in popularity.<sup>1</sup> Their toxic effects have been observed in non target organs causing muscle pain, joint pain, ataxia, chronic fatigue, headache and difficulty in concentration.

Pyrethroid induced neurotoxicity and other toxic symptoms, and their deleterious effects in humans and experimental animals caused a concern on their chronic use. These compounds are being extensively used and the product information leaflet enclosed by the manufacturers are too ambiguous to ensure the

safety profiles on prolonged usage to all groups including pregnant women. Most of the previous reports are based on studies on immature mammals who received drug through different routes except respiratory. The latter being conventional route through which millions of people are exposed for several decades. Hence the present study is aimed at investigating and evaluating the changes in various physical activity and psychomotor parameters in albino rats after inhalation of pyrethroid based mosquito repellent.

## MATERIAL AND METHOD

The present study was carried out on adult Charles foster rats weighing between 100-150gms.



The animals were provided with standard pellet laboratory diet (Lipton India Limited) and water ad-libitum. They were housed under identical diurnal conditions and temperature. The animals were weighed, marked and divided into two groups:

### **Group 1-Experimental**

### **Group 2-Control**

The experimental animals were kept in unit plastic cages (36cm x 22cm x 14cm) with many holes. They were exposed to liquid mosquito repellent inside a closed room (180cm x 240cm) according to the method of Sinha.<sup>2</sup> The animals were exposed to 3.2% w/v prallethrin vapours for 12 hrs daily for a period of 180 days. The control animals were kept under identical conditions without exposure to 3.2% w/v prallethrin vapours. The permission to perform experiments on rats was taken from Institutional animal ethics committee.

The body weight was measured weekly and the water consumption was assessed daily.

On day zero that is before exposure, the weight and physical activities of both control and experimental rats were noted down.

The experiments performed to assess physical activity were,

1. Spontaneous Motor Activity
2. Forced Locomotor Activity
3. Swimming endurance test

Thereafter all these parameters were assessed at days 1, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161, 168, 175 and 180.

### **Spontaneous Motor Activity**

Motor activity was recorded on "Digital Actophotometer" which has a chamber made up of perspex sheet for the animal. A variable shock of strength 100V, 50Hz, 0.2mA is provided which is inbuilt in the instrument. Also a four digit counter is provided which counts the movement of animal inside the perspex chamber. Each animal was observed over a period of 5 minutes and values expressed as counts per 5 minutes.<sup>3</sup>

### **Forced Locomotor Activity (Rota Rod test)**

This test was performed according to the method of Kihara.<sup>4</sup> Albino rats weighing 100-150 g were taken. The animals were placed individually on a scraped rod of 7 cm in diameter and rotating at a rate of 5 revolutions per minute. Animals were tested in two trials per day. The maximum trial duration was 180 seconds and the inter trial interval was about 30 minutes. The time that each animal remained on the rod at the rotation speed was recorded.

### **Swimming Endurance Test**

This was done according to the method of Trudeau And Murphy.<sup>5</sup> A group of seven rats were tested for swimming endurance. The rats were made to swim till exhaustion in a swimming pool. The apparatus measuring 90 x 45 x 70 cm in size was fitted with a thermostat. It was filled with water at a temperature of 37°C and the temperature was maintained throughout the experiment. The time taken to swim to exhaustion was calculated for each group by taking mean of individual time. The criterion for exhaustion was the animals inability to surface for a period of 10 seconds.<sup>6</sup>

The physical parameters were assessed using Student's t-test.

## **OBSERVATION AND RESULTS**

The rats were divided into two groups, experimental and control. Each group was divided into 3 subgroups to assess 3 different parameters. The experimental group was exposed to prallethrin vapors for 6 months and physical activity parameters were assessed weekly.

### **Physical Activity Parameters**

#### **a) Spontaneous Motor Activity**

No statistically significant changes were observed in the motor activity of the experimental subgroup as compared to control ones throughout the study (Figure 1.1 and Table 1.4).

#### **b) Forced Locomotor Activity**

This parameter also did not reveal any significant variation in the experimental group as compared to control group throughout the experiment (Figure 1.2 and Table 1.5).

**c) Swimming Endurance Test**

No statistically significant variation was observed between the experimental and control groups throughout the study (Figure 1.3 and Table 1.6).

**DISCUSSION**

**Physical activity and psychomotor parameter**

Neurotoxic effects of drugs are manifested as changes in behavioural and psychomotor functions as CNS controls number of functions like cognition, awareness, memory and motor functions. In our study, to evaluate the neurotoxic effects of inhaled pyrethroids rota rod test, swimming endurance test and spontaneous motor activity test was carried out. Significant changes in Spontaneous Motor Activity (Figure 1.1, Table 1.4), Forced Locomotor Activity (Figure 1.2, Table 1.5) and Swimming Endurance Test (Figure 1.3, Table 1.6) were not recorded in prallethrin exposed rats as compared to control ones in the study. The body weight of experimental animals did not show any significant variation compared with control rats.

The studies by Ahlbom<sup>7</sup> using fat emulsion vehicle containing bioallethrin, which were administered orally as a single daily dose for 7 days to 10 day old mice offsprings. He observed a significantly reduced locomotion score which was different for each dosage group. Crofton and Reiter<sup>8</sup> reported that decreased motor activity of rats is dosage dependent for type I and type II pyrethroids. Crofton<sup>9</sup> reported exposure to deltamethrin produced dose dependent decrease in motor activity. They adopted two different routes of administration, intraperitoneal and per oral route. Motor activity being decreased more significantly in intraperitoneal as compared to per oral route. Abou donia<sup>10</sup> reported decreased locomotor and sensorimotor performance in rats following exposure to pyridostigmine bromide, DEET, and permethrin using dermal or oral route. Manna<sup>11</sup> found that after oral dosing of alfa-cypermethrin in rats, there was significant motor incoordination.

Talts<sup>12</sup> reported that neonatal exposure increases the susceptibility of adult mice to toxic effects of bioallethrin, if reexposed. Ahlbom<sup>7</sup> also reported that exposure to an organophosphate (DFP) during a defined period in neonatal life induces permanent changes in brain muscarinic receptors and behaviour in adult mice. Wolansky<sup>13</sup> studied the relative potencies for acute effects of pyrethroids on motor function in rats and found that all pyrethroids, regardless of

structural class, produced dose dependent decreases in motor activity. The dosage and route of administration was acute and oral.

Sinha<sup>2</sup> reported that body weight of rat pups exposed to pyrethroid containing mosquito repellent decreased significantly but no gross abnormality in behaviour was observed. Tsuji<sup>14</sup> also reported lack of changes in brain muscarinic receptor and motor activity of mice after neonatal inhalation exposure to d-Allethrin.

In view of these studies, it can be deduced that the physical activity and psychomotor performances, in case of pyrethroid exposure were governed by dose, age of the animal, duration of exposure and route of administration. Most common route of exposure to pyrethroids is through the inhalational method, oral intake being either accidental or suicidal. Hence in our study the inhalation administration method was adopted. Since the masses are being exposed to pyrethroid on a continuous basis that may extend upto 30 to 40 years, our 180 days study may be a limiting factor.

The higher level of sensitivity of the neonatal rat to pyrethroid toxicity is due to the incomplete development of the enzymes which catalyze the metabolism of pyrethroids in the liver of young animal.<sup>15</sup>

**Table 1.4: Effect of prallethrin vapours on spontaneous motor activity (Mean ± S.E)**

Days	Spontaneous Motor activity		Significance
	Control	Exp	
0	216.42 ± 4.61	216.14 ± 4.25	Not Significant
7	217.14 ± 7.68	217.14 ± 4.89	
14	216.85 ± 6.08	215.14 ± 7.35	
21	216.14 ± 8.31	216.57 ± 6.37	
28	216.85 ± 4.90	217.28 ± 6.67	
35	216.28 ± 5.31	216.14 ± 6.07	
42	214.71 ± 5.41	214.57 ± 8.93	
49	216.57 ± 5.00	215.42 ± 10.37	
56	217.57 ± 3.35	217.14 ± 3.16	
63	214.14 ± 4.67	216.57 ± 9.36	
70	215.28 ± 6.28	216.71 ± 6.86	
77	215.57 ± 5.75	214.57 ± 6.58	
84	212.28 ± 8.05	216.71 ± 9.91	
91	215.28 ± 4.90	214.71 ± 5.85	
98	213.85 ± 3.23	214.28 ± 7.51	
105	216.28 ± 4.60	212.71 ± 8.77	
112	214.42 ± 5.24	213.28 ± 7.17	

**Table 1.4: Effect of prallethrin vapours on spontaneous motor activity (Mean S.E) (Contd.)**

Days	Spontaneous Motor activity		Significance
	Control	Exp	
119	216.28 ± 4.10	213.85 ± 8.65	
126	215.14 ± 4.33	212.85 ± 5.18	
133	216.85 ± 3.39	216.71 ± 5.73	
140	215.42 ± 4.29	215.42 ± 3.29	
147	219.42 ± 3.16	216.85 ± 3.79	
154	216.85 ± 4.90	217.14 ± 0.73	
161	218.14 ± 3.77	217.71 ± 0.86	
168	217.85 ± 3.98	215.42 ± 1.06	
175	217.57 ± 3.31	216.71 ± 0.56	
180	216.28 ± 2.16	216.85 ± 0.70	

(p 0.5 to 1.0)

**Table 1.5 :Effect of prallethrin vapours on forced locomotor activity (Mean S.E)**

Days	Forced Locomotor activity		Significance
	Control	Exp	
0	176.28 ± 2.01	176.07 ± 2.44	Not significant
7	176.42 ± 2.35	177.28 ± 1.39	
14	178.92 ± 1.07	179.35 ± 0.64	
21	175.78 ± 3.21	175.92 ± 1.57	
28	178.92 ± 1.07	178.50 ± 1.20	
35	177.28 ± 1.80	178.42 ± 0.92	
42	175.85 ± 2.75	175.71 ± 2.54	
49	170.07 ± 4.13	174.07 ± 3.15	
56	177.64 ± 2.19	176.78 ± 1.80	
63	176.28 ± 3.72	175.14 ± 2.37	
70	175.07 ± 4.93	169.28 ± 10.24	
77	176.28 ± 2.63	176.64 ± 2.75	
84	175.42 ± 3.33	174.92 ± 2.07	
91	176.50 ± 2.40	178.21 ± 1.48	
98	178.85 ± 0.85	177.57 ± 1.60	
105	178.14 ± 1.31	176.85 ± 1.16	
112	174.78 ± 4.89	176.35 ± 1.12	
119	178.85 ± 0.85	178.50 ± 1.50	
126	179.14 ± 0.85	176.92 ± 2.00	
133	180.00 ± 0.00	179.35 ± 0.64	
140	178.64 ± 1.06	178.14 ± 0.91	
147	179.35 ± 0.41	179.35 ± 0.64	
154	179.21 ± 0.78	177.71 ± 0.71	
161	177.78 ± 1.44	176.14 ± 1.05	
168	178.92 ± 0.85	174.71 ± 2.15	
175	177.85 ± 1.06	176.28 ± 1.26	
180	176.42 ± 1.90	176.28 ± 1.25	

(p 0.05 to 1.0)

**Table 1.6: Effect of prallethrin vapours on swimming endurance (MeanS.E)**

Days	Swimming Endurance Test		Significance
	Control	Exp	
0	154.26 ± 0.46	154.22 ± 0.33	Not significant
7	153.84 ± 0.66	154.42 ± 0.52	
14	154.10 ± 0.41	155.09 ± 0.70	
21	153.43 ± 0.43	154.59 ± 0.53	
28	153.84 ± 0.76	153.73 ± 0.22	
35	153.19 ± 0.61	153.37 ± 0.59	
42	153.52 ± 0.43	153.53 ± 0.43	
49	154.30 ± 0.55	154.05 ± 0.55	
56	153.87 ± 0.43	154.13 ± 0.37	
63	154.18 ± 0.53	154.24 ± 0.56	
70	153.94 ± 0.74	154.25 ± 0.78	
77	153.64 ± 0.63	153.09 ± 0.68	
84	153.19 ± 0.61	153.33 ± 0.59	
91	154.28 ± 0.41	154.55 ± 0.30	
98	153.60 ± 0.61	153.22 ± 0.71	
105	153.53 ± 0.43	153.51 ± 0.44	
112	154.23 ± 0.55	154.21 ± 0.56	
119	153.78 ± 0.48	153.74 ± 0.50	
126	153.45 ± 0.51	153.03 ± 0.62	
133	153.82 ± 0.65	152.96 ± 0.66	
140	153.64 ± 0.51	151.91 ± 1.19	
147	153.56 ± 0.69	152.08 ± 1.11	
154	153.92 ± 0.47	153.34 ± 1.38	
161	153.95 ± 0.65	152.68 ± 1.13	
168	154.31 ± 0.45	152.53 ± 1.18	
175	154.43 ± 0.49	152.73 ± 1.49	
180	153.90 ± 0.50	151.33 ± 1.38	

(p 0.1 to 1.0)

### CONCLUSION

Neurotoxic effects of drugs are manifested as changes in physical activity and psychomotor functions as CNS controls number of functions like cognition, awareness, memory and motor functions. In our study, to evaluate the neurotoxic effects of inhaled pyrethroids rota rod test, swimming endurance test and spontaneous motor activity test was carried out. Lack of changes in the physical activity and psychomotor parameters as seen in our study suggest the relative safety of the said mosquito repellent. Our findings deviate from many of earlier studies as it may be due to difference in the route adopted and perhaps due to limited duration of exposure and high degree of adaptability of the animal

to adverse insults. Further, study on the histological parameters is required to see if there is any abnormality in different areas of brain at microscopic level.

It appears that for the manifestation of abnormality in physical activity and other psychomotor parameters a further study with prolonged period of duration is required as in today's scenario the exposure to pyrethroid containing mosquito repellent is continued and chronic.

**Conflict of Interest:** None declared

**Acknowledgement:** The authors would like to thank Prof. Nafis A Faruqi, Professor, Department of Anatomy, J.N. Medical college and hospital, AMU, Aligarh, for his able guidance and valuable advice at every stage in the preparation of this manuscript.

**Source of Funding:** Research grant dept. of Anatomy, JN Medical college, AMU, Aligarh.

#### REFERENCES

1. Krieger RI, T.M. Dinoff, X. Zhang (2003) : Octachlorodipropyl ether (S-2) mosquito coils are inadequately studied for residential use in Asia and Illegal in the United States, Environ. Health Perspect. 111 1439-1442.
2. Sinha C, Agarwal AK, Islam F, Seth K, Chatuvedi RK, Shukla S, Seth PK (2004): Mosquito repellent (pyrethroid- based) induced dysfunction of bloodbrain barrier permeability in developing brain. Int. J. Dev. Neurosci. 22 (1),31-37.
3. Kumar P and Kumar A (2009). Progress in Neuro-Psychopharmacology and Biological Psychiatry Volume 33, Issue 1, Pages 100-108.
4. Kihara T (1991): Effects of the prenatal ochratoxin a exposure on behaviour of rat off spring. Acta Med Kinki Univ. Vol 16, No.1, 1-22, 1991.
5. Trudeau F And Murphy R(1993): Effects of potassium-aspartate salt administration on glycogen use in the rat during a swimming stress. Physiology & Behavior. Vol. 54, pp. 7-12.
6. Dawson CA, Roemer RB And Horvath SM (1970): Journal of applied physiology. vol 29, No 2, 150-154.
7. Ahlbom J, Fredriksson A, Eriksson P (1994): Neonatal exposure to a type – I pyrethroid (bioallethrin) induces dose response changes in brain muscarinic receptors and behaviour in neonatal and adult mice. Brain Res. 645: 318-324
8. Crofton KM and Reiter LW (1988): The effects of type 1 and II pyrethroids on motor activity and the acoustic startle response in the rat. Fundamental and Applied Toxicology Volume 10, Issue 4, May 1988, Pages 624-634.
9. Crofton KM, Kehn LS, Gilbert ME (1995): Vehicle and route dependent effects of a pyrethroid insecticide, deltamethrin, on motor function in the rat. Neurotoxicology and Teratology Volume 17, Issue 4, July-August 1995, Pages 489-495
10. Abou-Donia MB, Goldstein LB, Jones KH, Abdel-Rahman AA et al., (2001): Locomotor and Sensorimotor Performance Deficit in Rats following Exposure to Pyridostigmine Bromide, DEET, and Permethrin, Alone and in Combination. Toxicological Sciences 60, 305-314.
11. Manna S (2005): Neuropharmacological effects of alfa-cypermethrin in rats Indian J Pharmacol , February 2005 , Vol 37, Issue 1, 18-20.
12. Talts U, Fredriksson A, And Eriksson P (1998): Changes in Behavior and Muscarinic Receptor Density after Neonatal and Adult Exposure to Bioallethrin Neurobiology of Aging, Vol. 19, No. 6, pp. 545-552, 1998.
13. Wolansky M J, Gennings C, and Crofton K M (2006): Relative Potencies for Acute Effects of Pyrethroids on Motor Function in Rats. Toxicological Sciences 89(1), 271-277.
14. Tsuji, R., Kobayashi, K., Ikeda, M., Yoshioka, T., Yamada, T., Seki, T., Okuno, Y., Nakatsuka, I., Tsuruo, Y., Kishioka, S., (2002): Lack of changes in brain muscarinic receptor and motor activity of mice after neonatal inhalation exposure to d-allethrin. J. Appl. Toxicol. 22, 423-429.
15. Cantalamessa F (1993): Acute toxicity of two pyrethroids, permethrin, and cypermethrin in neonatal and adult rats Archives of Toxicology, Volume 67, Number 7, 510-513.

# Pattern of Blunt Abdominal Trauma - an Autopsy Based Cross-Sectional Study

Santhosh C S<sup>1</sup>, Tejas J<sup>2</sup>

<sup>1</sup>Professor, Dept. of Forensic Medicine, J.J.M. Medical College, Davangere, Karnataka State, India,

<sup>2</sup>Post Graduate Student, Dept. of Forensic Medicine, J.J.M. Medical College, Davangere, Karnataka state. India

## ABSTRACT

Abdominal trauma is an injury occurring to the abdomen which may be blunt or penetrating and may involve damage to any of the abdominal organ. We conducted an autopsy based study on 11 cases that had sustained blunt abdominal trauma and the results were analyzed. The most common cause for blunt abdominal trauma was found to be Road Traffic Accident (RTA) and a higher incidence was found in the male sex with a mean age group of 26.54years. Hollow viscous and mesenteric injury was most common (81.81%) followed by liver (63.63%) and splenic injury (9.09%). The most common cause of death in our study was cranio - cerebral injuries (27.27%) followed by hemorrhagic shock (18.18%), hypovolemic shock (18.18%) and peritonitis (18.18%). Most common manner of death was found to be Road traffic Accident (63.63%). Lack of discipline among drivers and ignorance towards safety measures are major contributors towards RTAs and most fatalities can be avoided by adopting simple preventive measures.

**Keywords:** Blunt Abdominal Trauma, Road Traffic Accident (RTA), Small Bowel Injury

## INTRODUCTION

Abdominal trauma is an injury occurring to the abdomen. It may be blunt or penetrating and may involve damage to any of the abdominal organ. As with thorax, the damage caused by blunt trauma depends upon the location of the injury. In addition, the large area of the anterior abdomen occupied by the intestines provides a target for perforation with consequent chemical and infective peritonitis.<sup>(1)</sup> Closed or blunt injury to the abdomen is common both in accidents and assaults. Impact on the abdomen by a car steering wheel was more common before the widespread use of safety-belts and air-bags and still

occurs in severe deceleration accidents. The liver, intestine, spleen and mesentery are the most vulnerable organs<sup>(2-5)</sup>.

## MATERIALS AND METHOD

This autopsy based prospective study was conducted on the cases autopsied at Mortuary of Dept. of Forensic Medicine and Toxicology, J.J.M. Medical College, Davangere from Jan 2011 to Dec 2011. During this period a total of 83 autopsies were conducted out of which 11 cases had sustained blunt abdominal trauma. The data was collected regarding the age, sex, injury to abdominal organs, cause of death and manner of death. The data thus collected was analyzed using Microsoft Office Excel 2010 worksheet and were depicted in the results.

## RESULTS

Out of 83 cases autopsied during the study period 11 (13.25%) had sustained blunt force trauma to the abdomen and 7(63.63%) of them were a direct result

---

### Corresponding author:

**Santhosh C S**

Associate Professor

Dept. of Forensic Medicine, J.J.M. Medical College,  
Davangere-577004, Karnataka State, India

Ph-9448220096

Email- drsan\_99@rediffmail.com



of Road traffic accident. The case profile in our study shows that 72.72% were male and 27.27% were female with a male to female ratio of 2.67: 1[Fig.1]. The age group of the cases ranged from 7years to 50 years with a mean age of 26.54 years. The cases were divided into equal groups of 10 years interval and maximum distribution was seen in age group of 11years to 20years [Fig.2]. Bleeding into the peritoneal cavity was present in 7 cases(63.63%) ranging from 200ml to 2.5liters with an average of 1litre. Hollow viscous and mesenteric injury were seen in 4 cases (36.36%) out of which 2 cases (50%) were associated with cranio – cerebral injury, liver injury associated with hollow viscous and mesenteric injury were seen in 4 cases (36.36%) out which one case (25%) was associated with cranio – cerebral injury, isolated liver injury was seen in 2 case (18.18%), splenic injury associated with liver injury and hollow viscous & messnetric injury were seen in only one case (9.09%)[Table No. 1].The cause of death varied among cranio – cerebral injury (3 cases, 27.27%), hemorrhagic shock (2 cases, 18.18%), hypovolemic shock (2 cases, 18.18%), peritonitis (2 cases, 18.18%),hemothorax and laceration of liver (1 case each, 9.09%) [Table No. 2]. Most common manner of death was found to be Road traffic Accident (7 cases, 63.63%) followed by fall from height (3 cases, 27.27%) and one case of wall collapse (9.09%)[Table No. 3]. In the 7 RTA cases, 3 were drivers of motorized 2 wheeler (42.85%), 2 were pedestrians (28.57%) and 2 were involved in motorized 4 wheeler accident (28.57%)[Table No. 4].

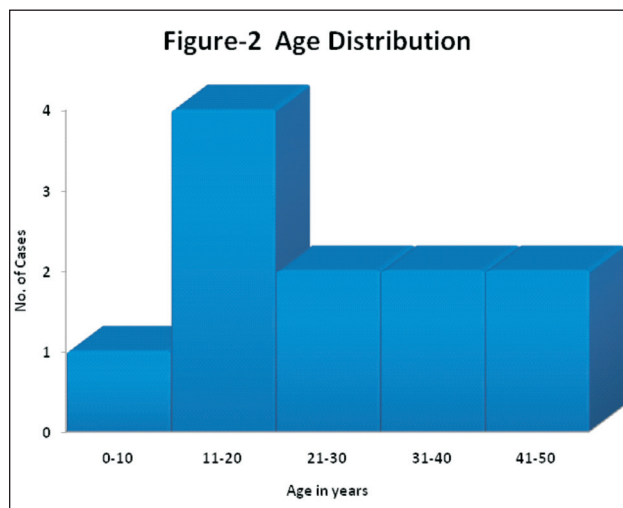
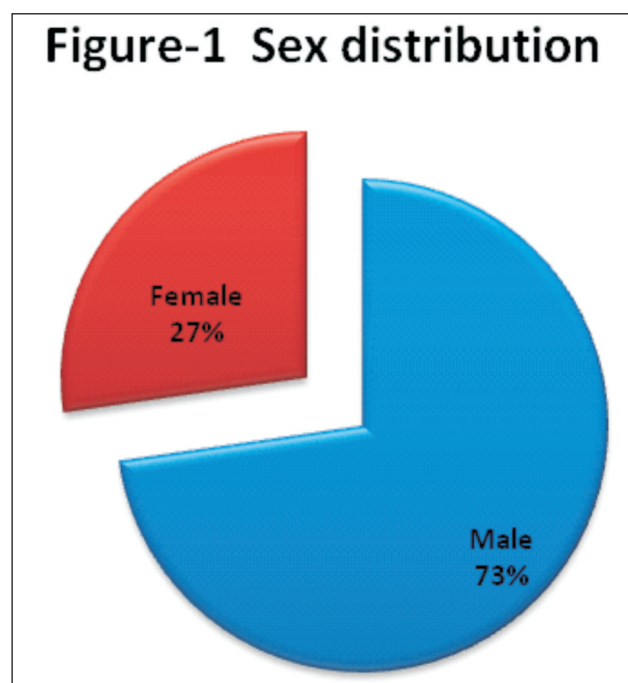


Table No. 1- Pattern of Injury to Abdomen

Pattern of Injury	No. of cases	Percentage (%)
Hollow viscous and mesenteric injury	4	36.36%
Liver injury + hollow viscous and mesenteric injury	4	36.36%
Isolated liver injury	2	18.18
Splenic injury + liver injury + hollow viscous and mesenteric injury	1	9.09

Table No. 2- Cause of death

Cause of Death	No. of Cases	Percentage (%)
Cranio – cerebralinjury	3	27.27
Hemorrhagic shock	2	18.18
Hypovolemic shock	2	18.18
Peritonitis	2	18.18
Hemothorax	1	9.09
Liver laceration	1	9.09

Table No. 3- Manner of Death

Manner of Death	No. of Cases	Percentage (%)
Road Traffic Accident	7	63.63
Fall from height	3	27.27
Wall collapse	1	9.09

Table No. 4 – Type of vehicle

Pattern in RTA	No. of Cases	Percentage (%)
2 wheeler accidents	3	42.85
Pedestrians	2	28.57
4 wheeler accidents	2	28.57

## DISCUSSION

According to T. Bates et al in an 8 year study he found that 129 cases were of abdominal trauma and

60% of them were due to road traffic accidents<sup>(6)</sup>. According to B. Suresh Shetty et al Road traffic accidents accounted for 77% of thoraco- abdominal injury related deaths during his study period<sup>(7)</sup>. Even in our study the most common cause of blunt force trauma to the abdomen was Road Traffic Accident(RTA). According to B. Suresh Shetty et al a male preponderance was found in his study (86%) , with a male-female ratio of 6:1 and the most vulnerable age group being 21years to 50years(80% )<sup>(7)</sup>. According to Madhumita Mukhopadhyay the male to female ratio was 8.4: 1 with an average of 34.98years age<sup>(8)</sup>. The findings in our study show a similar male preponderance but a more younger susceptible age group of 11 to 20 years (mean= 26.54 years) this can be explained due to the fact that this age group is more exposed to environmental factors such as indiscriminate use of alcohol, rash and negligent behavior and stress. With respect to pattern of abdominal injuries an increased risk of intestinal perforation is seen in Road traffic accidents which have been attributed to incorrect application of seat belts. The intestine and its mesentery are frequently damaged in abdominal trauma. Extensive bruising of the gut and its vascular mesentery may occur, mainly from being crushed against the prominent lumbar vertebrae in the midline. The duodenum and jejunum are particularly vulnerable to transection from being compressed against the spine. Extensive bleeding into the peritoneal cavity, usually from rupture of a solid viscus or bleeding from the mesentery may also occur which is associated with significant mortality<sup>(9,10)</sup>. Our study also reflects similar findings. Among the solid abdominal organs, the liver followed by spleen were the most commonly injured abdominal organs and the Liver being the largest intra- abdominal organ having a more anterior location is more often the target of blunt force trauma as reported in the earlier studies<sup>(11-13)</sup>. According to Bernard Knight<sup>(1)</sup>, Liver rupture is seen especially in traffic accidents, either from impact of the driver on the rim or center of the steering- wheel or by the unrestrained passenger being thrown against the fascia. A pedestrian can also suffer a ruptured liver either as a primary impact from a vehicle or as secondary damage from being thrown to the ground. The most common cause of death in our study was cranio-cerebral injuries associated with hollow viscus and mesenteric injury followed by hemorrhagic/ hypovolemic shock and peritonitis. Fractures of the skull especially in the temporo-parietal region and at the base of the skull called the 'motorcyclist's fracture'

is quite common in RTA. In Mant series of motorcyclists<sup>(13)</sup>, 60 per cent had skull fractures along with other injuries and almost 80 per cent had brain damage. The lack of use of protective gear like the helmet may also contribute to increased incidence of head injury. Multiple injuries make it difficult to decide which was the most serious and mortal lesion. According to Bernard Knight, death may occur immediately due to gross organ damage or severe hemorrhage or maybe delayed in cases of continuing bleeding, secondary haemorrhage, hypotension leading to renal failure and/or extensive, local and other systemic infections. Our findings are in agreement with these previous studies. Most common manner of death in our study was Road Traffic Accident (63.63%) involving motorized 2 wheelers which is again in agreement with previous studies<sup>(1, 6, 7, 9, 11-13)</sup>. This is often attributed as a counter product of modernization and busy life and also due to rash driving and lack of discipline among drivers especially among younger drivers who use motorized two wheelers as a more common mode of transport. The injuries in fall from height and wall collapse are highly unpredictable and blunt abdominal injuries may be present concomitantly in such cases.

## CONCLUSION

This study was undertaken to determine the pattern of blunt abdominal injuries especially among Road Traffic Accidents. Our study shows that abdominal viscous mainly the small bowel and solid organs especially liver and spleen are the most common targets for injury during Road traffic accidents which is in accordance to previous studies. A quest for such injuries during autopsy in suspected cases though difficult due to its miniscule nature, is imperative. Head injury still remains a major cause for fatality among those involved in RTA. Lack of discipline among drivers and ignorance towards safety measures are major contributors towards RTAs and most fatalities can be avoided by adopting simple preventive measures. There is a need for immediate implementation of more stringent traffic rules and regulations with respect to personal safety like the use of seat belts & helmets and driver discipline in our Centre. However the role of seat belts still remains controversial as it does not provide immunity against blunt abdominal trauma nevertheless proper application of seat belts and helmets have been found to significantly reduce the mortality in RTAs.

**Acknowledgement:** We would thank our Principal Dr Manjunath Alur for his encouragement and also our Head of the Department Dr Vishwanathan K G for his timely advice and guidance.

**Conflict of Interest:** We the Authors declare that we do not have any financial relationship with any organization. No profits of interest or profit product are discussed in the article and there are no funding or sponsoring agencies. Hence we declare that there are no conflicts of interest.

**Source of funding:** There is no source of funding for this research article.

**Ethical Clearance:** Ethical clearance is not required, since no human or animal experimentation is involved. The permission for all these cases to do autopsy is given by the investigating agency in the form of inquest, due care is taken in preparing this article before submission.

#### REFERENCES

1. Saukko PJ, Knight B. Knight's Forensic Pathology: Arnold; 2004. 229-34 p.
2. Dolinak D, Matshes E, Lew EO. Forensic Pathology: Principles and Practice: Elsevier Science; 2005. 259-88 p.
3. Raychaudhuri P, Cheung NK, Bendinelli C, Puvaneswary M, Ferch R, Kumar R. Seatbelt: A Double-Edged Sword. Case Reports in Pediatrics. 2012;2012(326936):1-3.
4. World Health Organisation: cause-specific mortality and morbidity 2009. Available from: [http://www.who.int/whosis/whostat/EN\\_WHS09\\_Table2.pdf](http://www.who.int/whosis/whostat/EN_WHS09_Table2.pdf). Accessed March 18 2013
5. Cothren CC, Moore EE, Hedegaard HB, Meng K. Epidemiology of urban trauma deaths: a comprehensive reassessment 10 years later. World Journal of Surgery 2007;31:1507-11.
6. Bates T. Abdominal trauma: a report of 129 cases. Postgraduate Medical Journal. May 1973;49: 285-92.
7. Shetty BSK, Kanchan T, Menezes RG, Bakkannavar SM, Nayak VC, Yoganarasimha K. Victim Profile and Pattern of Thoraco-Abdominal Injuries Sustained in Fatal Road Traffic Accidents. J Indian Acad Forensic Med. Jan- March 2012;34(1):16-9.
8. Mukhopadhyay M. Intestinal Injury from Blunt Abdominal Trauma: A Study of 47 Cases. Oman Medical Journal. October - 2009;24(4):256-9.
9. Abbas AK, Hefny AF, Abu-Zidan FM. Seatbelts and road traffic collision injuries. World Journal of Emergency Surgery. 2011;6:18.
10. Rossaint R, Bouillon B, Cerny V, Coats TJ, Duranteau J, Fernández-Mondéjar E, et al. Management of bleeding following major trauma: an updated European guideline. Critical Care 2010;14(R52):1-29.
11. Kaul A, Sinha US, Pathak YK, Singh A, Kapoor AK, Sharma S, et al. Fatal road traffic accidents, study of distribution, nature and type of injury. J Indian Acad Forensic Med. 2005;27:71-6.
12. Chandulal R. Fatal road accidents. J Police Research Development. 1971;12:17-9.
13. Mant AK. Injuries and death in motor vehicle accidents. In: Mason JK, ed. *Pathology of Violent Injury*. London, UK: Edward Arnold Publishers Inc; 1978:1-18.

# Analysis of Factors Causing Infertility in Women Using Statistical Analysis and Association Rule Mining

K Meena<sup>1</sup>, N Vijayalakshmi<sup>2</sup>

<sup>1</sup>Vice-Chancellor, Bharathidasan University, Trichy, <sup>2</sup>Assistant Professor, Shrimati Indira Gandhi College, Trichy

## ABSTRACT

Statistical Hypothesis Testing methods and Association Rule Mining through Frequent Item-set Mining have been used to analyze and mine knowledge on significant factors causing infertility in women. Even though there are a number of factors causing infertility in women, only three significant factors namely Age, Body Mass Index and Thyroid Stimulating Hormone Levels during prenatal periods have been taken for analysis. Sample data was collected from the case sheets of outpatients visiting a Fertility centre and Maternity Hospital at Trichy. Out of several independent attributes collected about outpatients, only three attributes considered to be significant have been taken up for preliminary study. The aim of the study is to assess the significance of the said factors in the light of fertility in women. Common attributes have been considered among an equal sample size of fertile and infertile outpatients. The results of the study show that the attributes considered are significant in determining fertility of women both individually and together. It is found that age significantly influences Body Mass Index and Thyroid Stimulating Hormone Levels. It is also found that obesity triggers changes in hormonal levels.

**Keywords:** Fertility, Infertility, Hypothesis Testing, Frequent Item-set Mining, Association Rule Mining, Data Mining

## INTRODUCTION

This paper applies statistical analysis and data mining techniques to acquire knowledge about certain factors that may lead to infertility in women. Among various factors that are believed to cause infertility in women, three significant factors namely Age of the woman, her Body Mass Index(BMI) and Thyroid Stimulating Hormone(TSH) level have been taken up for study. These three values have been collected for a group of 206 women of whom 103 have successful pregnancy and the other 103 have failed to report successful pregnancy.

### Survey of Literature

The American Society for Reproductive Medicine's Patient's Fact Sheet<sup>[1]</sup> states that the fertility of women peaks from their late teens through their late 20s and then begins to decline. Being overweight or obese has been shown to increase time to conception<sup>[2]</sup>. Women with fat levels that are too high may have a hormonal

imbalance that reduces their fertility. Even a small amount of weight loss may improve fertility. Therefore, maintaining a healthy weight may help restore menstrual and ovulatory cycles and consequently improve the chances of pregnancy.<sup>[3]</sup> "Weight loss should therefore be recommended in order to arrive at a body mass index not exceeding 30 (Clark et al., 1998)" <sup>[4]</sup>. Hanan Fahmy Azzam(2011)<sup>[5]</sup> has observed that the most common and well documented risk factors which can contribute to female infertility include abnormality in BMI (overweight or underweight), hormonal imbalances and age older than 27 years. Paul C. Adamson(et al)<sup>[6]</sup> have also studied the causes of primary infertility among young women in Mysore, India and observe that age plays a significant role in fertility. S. Sharmila and SL. Sasirekha<sup>[7]</sup> in their primary report on the risk factors affecting female infertility in south Indian districts of Tamilnadu and Kerala have also concluded that maximum infertility of females visiting infertility clinics prevailed between 25 and 30 years of age.



A.A.Osman<sup>[8]</sup> states that age plays a significant role in female aetiology of infertility and 95% of the females had anovulation problems due to hormonal imbalance.

Data Mining Techniques offer methodological and technical solutions to deal with the analysis of medical data and construction of prediction models<sup>[9]</sup>.

**Present Study**

About 542 Random samples containing 50 attribute values about fertile and infertile women were collected from a Fertility centre in Trichy. For making a preliminary study, an equal number of fertile and infertile data samples(103) were taken at random, and only three significant factors out of the others were chosen.

For performing statistical inference tests, the data were grouped into a frequency table for each factor – age, BMI and TSH - separately for fertile and infertile women groups and the mean, standard deviation, standard error and significance tests were carried out. The frequencies of fertile and infertile groups were taken together to perform Chi-square test for homogeneity for each factor on the two groups. All the three factors were grouped together to test for independence of factors among each group – fertile and infertile.

For performing frequent item set mining and association rule mining, the records of each group was divided into 2 categories for each factor. In the case of age, the first class contained records where age is less than 30 and the second class contained records where age > 30. Similarly for BMI factor, records with BMI <= 29 and records with BMI > 29 were classified into two groups. Even though correct BMI level is 22(in India, it has been recently fixed as 22, but generally it is 25 as per WHO records), a BMI up to 29 can be tolerated for fertility as per medical empirical study[4] and so 29 was taken as the cutoff for BMI. For TSH factor, records with TSH <=4 and TSH > 4 were used to form the two groups. This was done for both fertile and infertile samples. Then these groups were used to perform frequent itemset mining. Association rules were mined from the results of the frequent itemset mining exercise.

**Frequent Itemset Mining[10]**

Frequent patterns are patterns that appear in a dataset frequently. Finding such frequent patterns plays an essential role in mining associations,

correlations and many other interesting relationships among data. Frequent pattern mining searches for recurring relationships in a given data set.

Let  $I = \{ I_1, I_2, \dots, I_m \}$  be a set of items.

Let  $D$ , the task relevant data be a set of database records where each record  $T$  is a set of items such that  $T \supseteq I$ . Each record has a record-id called T-ID. Let  $A$  be a set of items. A record  $T$  is said to contain  $A$  if and only if  $A \supseteq T$ .

An association rule is an implication of the form  $A \Rightarrow B$  where  $A \supseteq I, B \supseteq I$  and  $A \cap B = \emptyset$ . The rule  $A \Rightarrow B$  holds in the record set  $D$  with support  $S$ , where  $S$  is the percentage of database records in  $D$  that contain  $A \cup B$ . This is taken to be the probability  $P(A \cup B)$ . The rule  $A \Rightarrow B$  has confidence  $C$  in the set of database records  $D$ , where  $C$  is the percentage of transactions in  $D$  containing  $A$  that also contain  $B$ .

This is taken to be the conditional probability  $P(B | A)$  that is

$$\left. \begin{aligned} \text{Support}(A \Rightarrow B) &= P(A \cup B) \\ \text{Confidence}(A \Rightarrow B) &= P(B | A) \end{aligned} \right\} \longrightarrow (1)$$

Rules that satisfy both a minimum support threshold and a minimum confidence threshold are called Strong. By convention, we write support and confidence values so as to occur between 0% and 100% rather than 0 to 1.0.

A set of items is referred to as an itemset. An itemset that contains  $k$  items is a  $k$ -itemset. If the itemset support (frequency of occurrence) satisfies a pre-specified minimum support count threshold then the itemset  $I$  is a frequent itemset. The set of frequent  $k$ -itemsets is commonly denoted by  $L_k$ . From equation 1, we have

$$\text{Confidence}(A \Rightarrow B) = P(B | A) \frac{\text{Support}(A \cup B)}{\text{Support}(A)} = \frac{\text{Support count}(A \cup B)}{\text{Support count}(A)} \longrightarrow (2)$$

Therefore once the support counts of  $A, B$  and  $A \cup B$  are found, it is easy to derive the corresponding association rules  $A \Rightarrow B$  and  $B \Rightarrow A$  and check if they are strong. Thus the problem of mining association rules can be reduced to that of mining frequent itemsets.

**Association Rule Mining[10]**

This consists of finding all frequent  $k$ -itemsets and generating strong association rules from the frequent  $k$ -itemsets. Based on equation 2, association rules can be generated as follows



- i. For each frequent itemset l generate all non-empty subsets of l
- ii. For every non-empty subset s of l output the rule | s=>(l-s) |  
if  $\frac{\text{support count}(l)}{\text{support count}(s)} \geq \text{min\_conf}$ , where min\_conf is the minimum confidence threshold.

Because the rules are generated from frequent itemsets, each one automatically satisfies minimum support.

**Association Mining to Correlation Analysis**

One of the major bottlenecks for successful application of association rule mining is that many rules that are generated with a good support and confidence limit are still not very interesting to users. Hence alternatives to the support-confidence framework can be useful in mining interesting data relationships. Correlation Analysis can help in this case.

**Correlation measures to mine large data sets**

- i. **Lift:** The occurrence of itemset A is independent of the occurrence of itemset B if  $P(AUB) = P(A)P(B)$  [That is  $P(AUB) = P(A)P(B)$ , probability of itemsets A and B occurring together and not occurring together is equal]. Otherwise itemsets A and B are dependent and correlated as events. This definition can easily be extended to more than two itemsets. The lift between the occurrence of A and B can be measured by computing

$$\text{Lift}(A,B) = \frac{P(AUB)}{P(A)P(B)}$$

If the resulting value is less than 1, then the occurrence of A is negatively correlated with the occurrence of B. If the resulting value is greater than 1, then A and B are positively correlated. If the resulting value is equal to 1, then A and B are independent and there is no correlation between them.

- ii. **Chi-Square Test:** We can use the  $\chi^2$  relation to test if A and B are correlated. If the  $\chi^2$  value is greater than the table value at the required degrees of freedom, then A and B are positively correlated. Otherwise they are independent.
- iii. **All-Confidence:** Given an itemset  $X = \{i_1, i_2, \dots, i_k\}$  the all-confidence of X is defined as

$$\text{All-conf}(X) = \frac{\text{sup}(X)}{\max\_item\_sup(X)} = \frac{\text{sup}(X)}{\max\{\text{sup}(i_j) | \forall i_j \in X\}}$$

where  $\max\{\text{sup}(i_j) | \forall i_j \in X\}$  is the maximum (single) item support of all the items in X and hence is called the max\_item\_sup of the itemset X. The all-confidence of X is the minimal confidence among the set of rules  $i_j \rightarrow X-i_j$  where  $i_j \in X$

- iv. **Cosine:** Given two itemsets A and B, the cosine measure of A and B is defined as

$$\text{Cosine}(A,B) = \frac{P(AUB)}{\sqrt{P(A)P(B)}} = \frac{\text{sup}(AUB)}{\sqrt{\text{sup}(A)\text{sup}(B)}}$$

The cosine measure can be viewed as a harmonized lift measure.

All-confidence and cosine measures are null-invariant and are good indicators of correlation

**Findings of Statistical Analysis**

From Table I, we find that the absolute values of t-test, for each factor, is greater than 1.96, the value of the normal probability distribution at 5% level. Thus we conclude that the mean values for each of these factors vary significantly. Therefore the three factors age, BMI and TSH are indeed significant factors that affect the fertility of women. The t-test when applied to check for difference between the two means for each attribute, reports significant difference in mean age, mean BMI and mean TSH between fertile and infertile groups.

$\chi^2$  value for test of independence among attributes of fertile and infertile groups also report values greater than corresponding table values at 0.05 level. Hence there is association between the attributes age, BMI and TSH of infertile and fertile women.

The test for homogeneity for each attribute among the two groups (Table II) shows that there is not much variance between age and BMI among fertile and infertile groups but there is a marked difference between TSH levels of fertile and infertile groups. This is shown by the  $\chi^2$  test value which is lesser than the table value in the case of age and BMI but greater than the table value for TSH. For simplicity and better understanding of the results, Chart I shows the comparative trends in age, BMI and TSH for fertile and infertile groups using line diagrams.

**FINDINGS OF ASSOCIATION RULE MINING**

Tables III shows the results of association rule mining from the results of frequent itemset mining at various levels of support and confidence for both the fertile and infertile data sets. The study indicates that

in spite of aging and obesity in patients, fertility could be achieved if TSH levels are normal. Abnormality in TSH values could be caused due to hormonal imbalances, obesity, other factors, or even due to age. Therefore we find that the factors are interrelated and each has its own effect on fertility and also influence each other.

In the case of infertile data sample, we can infer that “even though Age may be under 30, or BMI may be under 29, abnormality in TSH level contributes to infertility.” While in the case of fertile data we infer that “Fertile age values, normal BMI values and Normal TSH values lead to fertility in women”. The very same facts can be inferred from the line diagrams in Chart I.

Tables IV & V, show the results of correlation analysis. We find that the measures lift, chi-square, all-confidence and cosine computed on fertile and infertile data samples show that there is enough correlation between every pair of the factors age, BMI and TSH in both groups. We should consider all-confidence and cosine more, as these are null-invariant measures. Considering the values of the four measures of correlation for both groups taking all the attributes together, we find that there is sufficient correlation between the three attributes. Thus we can say that the findings of data mining concur with the findings of statistical analysis and correlation analysis for the two

data sets. Therefore we conclude that the attributes age, BMI and TSH are dependent on each other as found by Statistical Testing procedures.

**Scope for Further Research**

The accuracy of the results obtained can be improved by increasing the sample size of the data. The other factors contributing to infertility may also be similarly considered for study. A decision tree model that would help in classifying a given patient record for successful or unsuccessful pregnancy can be generated. This could also be implemented in a program to automate the classification approach.

**CONCLUSION**

The study has proved beyond doubt that the factors, age of the patient, BMI and TSH levels, are significant factors influencing fertility of women through statistical analysis and data mining techniques. Therefore, couples aiming for successful pregnancy, should always do so before 30 years of age. It is also emphasized that BMI levels should be brought down to less than 29 before any steps are taken for conception. Normal TSH levels can be achieved at lower age and BMI levels through medication, not taking into account, previous history of diseases, bad habits or other physical disorders.

**Table I: Statistical measures of fertile & infertile data for each attribute and results of hypotheses tests in each case**

	Fertile Women			Infertile Women		
	AGE	BMI	TSH	AGE	BMI	TSH
Arithmetic Mean	27.1942	25.2524	1.5485	28.6019	26.2718	3.2476
Standard Deviation	4.5647	4.4997	1.3751	5.3159	5.7626	2.2327
Standard Error	0.4498	0.4434	0.1355	0.5238	0.5678	0.2200
T Test Value	-13.2742	20.4683	-15.6753	-6.8134	19.5811	3.7201
Chi Square Test for Independence of Attributes	$\chi^2 (8)_{0.05} = 15.5$			$\chi^2 (10)_{0.05} = 18.3$		

**Table II: Chi-square test values for variance of attributes for fertile & infertile women**

	AGE	BMI	TSH
Chi-square Value	5.4543	5.6541	37.8214
Table Value	$\chi^2 (5)_{0.05} = 11.07$	$\chi^2 (4)_{0.05} = 9.49$	$\chi^2 (3)_{0.05} = 7.82$

**Table III: Association rule mining from infertile data sample**

Support	Confidence	Association Rule Mined from Infertile Data	Association Rule Mined from Fertile Data
50%	75%	Nil	{AGE1,BMI1}->N {{BMI,N}->AGE1 {AGE1,N}->BMI1
40%	75%	AGE1->BMI GOOD BMI1->ABNORMAL	—
30%	75%	AGE1->BMI GOODAGE1->NORMAL BMI1->ABNORMAL {AGE1,AB}->BMI1 (only 69% confidence)	—

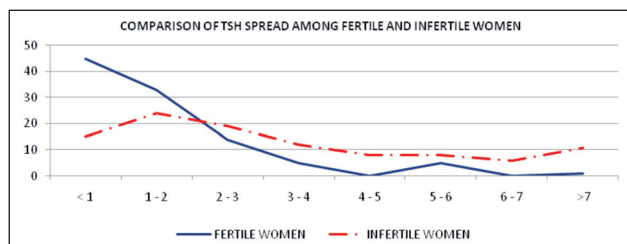
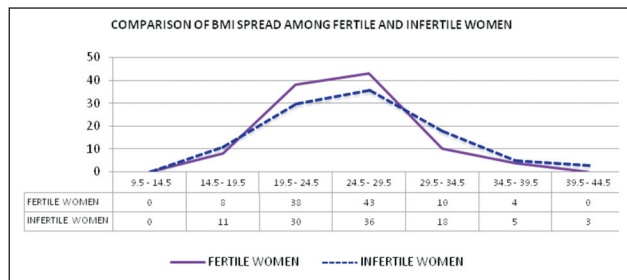
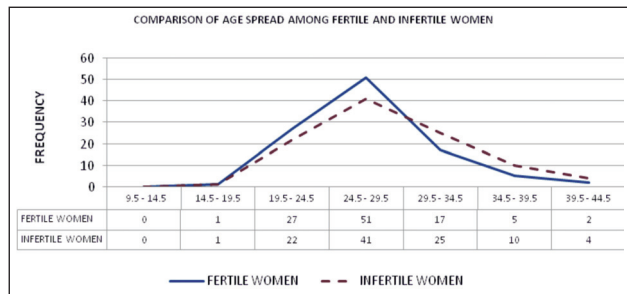
**Table IV: Values of measures of correlation analysis for each pair of attributes for infertile women**

	AGE Vs BMI		AGE Vs TSH		BMI Vs TSH	
	Fertile Women	Infertile Women	Fertile Women	Infertile Women	Fertile Women	Infertile Women
LIFT	0.0380	0.0385	0.0375	0.0389	0.0406	0.0386
CHI-SQUARE	0.7724	0.7724	0.6600	0.6597	1.6380	1.6375
ALL-CONF	2.0000	1.6002	1.1973	1.7670	1.2356	1.6065
COSINE	4.6874	1.9434	1.7177	1.9822	1.6729	1.9554

**Table V: Values of measures of correlation analysis for all attributes for infertile and fertile women**

	ALL-CONF	COSINE	LIFT	CHI-SQ
FERTILE	1.140	0.2298	0.07	1.898
INFERTILE	1.505	0.267	0.065	1.597

**Chart 1: Charts showing frequency levels of fertile and infertile women with respect to age, BMI and TSH**



**Acknowledgement:** I acknowledge the assistance provided by Dr. S. Chitra of Lalitha Nursing Home, Trichy for allowing me to access the case sheets of outpatients of her hospital, for carrying out the present study.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** No personal details revealing the identity of any of the outpatients under study have been collected. The data has been used only for the above study.

**REFERENCES**

1. The American Society for Reproductive Medicine, Alabama,(2005) "Patient's Fact Sheet - Reproductive Aging in Women", Available: [www.asrm.org](http://www.asrm.org),
2. Pandey S, Pandey S, Maheshwari A, Bhattacharya S, "The impact of female obesity on the outcome of fertility treatment", Journal of Human Reproductive Science, Vol(3), pp. 62-70, 2010, Available from: <http://www.jhrsonline.org/text.asp?2010/3/2/62/69332>
3. Safaa Al-Hassani and Kaled Zohni, "The Overlooked Role of Obesity in Infertility", Journal of Family and Reproductive Health, Vol 2(3), pp. 115-122, Sep 2008
4. Juan Manuel Montoya, Alejandra Bernal, and Claudia Borrero, "Diagnostics in assisted human reproduction", Reproductive Bio-Medicine Online, Volume 5(2), pp.198-210, July 2002, Available at [www.rbmonline.com/Article/397](http://www.rbmonline.com/Article/397)
5. Hanan Fahmy Azzam, "Predictors of Fertility among Egyptian Females at Reproductive Age at El-Manial Maternity Hospital", Journal of American Science, Volume 7(6), pp.1019-1029, 2011.
6. Paul C.Adamson (et al), "Prevalence & correlates of primary infertility among young women in

- Mysore, India", *Indian Journal of Medicinal Research*, Vol.(134), pp. 440-446, 2011
7. Sharmila.S and Sasikala.SL, "Primary report on the Risk Factors Affecting Female Infertility in South Indian Districts of Tamil Nadu and Kerala", *Indian Journal of Community Medicine*, Vol.(36), pp. 59-61, 2011
  8. Osman.A.A, "Management of Infertility within Primary Health Care Program in Sudan", *Asian Journal of Scientific research*, Vol. 4(2), pp. 158-164, 2011
  9. Riccardo Bellazzi , Blaz Zupan, "Predictive data mining in clinical medicine: Current issues and guidelines", *International Journal of Medical Informatics*, Vol.(77), pp. 81-97, 2008
  10. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", II Edition, Elsevier India Pvt. Ltd., 2007, pp.230-261

# Epidemiological Profile of H1N1 Cases in Western Rajasthan from January 2012 to December 2012

Singh Mahendra<sup>1</sup>, Bhansali Suman<sup>2</sup>, Hakim Afzal<sup>3</sup>, Sharma Savitri<sup>4</sup>

<sup>1</sup>3rd Year Postgraduate Student, <sup>2</sup>Professor, <sup>3</sup>Associate Professor, <sup>4</sup>Assistant Professor, Department of Community Medicine, Dr.S.N.Medical College Jodhpur, Rajasthan

## ABSTRACT

**Context:** A large number of H1N1 cases and deaths have been reported in Western Rajasthan during pandemic of H1N1 in year 2009-10. In year 2012 this Influenza A H1N1 virus once again resurfacing in western Rajasthan and reared its ugly head in the western Rajasthan. Once again H1N1 infection posed a serious threat to health community and was a cause of serious concerns in Western Rajasthan.

**Aims:** To study the epidemiological profile of H1N1 cases in Western Rajasthan from January 2012 to December 2012.

**Settings and Design:** Retrospective descriptive analysis

**Method and Material:** Epidemiological characteristics of Influenza A H1N1 cases in Western Rajasthan from January 2012 to December 2012 were retrospectively, descriptively analyzed using data from the swine flu control room, Influenza A H1N1 screening center and isolation wards at the Dr.S.N. Medical College, Jodhpur. Dr.S.N. Medical College, Jodhpur is a largest multispecialty tertiary care teaching institution in Western Rajasthan. Data were Analyzed using MS Excel software.

**Results:** At Dr. SNMC, from January 2012 to December 2012, a total of 817 patients were tested for Influenza A H1N1, of which 21.8% (178) were found to be positive for the disease. Majority (71.3%, 127) of cases were females. Maximum cases (50%) were detected in the month of December and the patients >15-45 years of age accounted for 75.8% (135) of the cases. Influenza A H1N1 resulted in death of 12.9% (23) of the total cases, of which 65% (15) deaths occurred within 48 h of admission. Majority (69.6%, 16) of deaths occurred in females. The patients >15-45 years of age accounted for 52.2% of the deaths. 40.4% (72) of cases and 52.2% (12) of deaths have occurred in pregnant and postpartum women.

**Conclusions:** Influenza A H1N1 virus once again resurfacing in western Rajasthan and reared its ugly head in the western Rajasthan in year 2012. Similar to H1N1 pandemic 2009, the incidence and mortality in 2012 in western Rajasthan was higher in young. H1N1 influenza can cause severe illness and deaths in pregnant and postpartum women.

**Keywords:** H1N1, Swine Flu, Western Rajasthan, Pandemic

## INTRODUCTION

H1N1 is a novel strain of Influenza A virus that evolved by genetic reassortment. Following its emergence in March 2009 in Mexico, H1N1 virus

spread rapidly throughout the world.<sup>[1]</sup> WHO declared H1N1 as a pandemic on 11th June, 2009.<sup>[1]</sup> This was the first of its kind declaration by WHO in the past 70 years.<sup>[1]</sup>

The disease started in India in the month of May 2009 and the first laboratory-confirmed case was reported from Hyderabad on 16 May.<sup>[2]</sup> Soon the disease spread to other parts of the country. During pandemic large number of cases and deaths occurred in India. WHO Declared H1N1 Post- Pandemic on 10 August 2010. The pandemic influenza A H1N1 virus

---

### Corresponding author:

**Mahendra Singh**

3rd Year Postgraduate Student

Department of Community Medicine, Dr.S.N.Medical College, Jodhpur (Rajasthan)

Email: gehlot.mahendrasingh@gmail.com

Contact No - 09460104328



is now circulating as seasonal influenza A H1N1 virus.

The state of Rajasthan which is the largest state in India reported its first case of H1N1 on 23 July 2009.<sup>[3]</sup> Soon the disease spread to other parts of the state. A large number of H1N1 cases (584 cases) and deaths (80 deaths) have been reported in western Rajasthan during pandemic of H1N1 in year 2009-10. After that in year 2011 Western Rajasthan reported little influenza activity (13 cases). In the year 2012 sporadic outbreaks of Influenza A H1N1 were reported from across the India. This Influenza A H1N1 virus once again resurfacing in western Rajasthan and reared its ugly head in the western Rajasthan. This study is aimed to give an idea regarding the epidemiological trends of the H1N1 diseases in western Rajasthan in year 2012.

**METHOD AND MATERIAL:**

The Dr.S.N. Medical College, Jodhpur is a largest multispecialty tertiary care teaching institution in Western Rajasthan with capacity of approximately 2000 beds. Four Government hospitals attached to this Medical College. There is a screening centre and isolation ward with critical care facility for Influenza A H1N1 patients in all these four hospitals to provide necessary medical care.

There is a swine flu control room at Dr.SNMC for monitoring of Influenza A H1N1. Function of swine flu control room is collect information about all suspected and confirmed cases of H1N1 and keep complete data of all the patients visiting these screening centres and swine Flu wards.

In order to study the epidemiology and establish the magnitude and severity of Influenza A H1N1 in Western Rajasthan in year 2012, a retrospective, descriptive study was carried out at the Dr.S.N. Medical College, Jodhpur. Data of swine flu cases from January 2012 to December 2012 were taken from the Swine flu control room.

Epidemiological characteristics were analyzed in terms of demographic characteristics, clinical presentation and outcome.

Data were analyzed using Microsoft Excel Software and basic statistical measures like mean, median, percentage, etc. were calculated.

**RESULTS**

A retrospective, descriptive study was carried out

at the Dr. SNMC, Jodhpur to study the epidemiological profile of H1N1 cases in Western Rajasthan from January 2012 to December 2012.

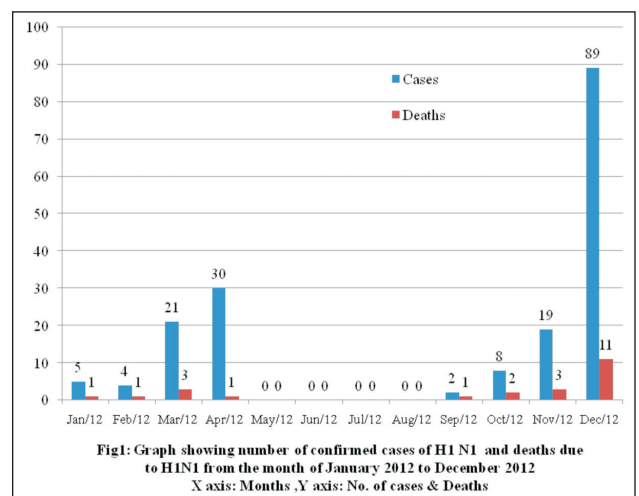
In year 2012, from January to December, 817 suspected patients were tested, of which 21.8 % (178) were found to be H1N1 positive. A total of 117 confirmed cases were admitted in the Influenza A H1N1 isolation wards, of which 12.9% (23 cases) succumbed to the disease [Table 1]. The case fatality ratio was found to be 12.9%.

**Table 1: District wise distribution of Influenza A H1N1 cases and deaths from the month of January 2012 to December 2012 in Western Rajasthan**

District	Confirmed Cases	Deaths
Jodhpur	131	11
Pali	9	1
Barmer	14	7
Jaisalmer	5	3
Nagour	20	1
Jalore	1	0
Total	178	23

Dr. SNMC received patients from Jodhpur, Barmer, Jaisalmer, Pali, Nagour and Jalore district of the Western Rajasthan [Table 1]. The Maximum numbers of cases (73.6%, 131) were seen in Jodhpur district [Table 1].

From [Figure 1], it can be seen that the number of Influenza A H1N1 cases gradually escalated from the month of September reaching a peak in the winter months. The western Rajasthan had reported maximum cases and mortality in the month of December, i.e., 50% and 47.8% of total cases and mortality reported during the month of December respectively [Figure 1].



### Characteristics of influenza A H1N1 cases

In year 2012, from January to December, 817 patients were tested for H1 N1 at Dr.SNMC, of which 21.8 % (178) were found to be positive.

Patient's age varied from 20 days to 87 years, with an average age of 28.9 years (median age of 26

years). From Table 2, it can be seen that of the total cases, 71.3% (127 cases) were female and 28.3% (51 cases) were male. Influenza A H1N1 primarily affected the younger population, with patients >15-45 years age group accounting for 75.8% (135 cases) of the total cases [Table 2].

**Table 2: Morbidity and mortality due to Influenza A H1N1 from the month of January 2012 to December 2012 in Western Rajasthan**

Age group (Years)	Male					Female				
	Positive		Deaths		Case fatality ratio	Positive		Deaths		Case fatality ratio
	No	%	No.	%		No.	%	No.	%	
0-15	13	25.5	0	00	00	6	4.7	1	6.25	16.7
>15-30	10	19.6	0	00	00	92	72.4	12	75.0	13.0
>30-45	11	21.6	3	42.8	27.2	22	17.3	2	12.5	9.1
>45-60	8	15.7	2	28.6	25.0	4	3.2	1	6.25	25.0
>60	9	17.6	2	28.6	22.2	3	2.4	0	00	00
Total	51	100	7	100	13.7	127	100	16	100	12.6

The age group of >15-30 years accounted for 57.3% (102 cases) and >30-45 years age group comprised 18.6% (33 cases) of the total cases [Table 2]. 72.4% of the total positive patients in females were of the age group >15-30 years.

The age group of 0-15 years comprised only 10.7% (19 cases) of the total cases, of which 13 cases occurred in children less than 5 year of age. Population at the extremes of age (0-15 and >60 years) formed 17.4% (10.7% and 6.6%, respectively) of the total positive patients [Table 2].

From Table 2, it can be hypothesised that Influenza A H1N1 has caused huge morbidity among the younger population, i.e., in the age group of >15-30 years and the older population got relatively spared.

Out of total 178 Influenza A H1N1 cases 23 had expired with an overall case fatality rate of 12.9%. Majority of the patient who died required intensive care and ventilator support. There were 13 deaths in Jodhpur district, whereas Barmer, Pali, Jaisalmer and Nagour had 4, 2, 2 and 2 deaths respectively [Table 1]. 69.6% (16) deaths occurred in females and the rest occurred in males.

It can be seen from Table 2 that 78% deaths occurred in the age group >15-45 years, with 52.2% (16) deaths in the age group of >15-30 years and 26.1% (6) deaths in the age group >30 to 45 years. Only 3 deaths had occurred in population at the extremes of age (0-15

and >60 years) [Table 2]. Of the total 23 deaths, 65% (15) occurred within 1 to 3 days of admission.

### Pregnancy and influenza A H1N1 Infection

40.4% (72 out of 178) of total H1N1 cases and 56.7% of total female cases (72 out of 127) have occurred in pregnant and postpartum women [Table 3]. 52.2% (12 out of 23) of total deaths and 75% of female deaths (12 out of 16) caused by H1N1 influenza A virus have occurred in pregnant and postpartum women [Table 3]. Of the 72 H1N1 positive pregnant and postpartum women 55 were pregnant and 17 were postpartum. Out of 72 pregnant patients, 62 (45 who were pregnant and 17 who were postpartum) requiring hospitalisation. Of the 55 pregnant patients, 5 (9.1%) were in the first trimester, 16 (29.1%) were in the second trimester, and 34 (61.8%) were in the third trimester.

**Table 3: Pregnancy and H1N1 Infection**

	Cases	Deaths	Case fatality ratio (%)
Pregnant	72	12	16.6
Non-Pregnant	55	04	7.3
Total	127	16	12.6

### DISCUSSION

All the cases from January 2012 to December 2012 reporting to the Influenza A H1N1 screening center, outpatient department and emergency department of Dr. SNMC were included in this study. Dr. SNMC had

cases from Jodhpur, Barmer, Jaisalmer, Pali, Nagour and Jalore districts of the Western Rajasthan, which may reflect the trend, morbidity and mortality of Influenza A H1N1 in this part of India. Majority (73.5%, 131 out of 178) of cases reported from Jodhpur district.

Total 4,568 cases of swine flu were registered in the India in year 2012 with a case fatality rate of 7.5% (344 deaths).<sup>[4]</sup>

A Puvanalingam et al (2010) in their Study in two government hospitals in Chennai observed case fatality rate of H1N1 was only 1.8%.<sup>[5]</sup> Tanvir Samra et al (2010) in their Study in tertiary care hospital in Northern India reported case fatality rate of H1N1 was 5%.<sup>[6]</sup> While the positivity rate in present study is 21.8%, with a case fatality ratio of 12.9%. High prevalence and mortality may be attributed to the study population restricted to a small geographical area when compared against the entire country and sick patients referred from adjacent desert parts having delay in essential medical care required, with loss of crucial time.

In present study it was observed that majority (71.3%) of cases were female and only 28.3% cases were male. In contrast, A Puvanalingam et al (2010) in their Study observed that more cases occurred in male (54%) as compare to female (46%).<sup>[5]</sup> Majority (69.6%) of deaths caused by H1N1 influenza A virus have occurred in female. This is similar to that reported in other studies<sup>[5,7]</sup>. This indicating not only a late referral but also the severity of disease being more in women, especially, pregnant women.

Age of patient varied from 20 days to 87 years, with an average age of 28.9 years (median age-26.0 years). Of the total 75.8% cases, 78% of total mortality was observed in patients with >15-45 years of age, which clearly reflects its high prevalence, morbidity and mortality among the younger population. This is similar to that reported in other studies.<sup>[5,8,9,10,11]</sup> In contrast, Himanshu Rana et al (2010) in their Study observed a very high H1N1 mortality in those above 45 years of age (case fatality of 26.8%).<sup>[7]</sup>

The suspected as well as confirmed cases rose during the winter months of October, November and December. As H1N1 is a viral disease that spreads via aerosols, the disease was expected to rise in winter months. With the fall in temperature during the winter months the spread of the disease via aerosols like any other influenza strain and like other respiratory viruses increased steeply so that 50% of all positive were seen

in the month of December itself.

In our study, approximately 40.4% (72 out of 178) of cases and 52.2% (12 out of 23) of deaths caused by H1N1 influenza A virus have occurred in pregnant and postpartum women. During prior influenza epidemics and pandemics, as well as during the pandemic (2009), pregnant women have had increased morbidity and mortality.<sup>[12]</sup> Similarly in our study mortality rate in H1N1 influenza in pregnancy was found to be 16.7% (12 out of 72). During previous influenza pandemics, increased rates of spontaneous abortion and preterm birth have been reported among pregnant women, especially in those with pneumonia.<sup>[13]</sup> H1N1 influenza infection was more common in the third trimester of pregnancy (61.8%). Similar to our analysis, A Puvanalingam et al (2010) in their Study in two government hospitals in Chennai also observed the high case fatality (25%, 3 out of the 12 cases) among pregnant women.<sup>[5]</sup>

Although patients in this study comprised a sizeable proportion of cases from Jodhpur and the adjoining districts of the Western Rajasthan, the findings of this study need to be carefully extrapolated and cannot be generalized to a large population. This is one of the limitations of our study. Secondly, we restricted our study to only hospital; therefore, many cases of Influenza A H1N1 may have been missed. Not being a community-based study, we may not be able to calculate the exact measures of epidemiology. Thirdly, regional geographical conditions have not been accounted for, which may have a significant impact on prevalence and morbidity. There may be a small number of cases that may have been missed out, although every attempt was taken to include all the cases, but this figure would not have been significant.

## CONCLUSION

The incidence and mortality from H1N1 in Western Rajasthan in 2012 was significantly higher in young, more during the winter months. Jodhpur and Barmer were the most affected districts in the Western Rajasthan. H1N1 influenza can cause severe illness and death in pregnant and postpartum women; regardless of the results of testing, prompt evaluation and antiviral treatment of influenza-like illness should be considered in such women.

**Acknowledgement:** We express gratitude to Chief Medical and Health Officer, Jodhpur and Department of Microbiology, Dr.S.N. Medical College, Jodhpur for providing assistance.

**Conflict of Interest:** Nil

**Source(s) of Support:** Nil

**Ethical Clearance:** Provided by ethical committee of Dr. S.N.Medical College, Jodhpur.

### REFERENCES

1. WHO (2009). Weekly Epidemiological Record No. 41, 9<sup>th</sup> Oct 2009. Available from: <http://www.who.int/wer/2009/wer8441.pdf>. [Last accessed on 2011 Oct 16].
2. Ministry of Health and Family Welfare, Government of India. Pandemic Influenza (H1N1)-Situational Update. Available from: <http://mohfw-h1n1.nic.in/document/PDF/SituationalUpdatesArchives/may/Situational%20Updates%20on%2016.05.2009.pdf>. [Last accessed on 2012 March 20].
3. Shiv Dutta Gupta, Vivek Lal, Rohit Jain, OmPraksh Gupta: Modeling of H1N1 Outbreak in Rajasthan. *Indian J Community Med* 2011; 36:36-38.
4. Swine flu claimed 344 lives in India in 2012. *NDTV.com*. Available from: <http://www.ndtv.com/article/india/swine-flu-claimed-344-live>. [Last accessed on 2012 Jan 16].
5. Puvanalingam, C Rajendiran, K Sivasubramanian, S Ragunathanan, Sarada Suresh, S Gopalakrishnan: Case Series Study of the Clinical Profile of H1N1 Swine Flu Influenza. *JAPI* 2011; 59:14-18
6. Tanvir Samra, Mridula Pawa, Amlendu Yadav : One year of experience with H1N1 Infection: clinical observations from a tertiary care hospital in Northern India. *Indian J Community Med* 2011; 36:241-243
7. Himanshu Rana, Pathik Parikh, Asha N Shah, Sanjay Gandhi: Epidemiology and Clinical Outcome of H1N1 in Gujarat from July 2009 to March 2010. *JAPI*. 2011; 60:17-19.
8. You are at greater H1N1 risk if aged 21-50 yrs. *Times Of India*; Jodhpur; August 28, 2010.
9. Delaney JW, Fowler RA. 2009 Influenza A (H1N1): A Clinical review; *Hosp Pract (Minneapolis)* 2010; 38:74-81.
10. Dee S, Jayathissa S. Clinical and epidemiological characteristics of the hospitalized Patients due to Pandemic H1N1 2009 Viral infection: Experience at Hutt Hospital, New Zealand. *N Z Med J* 2010; 123:45-53.
11. Appuchamy RD, Beard FH, Phung HN, Selvey CE, Birell FA, Culleton TH. The changing phases of pandemic (H1N1) 2009 in Queensland: An overview of Public Health Action and Epidemiology; *Med J Aust* 2010; 192:94-7.
12. Dodds L, McNeil SA, Fell DB, et al. Impact of influenza exposure on rates of hospital admissions and physician visits because of respiratory illness among pregnant women. *CMAJ* 2007; 176:463-468.
13. Jamieson DJ, Honein MA, Rasmussen SA, et al. H1N1 2009 influenza virus infection during pregnancy in the USA. *Lancet* 2009; 374:451-458.

# Informed Consent How Important ?

**Nalini M S**

*<sup>1</sup>Reader, Department of Periodontics, Rajarajeshwari Dental College, No. 14, Ramohalli, Kumbalagodu Cross, Mysore Road, Bangalore*

## ABSTRACT

Human beings are responsible for their own destinies. Informed Consent is when a competent individual makes decisions for her or himself. The informed consent process allows the patient or the custodial parent or, in the case of minors, legal guardian to participate in and retain autonomy over the health care received. The act of asking for consent, specifically informed consent from the patient fulfils three aspects. Firstly, respect for the patients' right to make a choice regarding his body, secondly as an ethical and moral obligation and finally a legal necessity to safeguard the dentist from possibility of future legal action. Failure to do so violate patients' trust in dentists and increases dentists' liability to malpractice suits. The following review article aims to provide fundamental information regarding important ethical principle of informed consent. It also focuses on various types of consent and review of current literature.

**Keywords:** *Informed consent, Ethics, Dentistry*

## INTRODUCTION

A patient's informed consent to investigations or treatment is a fundamental aspect of the proper provision of dental care. Without informed consent to treatment, a dentist is vulnerable to criticism on a number of counts, not least those of assault and/or negligence - which in turn could lead respectively to criminal charges and/or civil claims against the dentist.

A doctor-patient, especially a dentist-patient relationship is a special one as the patient seeks help from the dentist for relief from pain and for care of their oral health. They permit the dentists to see, touch and treat structures in and around the oro-facial region and also divulge information about themselves they wouldn't normally reveal. They do this because they trust the dentist to maintain their confidentiality and also believe that that dentist will act in their best interests.

Informed Consent defined to encapsulate a doctors moral duty to provide sufficient information for a patient to make an informed and rational choice, the

information includes the inherent risks and alternatives that a reasonable doctor would provide having regard to the particular circumstances of patient.<sup>1</sup>

Consent in clinical settings can be considered as a 'special and formalized type of communication in dentistry ,quite a number of option available for the treatment of a condition,direct real life and death decisions are rarely made, making, it an elective branch of medical care. Patient usually find it difficult to grasp the technical details of each treatment and the long term effects of the various option.<sup>1</sup>

### **Informed Consent Involves**<sup>2,3</sup>

- Evaluating, making and signifying a decision.
- It is better understood as a process than an event where reasoned understanding with emotional insights could be included.
- Right of patient to control their own moral destiny.
- Improves quality of care provided to patient



### Elements of Informed Consent<sup>4</sup>

- A. **Knowledge / Information:** 'Knowledge' means that sufficient comprehensible information is disclosed to the patient regarding the nature and consequences of the proposed and alternative treatments, Risks and benefits.
- B. **Competence / Understanding:** Competence means that the patient has sufficient ability to understand the nature of the treatment and the consequences of undergoing or refusing the treatment.
- C. **Voluntariness / Freedom:** 'Voluntariness' means that the patient has freely agreed to submit to the treatment without any coercion or force.

### Types of Consent which are Routinely used in Dental Practice. they Include:<sup>5</sup>

- A. **Implicit (tacit) consent:** This is the most common type of consent one encounters in a dental clinic or hospital. Here consent is implied when the patient indicates a willingness to undergo a certain procedure or treatment by his or her behaviour. For example, consent for an oral examination is implied by the action of opening one's mouth.
- B. **Explicit consent:** This type of consent is given orally or in writing. It is required for minor examinations or invasive procedures. It is preferable that a disinterested third party act as witness to the consent.
- C. **Proxy consent (Substitute consent):** This type of consent is utilized in the event the patient is unable to give consent because he/she is a minor or mentally unsound/unconscious. In such situations a parent or close relative can provide proxy consent.
- D. **Loco parentis<sup>6</sup> In an emergency situation in case of children, when parents / guardians are not available, consent can be obtained from the person bringing the child for dental examination or treatment (For example: school teacher, warden, etc).**
- E. **Open/broad/blanket consent:<sup>7,8</sup>** is usually consent signed at the time of hospital admission, to cover any subsequent procedures. This type of consent implies that there are no restrictions to the scope and duration of the consent, and does not inform patients adequately about risks. It is said to be an

inappropriate form of consent because it is equivalent to requesting carte blanche permission for medical procedures

- F. **Verbal consent:** Verbal consent is where a patient states their consent to a procedure verbally but does not complete a written consent form.

### Consequences of failing to obtain informed consent

Failure to obtain consent before performing an invasive procedure could result in either trespass to a person or negligence. Simply defined, assault involves the threat of using force while battery involves the actual usage of force, either intentionally or negligently, against another person, without lawful justification or excuse.

### Refusal of consent

Acceptance of the principle of respect for patient autonomy requires the dentist to respect a patient's choice if it is contrary to the dentist's recommended treatment. However, where the patient has refused a dental procedure that the dentist believes would be beneficial to the patient, it is incumbent on the dentist to be satisfied that the patient has evaluated properly the consequences of treatment and non-treatment and enquire into the reasons why the patient is refusing treatment. In this way any misunderstanding can be eliminated and the dentist can be assured that the patient has validly refused treatment. It should not be thought, however, that a Patient's right of self-determination is a right to insist that the dentist provide whatever treatment the patient desires. Dentists are also entitled to respect for their autonomy and can refuse to provide the patient's preferred treatment if it is believed to be harmful.

### Consent in the context of indian law

According to the Indian Civil law - Indian Contract Act of 1872, a doctor patient relationship is considered to be a contractual and legal agreement for professional services. Section 13 of the act defines consent as when "two or more persons agree on the same thing in the same sense." Section 14 of the same act defines 'free consent' as one that is "given without the existence of coercion, undue influence, fraud, misrepresentation or mistake". Therefore according to this act, a contract is valid only if it is entered into with the free consent of the parties concerned in this case, the dentist and patient<sup>9, 10, 11</sup>

### Who can give consent?

Since the dentist-patient relationship is essentially a contract, it implies that only persons 18 years of age and above can enter into a doctor-patient contract and can give consent for treatment.<sup>12</sup>

In the absence of clear cut legislation, the majority of doctors/dentists in India consider the consent of a person above twelve and less than eighteen years of age valid for medical/dental examination only, but for dental interventions prefer to take the consent of the parents/guardians. This is a definite safeguard against civil liability.

### When is consent invalid?<sup>11</sup>

It is essential to keep in mind various situations where consent could be invalidated.

1. Consent given under fear, fraud or misrepresentation of facts,
2. Persons under the influence of alcohol,
3. Person who is ignorant of the connotations of the consent,
4. Person who is under 12 years of age

### Situations where consent may not be obtained:<sup>13</sup>

Though consent is an essential aspect in a doctor-patient relationship it need not be obtained in the following situations

1. In the event of Medical Emergencies.
2. In case of a person suffering from a notifiable diseases
3. Immigrants.
4. Members of Armed Forces.
5. Handlers of food and dairymen.
6. New admission to Prisons.
7. In case of a court order or request of the police

### For how long is consent valid?<sup>14</sup>

Though there is no legally defined time period for consent to be valid, it can be considered valid until the patient withdraws it or there is a change in the patient's circumstances, which may include

1. Improvement/deterioration in the patient's condition
2. Availability of new treatment options since consent was given.
3. Due to disease progression the treatment choice has changed from cure to palliation.

### METHODS TO IMPROVE INFORMED CONSENT

Most health professionals including dentists pride themselves on the fact that they take time to explain health care actions/interventions, home care instructions, drug use, follow up procedures etc., despite their busy schedules. Whereas, in fact, their communications are not always comprehensible even to well educate individuals. Use of medical/dental jargon further complicates the communication process. The health professional is then completely astounded and feels victimized when he is faced with litigations regarding failure to explain adverse effects or is accused of performing unwanted procedures or negligence. These situations could be avoided by improving communication with the patient thereby obtaining a valid informed consent.

The first step in the communication process is to assess the health literacy of the patient by observing for a few simple signs.<sup>15</sup>

1. A low level of health literacy is indicated when the following signs are noticed.
  - Patient's registration forms are incomplete or inaccurately entered.
  - Patient regularly misses appointments and does not follow through with the recommended laboratory tests and shows non compliance with medication regimen.
  - Patient is unable to name the drug, the timing or the reason why a medication has been prescribed to them.
  - Patient shows reluctance or avoidance of read written health information provided to them.
2. After gauging the level of understanding of the patient start off with a verbal discussion. Draw or show pictures to improve patients recall. Dental jargon should be avoided and plain and simple –

preferably local language should be employed. A reliable interpreter, maybe someone from the dental team to assist in case the clinician is unable to communicate efficiently in the language of the patient.

3. Encourage the patients to ask questions and clarify doubts. Patients should be made aware of the program through posters and brochures displayed in the office.
4. Provide information to patients in an easy to read written format so that the patient can assimilate the information at his own pace.
5. In case of complex treatment procedures audiovisual aids or models can be used to explain the procedure.
6. Allow the patient sufficient time so that he is able to digest the information provided and arrive at an informed decision.
7. Consent should also be repeated before carrying out the actual treatment procedure, especially if some time has elapsed between the signing of the consent form and the actual time of treatment.

#### **Items appearing on a consent form should include**

1. Name and date of birth.
2. Name, relationship to patient, and legal basis for adult to consent on behalf of minor.
3. Description of specific treatment in simple terms.
4. Alternatives to treatment;
5. Potential adverse sequelae specific to the procedure;
6. An area for the patient or parent/guardian to indicate all questions have been answered;
7. Signature lines for the dentist, patient, parent or legal guardian, and a witness.

### **PRACTICAL CONSIDERATIONS FOR DENTISTS**

#### **Quality Of Communication**

Good communication lies at the heart of successful dentist/patient relationships, whilst poor communication is likely to engender apprehension, dissatisfaction, suspicion and possible litigation. Communication skill has many aspects. Practitioners

may require improved ability in listening and feedback techniques, avoidance of technical language, or understanding of

negotiation, decision-making, behavioural processes and the needs of minority groups. In explaining the nature of proposed treatment, communication can effectively be extended by use of diagrams, suitable pamphlets and other literature, photographs, videos and models. The cost of a proposed treatment plan is always an important aspect to be communicated.

#### **Determining Reasonable Disclosure**

Whilst the extent of information which should be given to patients will depend on the circumstances. From a health provider perspective, however, it would usually be preferable for disclosure to be based not so much upon an hypothetical 'reasonable person' as on the circumstances and needs of the particular patient in question. Relevant factors, especially in relation to risk, might include:

#### **The treatment option.**

More drastic treatment requires more information. Most procedures carried out in general practice would be considered minor. However, an extensive treatment plan composed of numerous minor items will require elaboration, as will more costly or controversial items.

#### **The possible harm.**

Information about the possibility of serious harm should normally be given even if the chance of it occurring is slight. Similarly, information should generally be given if the potential harm is relatively slight but the risk of it occurring is great. It is probably not necessary to discuss risks that are inherent in any operation, such as post-operative infection.

#### **The attitude personality, temperament and of the patient.**

More information must be given to those keen to have it for more than just reassurance, especially in response to specific questions. On the other hand, it is not necessary to force information on a patient who is prepared to leave all decisions to the service provider. On occasions, albeit rarely in dentistry, it would be considered justifiable not to volunteer certain information if there are reasonable grounds for believing that the patient's health or welfare might be seriously harmed by being given the information.

### **The patient's level of understanding.**

Without it being necessary to cross-examine a patient to ascertain understanding, information-giving should be influenced by some appraisal of the patient's intelligence and apparent understanding, and made in the light of the simplicity or complexity of the proposed treatment.

### **Records**

In all situations it is necessary to keep careful, clear records. Disclosure of information and subsequent oral consent should be listed in the clinical notes. For major treatment, either in terms of invasiveness or expense, written consent forms acknowledging that the nature, implications and risks of the proposed procedure have been explained may provide substantial, although still not entirely conclusive, evidence that information was given and consent granted. Whenever in doubt about whether a procedure is major or minor, written consent should be obtained.

### **Controversies**

Dentists must take care always to mention any proposed use of treatments which, although considered standard, safe and minor procedures by the dental profession, might be regarded with some doubt by certain patients, so that these patients have the opportunity to request further information or decline such treatment modalities. Procedures which have yet to receive general acceptance as standard or desirable practices, or which do not accord with mainstream dental opinion, necessitate the precaution in every case of ensuring that "fully informed" consent is forthcoming.

### **Less Tangible Items Of Treatment**

Genuine service should be free from any suspicion of overservicing. Consent for relatively minor procedures which might not be very apparent after completion, such as occlusal adjustment, recontouring of existing restorations or fissure sealants, especially if numerous, will often require fuller justification than more obvious items.

### **Situations In Which Authority Is Not Clear**

If a practitioner cannot be certain that consent is valid: for example, where there is conflict between parent and child, or where a child or other legally

incompetent person is under the control of a person not normally authorised to give consent; then it would be unwise to proceed with treatment (except in the case of an emergency) until the situation is clarified.

### **Treatment Alternatives**

Where alternative treatments have been explained. But it is usually better to decline giving a treatment of the patient's choice which, although included among discussed options, has been recommended against or declared undesirable. If any part of an accepted treatment plan is to be delivered by someone other than the dentist presenting it, such as another dentist or auxiliary within the practice, then the patient must be made aware of this in advance.

**Acknowledgement:** Nil

**Conflict of interest:** Nil

**Source of support:** Nil

### **REFERENCES**

1. Seema Lal. Consent in Dentistry. Pacific Health Dialog. 2003;10:102-105.
2. Alderson P. Informed consent: Ideal or Reality?. J. Health Serv. Res. Policy 1998;3(2):124-6.
3. Schwabel ST. Informed Consent. Medical, Legal, and Ethical Implications Physician. Assist. 1986;10(4):108-5.
4. Corless-Smith D. Consent to treatment. In: Lambden, P. Editor. Dental Law and Ethics. Radcliff Medical Press. 2002. p. 63-88
5. Murkey PN, Khandekar IL, Tirpude BH, Ninave SV. Consent-Medico Legal Aspects. Medico-legal Update 2006; 6(4): 10-12.
6. Krishnan NR, Kasthuri AS. Informed Consent. MJAFI. 2007;63:164-66.
7. Lunshof JE, Chadwick R, Vorhaus DB, Church GM. From genetic privacy to open consent. Nature Reviews Genetics 2008;10:1038.
8. Manthous CA, DeGirolamo A, Haddad C, Amoateng-Adjepong Y. Informed Consent for Medical Procedures - Local and National Practices. CHEST 2003;124(5):1978-84.
9. Indian Contract Act 1872, Sections 12-14. Retrieved from: <http://indianlawcases.com/Act-Indian.Contract.Act.,1872.-2384>
10. Dhillon GK, Singhal S. Hospital Contracts- Law of Business Contracts in India. SAGE 2009; 216-227.

11. Indian Penal Code 1860, Sections 87-92. Retrieved from: <http://indianlawcases.com/Act-Indian.Penal.Code,1860-1515>
12. Bastia BK, Kuruvilla A, Saralaya KM. Validity of Consent - A Review of statutes. *Indian Journal Medical Science* 2005;59:74-78.
13. Bansal YS, Singh D. Medico-Legal Aspects Of Informed Consent. *Indian Journal of Forensic Medicine & Toxicology* 2007;1(1):7-12.
14. ACT Health Procedure Consent to treatment. 2008 .Retrieved from: <http://www.health.act.gov.au/c/health?a=dlpubpoldoc&document=1118>.
15. Arishka Devadiga. INFORMED CONSENT AND THE DENTIST *Online Journal of Health Ethics* 2012 ;8:1-19.



# Reporting Confidence Interval Instead of a Point Estimate: a Review

Biswas S S<sup>1</sup>, Jain V<sup>2</sup>

<sup>1</sup>Professor, <sup>2</sup>Assistant Professor, Biochemistry, LN Medical College, Bhopal

## ABSTRACT

In medical studies, investigators try to find out whether the difference of a measured outcome between groups is statistically significant by reporting a p value to reject or retain a null hypothesis. Such reporting of p value from comparisons of mean of the two groups has its limitations. Hypothesis testing does not take into account the variability of an observed sample statistic or its precision. Hence, it is important to quantify the uncertainty in this estimate by means of a confidence interval around the mean difference rather than reporting the mean difference simply as a point estimate. The confidence interval provides a range within which the true population value of the mean difference would lie with a certain degree of probability. Thus, a 95% confidence interval provides a range of mean differences that would contain the true population mean difference at least 95 times out of 100 repeated studies. The width of this range is determined by the sampling error or standard error. Greater the standard error, wider the range of the confidence interval. Conversely, a narrow range of confidence interval reflects a more precise study.

**Keywords:** Confidence Interval, Standard Error, Point Estimate

## INTRODUCTION

In medical studies, investigators are usually interested in determining the size of the difference of a measured outcome between groups and find out whether the difference is statistically significant. The statistical significance is determined usually by hypothesis testing reporting a *p value* to reject or retain a null hypothesis. Reporting *p value* generated from comparisons of mean of the two groups has therefore been a common practice in articles published in medical journals<sup>1,2</sup>. However, hypothesis testing has its limitations as the variability of an observed sample statistic or its precision is not taken into account by it<sup>3,4</sup>. It is important to quantify the uncertainty in this estimate by means of a confidence interval (C.I.)<sup>5-7</sup>. Although C.I. is difficult to apply to non-parametric tests<sup>8</sup>, but still its advantages are overwhelming<sup>9</sup>.

Hence, the emphasis has shifted to reporting the mean difference not just as a point estimate but to a more informative range of C.I. around the point estimate in which the true value lies with a certain degree of probability<sup>10-12</sup>. Despite its evident merits, C.I. reporting in published literature continues to be moderate<sup>13,14</sup> and it is essential to create awareness related to its advantages. As the precision of study in C.I. method depends on the standard error, we should understand both of these concepts in simple terms.

### Understanding standard error and the confidence interval

It is not possible to carry out a study on the entire population. Hence studies are conducted on a sample representative of that population. If sampling error is less, it will be more representative of the population. The results found in the specific sample are then generalized to the population.

If the study is repeated several times taking different samples from the same population, the sample means should be close, but they are never exactly the same. This is due to the sampling error or standard error.

---

### Corresponding author:

**Shubho Subrata Biswas**

Department of Biochemistry

LN Medical College, Kolar Road, Bhopal-462042, India

Mail: shubho20005@yahoo.com

Mobile:91- 9302066808

Fax: 07554049610

If a Mean of all these sample means is calculated, then all the sample means would show a normal distribution about this Mean of means, assuming that individual samples are all normally distributed. This Mean of all the sample means is very close to the actual population mean or true value.

While Standard Deviation (S.D.) reflects the average variability of the observations of a given sample from the sample mean, Standard Error (S.E.) reflects the average variability of the individual sample means from the Mean of the sample means<sup>15</sup>. Thus, S.E. is simply the S.D. of the sample means.

But it is difficult to find resources to do repeated sampling on the same population for the same study, so S.E. can be calculated from a single sample of size  $n$  as below-

$$\text{S.E. of mean} = \text{S.D.} / \text{square root of } n$$

#### Factors affecting standard error

A smaller sample will increase the standard error, but if the entire population is studied, then there will be practically no S.E. as sampling error becomes almost zero. S.E. also depends on the S.D., which in turn depends on the variance<sup>16</sup>.

$$\text{SD} = \text{square root of variance} \quad \text{variance} = \frac{\sum (x_i - \text{mean})^2}{n}$$

#### Importance of standard error and the confidence interval

S.E. shows how precise is the estimate of the sample mean in representing the population mean. Greater the sampling error, greater the S.E. and wider is the range of the confidence interval.

The interval or range of values that has a 95% chance of containing the true population mean is the 95% confidence interval. When difference between the means of two population is compared, a confidence interval for the mean difference specifies a range of values within which the difference between the means of the two populations may lie. If the C.I. of the mean difference includes zero, the mean difference is statistically not significant<sup>17</sup>. On the other hand, if the two groups being compared have non-overlapping individual C.I., then their mean difference is highly significant[18]. If repeated samples are studied in the two populations, then their mean difference would fall in this range of 95% C.I. 95 times out of 100<sup>19,20</sup>.

Another way of expressing the level of confidence is that on repeating the study, the distribution of the sample means about the population mean, represented by the Mean of the sample means will be as follows-

- 68% confidence interval means that we are certain about 68% of the sample means will lie within one S.E. of the Mean of all the sample means.
- 95% confidence interval means that we are certain about 95% of the sample means will lie within two S.E. of the Mean of all the sample means.
- 99% confidence interval means that we are certain about 99% of the sample means will lie within three S.E. of the Mean of all the sample means.

Usually alpha error is kept at 5%, so we are certain that on repeating the study 100 times, the sample means will come in this range of confidence interval at least 95 times out of 100 (95% level of confidence for this range of C.I.)<sup>21</sup>. Less than 5 times out of 100, the sample mean of a repeat study may fall outside the range of this 95% C.I.

As  $\text{Mean} \pm 2 \text{S.E.}$  gives the range for 95% C.I., hence greater S.E. gives a wider confidence interval. Conversely, a narrow range of C.I. implies a more precise study with less sampling error<sup>22</sup>. Hence, the latter study is better representative of the population.

### CONCLUSION

The advantages of reporting results with a confidence interval instead of only a point estimate have been emphasized in this paper. Although it is difficult to apply to non-parametric tests, but its advantages are far more than its disadvantages. However, CI reporting in published literature continues to be moderate and more effort needs to be taken to improve its use. Hence, spreading awareness about its advantages will increase its use in published literature and this paper is an attempt in this direction.

Permitted by Institutional Ethical Committee

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Acknowledgement:** Nil

## REFERENCES

1. Riou B, Landais P. [Principles of tests of hypotheses in statistics: alpha, beta and P]. *Ann Fr Anesth Reanim.* 1998;17(9):1168-80.
2. Gardner MJ, Altman DG. Confidence intervals rather than P values: estimation rather than hypothesis testing. *Br Med J.* 1986 Mar 15;292(6522):746-50
3. Nakagawa S, Cuthill IC. Effect size, confidence interval and statistical significance: a practical guide for biologists. *Biol Rev Camb Philos Soc.* 2007 Nov;82(4):591-605.
4. Kelen GD, Brown CG, Ashton J. Statistical reasoning in clinical trials: hypothesis testing. *Am J Emerg Med.* 1988 Jan;6(1):52-61
5. Wolfe R, Cumming G. Communicating the uncertainty in research findings: confidence intervals. *J Sci Med Sport.* 2004 Jun;7(2):138-43
6. Altman DG. Why we need confidence intervals. *World J Surg.* 2005 May;29(5):554-6
7. Sim J, Reid N. Statistical inference by confidence intervals: issues of interpretation and utilization. *Phys Ther.* 1999 Feb;79(2):186-95
8. Zhou XH, Dinh P. Nonparametric confidence intervals for the one-and two-sample problems. *Biostatistics.* 2005 Apr;6(2):187-200
9. Domenech Maisons JM, Cava Valenciano F. [Standard error or confidence interval? Advantages of giving the confidence interval to present results to biomedical journals]. *Med Clin (Barc).* 1994 Jan 22;102(2):77-8
10. du Prel JB, Hommel G, Rohrig B, Blettner M. Confidence interval or p-value? part 4 of a series on evaluation of scientific publications. *Dtsch Arztebl Intl.* 2009 May;106(19):335-9
11. Luus HG, Muller FO, Meyer BH. Statistical significance versus clinical relevance. Part II. The use and interpretation of confidence intervals. *S Afr Med J.* 1989 Dec 2;76(11):626-9
12. Akobeng AK. Confidence intervals and p-value in clinical decision making. *Acta Paediatr.* 2008 Aug;97(8):1004-7
13. Fidler F, Thomason N, Cumming G, Finch S, Leeman J. Editors can lead researchers to confidence intervals, but can't make them think: statistical reform lessons from medicine. 2004 Feb;15(2):119-26
14. Polychronopoulou A, Pandis N, Eliades T. Appropriateness of reporting statistical results in orthodontics: the dominance of p values over confidence intervals. *Eur J Orthod.* 2011 Feb;33(1):22-5.
15. Nagele P. Misuse of standard error of the mean(SEM) when reporting variability of a sample. A critical evaluation of four anaesthesia journals. *Br J Anaesth.* 2003 Apr;90(4):514-6
16. Altman DG, Bland JM. Standard deviation and standard errors. *BMJ.* 2005 Oct 15;331(7521):903
17. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986.i:307-10
18. Cumming G. Inference by eye: reading the overlap of independent confidence intervals. *Stat Med.* 2009 Jan 30;28(2):205-20
19. Young KD, Lewis RJ. What is confidence? PartI: The use and interpretation of confidence intervals. *Ann Emerg Med.* 1997 Sep;30(3):307-10
20. Young KD, Lewis RJ. What is confidence? Part 2: Detailed definition and determination of confidence intervals. *Ann Emerg Med.* 1997 Sep;30(3):311-8
21. Luus HG, Muller FO, Meyer BH. Statistical significance versus clinical relevance PartIII. Methods for calculating confidence intervals. *S Afr Med J.* 1989 Dec 16;76(12):681-5
22. Verdoux H, Salamon R. [Statistical results: which method of presentation to chose?] *Encephale.* 1997 Jan-Feb;23(1):19-21.

# Study of Psycho- Social Aspects of Schizophrenia at Tertiary Care Hospital in Maharashtra

Ashturkar MD<sup>1</sup>, Dixit JV<sup>2</sup>, Kulkarni AP<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Community Medicine, Smt Kashibai Navale Medical College, Narhe, Pune, Maharashtra, <sup>2</sup>Associate Professor, Department of PSM, <sup>3</sup>Ex Prof. and Head Dept of PSM, Government Medical College, Aurangabad, Maharashtra

## ABSTRACT

**Background:** schizophrenia is a severe psychiatric disorder and affects quality of life. The present study was carried out to identify psycho social aspects of schizophrenia.

**Method:** Diagnosed cases of schizophrenia according to WHO ICD -10 classification at tertiary care hospital in central Maharashtra between 1st Jan 2006 to 31st Dec 2006. The data was collected with pre-tested questionnaire by direct interview method. Psycho - social aspects were studied.

**Results:** Schizophrenia Social Functioning Index (SSFI) was studied, 63.33% were in Group II, 27.77% in Group I, 8.33% in Group III. Psycho -social factors such as substance abuse was 55.55%, attempt of suicide was 29.16%, and stressful life events was 41.66%. Out of 72 study subjects, 33 were living in the municipal corporation area, all 33 houses were visited. Non medical treatment (Magico-religious ways) was taken by 18 of 33 study subjects.

**Conclusion:** It was observed that all families were facing the social stigma because of schizophrenia. Interaction with neighbourhood was less, also tendency to avoid people was found in families.

**Keywords:** Schizophrenia, Schizophrenia Social Functioning Index (SSFI), Substance Abuse

## INTRODUCTION

Schizophrenia begins in early age of life; causes significant & long lasting impairments; makes heavy demands for hospital care and requires ongoing clinical care, rehabilitation & support services and the financial costs. The burden on patient's family is heavy & both patient and his or her relatives are often exposed to the stigma associated with illness over generation <sup>1</sup>.

Schizophrenia is a clinical syndrome of variable but profoundly disruptive psychopathology, which involves thought, perception, emotion, movement and behaviour <sup>2</sup>. The condition as such, causes serious distress, suffering, decreases the positive strengths of an individual and affects quality of life.

They will miss out career opportunities, stable relationships and friendships. Because of lack of public

understanding, people with schizophrenia often feel isolated and stigmatized and may be reluctant or unable to talk about their illness<sup>3</sup>.

In year 1990, it was estimated that 3% Disability Adjusted Life Years (DALYs) in 15-44 years age group worldwide were due to schizophrenia. It is estimated that by 2020, 15% of DALYs lost due to mental and behavioural disorders <sup>4</sup>.

The WHO has focused special attention on schizophrenia, and has organized a number of studies aiming at improving, understanding the disorder and finding ways to deal with it <sup>1</sup>.

Emerging evidence has an important implication for the role of mental health professionals who need to recognize the bio-psycho-social approach in practice of psychiatry <sup>5</sup>.

Present study is an attempt to study psycho-social aspects in patients of schizophrenia at Tertiary care hospital in central Maharashtra.

### OBJECTIVES

1. To study psycho – social factors in cases of schizophrenia
2. To study distribution of cases of schizophrenia according to Schizophrenia Social Functioning Index (SSFI)
3. To study the magnitude of non- medical treatments received by patients of schizophrenia

### MATERIAL AND METHOD

Hospital based cross sectional study was carried out at a tertiary care teaching hospital in marathwada region of Maharashtra state from 1<sup>st</sup> Jan 2006 to 31<sup>st</sup> Dec 2006.

#### Selection criteria for cases

Confirmed cases of schizophrenia visiting in psychiatric OPD and admitted in psychiatric ward of the hospital during the study period were included cases.

The cases were diagnosed by qualified psychiatrist according to WHO ICD -10 classification.

The purpose and methodology of study were explained to the psychiatrists for seeking their active cooperation in selection of cases.

#### Exclusion criteria for cases

Cases with acute and transient psychotic disorders, persistent delusional disorders, induced delusional disorders, organic psychotic disorders; other non organic psychotic disorders were excluded from study. Seriously ill patients were excluded from study.

Ethical committee approval was taken to conduct the present study.

The data was collected by the investigator by direct interview method, using pre –tested questionnaire and Schizophrenia Social Functioning Index (SSFI) of the study subjects who were admitted in psychiatry ward (no-7) and outpatient department (OPD) of psychiatry of teaching to hospital in central Maharashtra.

In situation where the study subject could not answer, parents or accompanying relatives were asked for relevant information.

Home visits were done in the study subjects who were living in Municipal Corporation Area to gain confidence, to confirm the findings which were observed during hospital visit and get the information related to non medical treatments received by the study subjects.

Defining stressful life events the most common psychological and social stressors in adult life include break up of intimate romantic relationships, death of family member or friend, economic hardships, racism and discrimination, poor physical health and accidental and intentional assaults on physical safety<sup>6</sup>.

SSFI<sup>7</sup> was developed by SCARF (Schizophrenia Research Foundation, Chennai, India. SSFI comprises of four main sections: self-concern, occupational role, role in family and other social roles. Each section has several subsections covering different areas of social functioning. The rating on five point scale, vary between poor functioning (lower scores) and good functioning (higher scores) between three groups; Group I (0-30), Group II (31-60), Group III (61-85). These were made on the basis of information given by patient’s relatives. Validity and reliability have been established for a group of normal, patients suffering from schizophrenia and Hansen’s disease.

Substance abuse – it is self administration of substance (drug) for non – medical use, in quantities and frequencies that may impair the individual’s ability to function effectively and which may result into social, physical, or emotional harm<sup>4</sup>.

### RESULTS

Total 72 cases were studied and the mean age for the cases were 30.26 years.66.66% were males and 33.33% were females.

**Table 1: Distribution of cases of schizophrenia according to the psycho –social risk factors**

Psycho – social factors	Male	Female	Total (%)
Substance abuse	40	00	40 (55.55)
Attempt of suicide	11	10	21 (29.16)
Stressful life events	20	10	30 (41.66)



Table 1 shows the psychosocial factors among the study subjects. 29.16% of subjects have attempted suicide in the past, 41.66% subjects have stressful life event in the past.

**Table 2: Distribution of cases of schizophrenia according to the type of substance abuse**

Type of substance	Number (%)
Tobacco	23 (57.5)
Cigarette	07 (17.5)
Alcohol	03 (7.5)
Tobacco with alcohol	03 (7.5)
Cannabis with tobacco	02 (5.0)
Cannabis with alcohol	02 (5.0)
Total	40 (100)

Table 2 shows the distribution of cases of schizophrenia according to substance abuse; 57.5% were tobacco abuse out of 40 cases.

**Table 3: Distribution of case s of schizophrenia according to Schizophrenia Social Functioning Index (SSFI)**

SSFI	Number (%)
I	20 (27.77)
II	46(63.88)
III	06 (8.33)
Total	72 (100)

Table 3 shows high score in 8.33% while 63.88% were in group II. High score in 8.33% in those study subjects whose education was more than high school, good family support and employment.

**Table 4: Outcome in cases of schizophrenia in relation to the treatment**

Outcome	Improved	Not improved	Total
Regular	36	04	40
Irregular	11	21	32
Total	47	25	72

$\chi^2$  with Yates correction =21.88, P value =0.000 (p <0.05 significant)

Table 4 shows outcome of schizophrenia, improved or not improved, in relation to regular or irregular treatment received by the cases. Those cases who were receiving regular treatment showed better improvement than those who were taking irregular treatment, and this difference is found to be statistically significant. Criteria for improved and not improved is based on subjects able to carry out their daily activities, do their work and able to live social life.

Out of 72 study subjects, 33 were living in the municipal corporation area, all 33 houses were visited.

Non medical treatment (magico-religious ways) was taken by 18 of 33 study subjects.

**Table 5**

Non medical treatment	Number
Darga	08
Temple	09
Maharaj	01
Total	18

Other than medical treatment people believed in other traditional treatments as per their myths, beliefs about the disease. So 18 out of 33 patients went for the treatment in magico- religious ways.

Most of the places were nearby to the corporation area. Nobody was relieved by taking these non medical treatments. The cost of the treatment varies from place to place. This cost is determined with consideration of cost of traveling, visiting charges, residential charges, different things like lemon etc. and tablets.

**DISCUSSION**

In this study showed the subjects have undergone the stressful life events were 41.66%. similar findings were observed by Brown and Birley (1968) <sup>8</sup> found substantially greater incidence of stressful life events of various degrees of severity in 3 weeks period before the onset of disorder in schizophrenic patients compared with control subjects of general population and Day R et al (1987) <sup>9</sup> studied acutely ill schizophrenic patients selected from nine field research centres located in developing and developed countries. Findings of the study had shown that socioenvironmental stressors may precipitate attacks and such events tend to cluster in two or 3 week period immediately preceding illness onset.

The study shows the risk of attempt of suicide in the past is higher among schizophrenic patients (29.16%). These findings coincide with Fenning et al (2005) <sup>10</sup> carried out study of relationship of suicidal attempts and life events in adolescent schizophrenic patients. Results: within schizophrenic group, the suicidal patients reported life events than non-suicidal patients.

SSFI was found 63.88% in group II and 8.33% in group III. As the educational status increases, the SSFI also improves. In this study, correlation between SSFI with the educational status was done but it was not found to be significant. Those who were educated and those who had family and social support were having better Social Functioning Index.

The expenditure on the treatment of study subjects includes medical and non medical treatment. It is evident that the disease schizophrenia has economic burden on these families.

It was observed that all families were facing the social stigma because of schizophrenia. Interaction with neighbourhood was less, also tendency to avoid people was found in families. This was probably because of lack of knowledge about the disease and attitude towards the disease. Similar finding are seen in Gaebel W et al (2006)<sup>11</sup>, conducted study to see the relationship between mental illness severity and stigma; shows that besides perceived treatment intensity and diagnostic label, the perception of social disability of mentally ill people accounts for differentiated stigma, Angermeyer MC et al (2005)<sup>12</sup>, studied the causal beliefs and attitudes to the people with schizophrenia; study shows that an increase in the public's tendency to endorse biological causes, an increase in the desire for social distance from people with schizophrenia was found.

Srinivasan TN, Thara R (2001),<sup>13</sup> carried out a study on belief on supernatural causes of schizophrenia, method: key relatives living with 254 chronic schizophrenia patients were interviewed and asked to name the causes they believed behind the illness, a list of possible causes was provided to families to select from and asked to mention other possible causes not featured on the list. Result: supernatural was named by 12% of families and the only cause for disease by 5%. Psychosocial stress was most commonly cited cause followed by personality defect and heredity. A small no of families 14% could not name and 39% named more than one cause.

Onset of psycho-social problems is usually insidious. Commonly following a prolonged period of increasing social withdrawal and turning inward to philosophical or religious interests or both, is onset of psychotic illness. These individuals frequently show a child development pattern in which they tend to play themselves, have few playmates, avoid eye contact and be somewhat awkward in their motor activities. They tend to achieve developmental milestones later and frequently social deterioration as well as loss of interest in personal grooming and hygiene<sup>14</sup>.

## CONCLUSION

It was observed that good educational status and family support improves the SSFI. It was observed that all families were facing the social stigma because of

schizophrenia. Interaction with neighbourhood was less, also tendency to avoid people was found in families.

**Acknowledgement:** Dr Prasad Deshpande Associate Professor, Department of Psychiatry, Government Medical College, Nanded, Maharashtra

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical clearance** was taken from local college ethical committee

## REFERENCES

1. World Health Organization, Epidemiology of Mental disorders & psychosocial problems, Schizophrenia. Warner R, Giralmo G; Geneva WHO 1995.
2. Schizophrenia: Youth's Greatest Disabler – Some facts and figures. Internet site [www.searo.who.int](http://www.searo.who.int); accessed on 27th Oct 2012.
3. Internet site [www.psychiatry24x7.Com](http://www.psychiatry24x7.Com); About Schizophrenia; accessed on 4<sup>th</sup> Dec 2012.
4. Kulkarni AP, Baride JP: 3<sup>rd</sup> edition Textbook of Community Medicine; Vora Medical publication; Mumbai. 22-35, 666-675.
5. Gururaj G, Girish N, Isaac MK; Mental, neurological and substance abuse disorders: strategies towards a system approach; NCMH – background papers- burden of disease in India; 226-250.
6. Internet site [www.surgeongeneral.gov](http://www.surgeongeneral.gov); Krieger et al; Mental Health: A report of the Surgeon General Chapter 4, 1993
7. Padmavati R, Thara R, Srinivasan L, Kumar S; SCARF Social Functioning Index; Indian Journal of Psychiatry, 1995, 37(4), 161-164.
8. Brown & Birley; Crises and Life changes and the onset of schizophrenia. Journal of health and social behaviour, 1968; 9:203-214.
9. Fenning et al; life events and suicidality in adolescents with schizophrenia Eur child adolescent psychiatry; 2005, Dec; 14(8): 454-460.
10. Day R et al; stressful life events preceding the acute onset of schizophrenia: a cross sectional study from World health organization. Cultural medicine psychiatry. 1987; 11(2): 123-205.
11. Gaebel W et al; the Relationship between Mental illness Severity and Stigma. Acta Psychiatry Scand. Suppl.2006; (429): 41-45.

12. Angermeyer MC, Matschinger H; Causal Beliefs and Attitude to people with Schizophrenia. Trend Analysis based on data from two population surveys in Germany. *British Journal of Psychiatry*. 2005. April; 186: 331-334.
13. Srinivasan TN, Thara R; beliefs about causation of schizophrenia: Do Indian families believe in supernatural causes? *Social Psychiatry, Psychiatric Epidemiology*. 2001 March; 36(3): 134-140.
14. Sadock B, Sadock V; Kaplan and Sadocks *Comprehensive Textbook of Psychiatry*, 7<sup>th</sup> edition: Lippinkott, Philadelphia, Williams and Wilkins Publication; 1096-1231.

# Epidemiology and Outcome of Hospitalized Burn Patients in a Tertiary Care Teaching Hospital in South India

Gowri Shankar<sup>1</sup>, Eshwar B Kalburgi<sup>2</sup>, Gagan Srinivas<sup>3</sup>, Sarojini Hunshikatti<sup>4</sup>

<sup>1</sup>Associate Professor, Department of Community Medicine, SN Medical College, Navanagar, Bagalkot, Karnataka, India,

<sup>2</sup>Professor and HOD, Department of Surgery, HSK Hospital and Medical Research Centre, Navanagar, Bagalkot, Karnataka, India, <sup>3</sup>Assistant Professor, Department of Community Medicine, Akash Institute of Medical Sciences,

Devanahalli, Karnataka, <sup>4</sup>Medico Social Worker, Department of Community Medicine, S.N. Medical College, Navanagar, Bagalkot

## ABSTRACT

**Back ground:** Burn injuries are a global public health problem, accounting for an estimated 1, 95, 000 deaths annually. The majority of these occur in low- and middle-income countries and almost half occur in the WHO South-East Asia Region. The causes of burn injury differ in various communities and understanding this problem is necessary before prevention can be recommended. So, the present study was done to know the epidemiology and outcome of hospitalized burn patients.

**Method:** A one year case series study of all burn injury patients admitted in Hangal Sri Kumareswar Hospital and Medical Research Centre, Navanagar, Bagalkot was conducted between January 1st, 2011 to December 31st, 2011. Data was obtained on a pre designed and pre tested proforma from the Medical Records Department and analyzed by chi-square test and percentages

**Results:** A total of 94 burn injury patients were admitted during the study period. . More than 60% of the patients were females (61.70%) and maximum numbers (56.38%) were between 21-40 years of age ( $p=0.352$ ). Flame contributed to 89.66% of burn injuries in females ( $p=0.000$ ). In half of the males, total burn surface area was <20% whereas in almost 40% females, total burn surface area was >61%. ( $p=0.003$ ). The case fatality rate was 41.49%

**Conclusion:** Burn injuries can be prevented by bringing about regulations to develop safer cooking equipment, promoting non flammable garments and educating the community to be careful while handling equipment that can cause burn injury.

**Keywords:** Burn Injuries, Total Burn Surface Area, Hospital, Flame

## INTRODUCTION

Burn injuries are a global public health problem, accounting for an estimated 1, 95, 000 deaths annually. The majority of these occur in low- and middle-income countries and almost half occur in the WHO South-East Asia Region. Women in the WHO South-East Asia Region have the highest rate of burns, accounting for

27% of global burn deaths and nearly 70% of burn deaths in the region. Non-fatal burns are a leading cause of morbidity, including prolonged hospitalization, disfigurement and disability, often with resulting stigma and rejection. Burns are among the leading causes of disability-adjusted life-years (DALYs) lost in low- and middle-income countries. In India, over 10, 00,000 people are moderately or severely burnt every year.<sup>(1)</sup> India in the 21<sup>st</sup> century is competent enough industrially and technologically but there is lack of commitment in safety measures in all spheres of a common man's every day life. The causes of burn injury differ in various communities and understanding this problem is necessary before

---

### Corresponding author:

**Gowri Shankar**

Associate Professor

Department of Community Medicine, SN Medical College, Navanagar, Bagalkot-587103, Karnataka

E-mail: drgowrijnmc@gmail.com

Phone- 91-9986613442

prevention can be recommended. So, the present study was done to know the epidemiology and outcome of hospitalized burn patients.

## MATERIALS AND METHOD

A one year case series study of all burn injury patients admitted in Hangal Sri Kumareshwar Hospital and Medical Research Centre, Navanagar, Bagalkot was conducted between January 1st, 2011 to December 31<sup>st</sup>, 2011. Ethical clearance was obtained from Institutional review board. Data was obtained on a pre designed and pre tested proforma from the Medical Records Department and analyzed by chi-square test and percentages. For the purpose of the study, burn injury was defined as a body lesion due to an external cause resulting from mechanical, electrical, thermal, chemical or radiant heat.

## RESULTS

A total of 94 burn injury patients were admitted during the study period. The male to female ratio was

0.6:1. The mean age was 26.52 years ranging from 9 months to 80 years. More than 60% of the patients were females (61.70%) and maximum numbers (56.38%) were between 21-40 years of age ( $p=0.352$ ). Majority were hailing from rural areas (81.91%) ( $p=0.2058$ ). Maximum number of females (98.28%) sustained burn injuries at home compared to 41.67% males sustaining injuries outdoors. ( $p=0.000$ ) Majority (96.81%) were Hindus. Majority (75.53%) were allegedly accidental injuries followed by 23.4% suicidal and 1.06% homicidal ( $p=0.082$ ). Flame contributed to 89.66% of burn injuries in females ( $p=0.000$ ). A cooking appliance was responsible for 44.83% injuries in females. Electrical injuries (11.11%) were more in males (Table I). Almost one third injuries (29.79%) occurred between 4 pm to 8 pm followed by 19.15% between 4 am to 8 am ( $p=0.645$ ). In half of the males, total burn surface area was  $<20\%$  whereas in almost 40% females, total burn surface area was  $>61\%$ . ( $p=0.003$ ). The case fatality rate was 41.49%. Majority of the males (47.22%) recovered whereas 55.17% females succumbed due to their burn injury. ( $p=0.004$ )

Table I: Source of burn injury

Source of burn injury	Male	Percent	Female	Percent	Total	Percent
Kerosene	7	19.44	22	37.93	29	30.85
Kerosene stove	4	11.11	21	36.21	25	26.59
Kerosene lamp	3	8.33	4	6.9	7	7.45
Open fire	1	2.78	4	6.9	5	5.32
Crackers	2	5.56	0	0	2	2.13
Coal	1	2.78	0	0	1	1.06
LPG	0	0	1	1.72	1	1.06
Hot water	6	16.67	5	8.62	11	11.7
Hot milk	1	2.78	0	0	1	1.06
Hot tea	1	2.78	0	0	1	1.06
Hot curry	1	2.78	1	1.72	2	2.13
Live wire	4	11.11	0	0	4	4.26
Acid	3	8.33	0	0	3	3.19
Hot brick	2	5.56	0	0	2	2.13
Total	36	100	58	100	94	100

## DISCUSSION

Epidemiological studies indicate that on an average more than 90% of burn injuries are preventable and are a prerequisite for effective burn prevention programs, as each community has its own characteristics.<sup>(2)</sup> In the present study, majority of the patients were women in the age group of 21-40 years. Most of the women sustained injuries at home. These results are similar to other studies<sup>(3-8)</sup> and indicate that

ones own home can lead to dangerous heat generating equipment are continuously used. One third of the injuries have occurred between 4 pm to 8 pm and were similar to a study conducted in India.<sup>(6)</sup> This is the period when evening meals are prepared and lighting equipment are used. Alleged accidental burns contributed to 75.53% of the injuries. This finding indicates the care needed while using equipment that can cause burns. Flame was the most common agent in 89.66% of women injured and similar results have



been seen in various studies. <sup>(3, 5)</sup> Cooking appliance was the most common source of injury in females and this finding indicates that women should be very careful while handling them. In this study, almost 40% of females had total burn surface area >61% and indicates the seriousness of the present day situation. The case fatality rate was 41.49%. About 50% males recovered whereas more than 50% females died as a result of the burn injury. This is similar to other studies <sup>(3, 9, 10)</sup> and indicates the need for aggressive measures to decrease the mortality due to burns.

### CONCLUSION

Burn injuries even to this day are creating severe trauma in the population and has to be addressed by one and all so that they can be prevented by bringing about regulations to develop safer cooking equipment for all households, promoting nonflammable garments to be worn at home and educating women and children to be careful while handling equipment that can cause burn injury.

**Acknowledgement:** The authors acknowledge the principal of S.N. Medical College and the staff of Medical records department, H.S.K. Hospital Navanagar, Bagalkot, Karnataka, India.

**Conflict of Interest:** Nil

**Source of Support:** Nil

### REFERENCES

1. Burns Fact Sheet N°365; May 2012: [www.who.int](http://www.who.int): accessed on 26/10/2012
2. Atiyeh BS, Gunn SW, Hayek SN, State of the art in burn treatment. *World J Surg* 2005; 29(2): 131-48.
3. Subrahmanyam M, Joshi AV. Analysis of burn injuries treated during a one year period at a district hospital in India. *Annals of burns and Fire Disasters* June 2003; 16(2): 74-6.
4. Singh D, Sing A, Sharma AK, Sodhi L. Burn mortality in Chandigarh zone: 25 years autopsy experience from a tertiary care hospital of India. *Burns* March 1998; 24 (2): 150-156.
5. Attia AF, Sherif AA, Mandil AM, Massoud NM, Arafa MA, Mervat W et al. Epidemiological and sociocultural study of burn patients in Alexandria, Egypt. *Eastern Mediterranean Health Journal* 1997; 3(3): 452-61.
6. Singh MV, Ganguli SK, Aiyanna BM. A study of epidemiological aspects of burn injuries. *Medical Journal of Armed Forces in India* Oct 1996; 52(4): 229-32.
7. Kumar V. Accidental burn deaths in married women. *The Indian Practitioner* Feb. 2004; 57(2): 87-92.
8. Ganesamani S, Kate V, Sadasivan J. Epidemiology of hospitalized burn patients in a tertiary care hospital in South India. *Burns* 2010; 36:422-29.
9. Kumar P, Chaddha A. Epidemiological study of burn cases and their mortality experiences amongst adults from a tertiary level care center. *Indian Journal of Community Medicine* Oct. – Dec. 1997; 22(4): 160-7.
10. Naralwar UW, Badge PS, Meshram FA. Epidemiological determinants of burns and its outcome in Nagpur, Maharashtra, India. *Souvenir of 31<sup>st</sup> Annual National Conference of IAPSM, Chandigarh: 27-29 Feb. 2004.*

# A Comparative Study on the Changes in Hand Function in Geriatrics vs Young Healthy Adults as Measured by Grip and Pinch Strength

Khyati Shah<sup>1</sup>, Ajin Jayan Thomas<sup>2</sup>, Sujata Yardi<sup>3</sup>

<sup>1</sup>Intern, <sup>2</sup>Assistant Professor, <sup>3</sup>Head of the Department, Department of Physiotherapy, Pad. Dr D Y Patil University, Nerul, Navi Mumbai

## ABSTRACT

A comparative study on the changes in hand function in geriatrics as compared to young healthy adults was carried out to determine changes in grip and pinch strength with age. 40 older individuals in the age group of 60-75 was compared with 40 young adults in the ages of 20-35. Jamar hand dynamometer and Jamar hydraulic Pinch gauge was used to measure the grip and pinch strengths. The findings of the study showed that there is a decline in grip strength in geriatrics as compared to young adults in both dominant and non dominant hand and the difference is statistically significant. Statistical significance was found only in Lateral pinch strength of non dominant hand and Tip to Tip pinch strength of both dominant and non dominant hand although there was a reduction in pinch strength.

**Keywords:** Hand Function, Geriatrics, Grip Strength, Pinch Strength, Dynamometer

## INTRODUCTION

The human hand is a miraculous instrument that serves us extremely well in a multitude of ways. The evolution of hand has reached its highest degree of development in humans and it has determined many of unique functional and creative capabilities of our species. The evolution of opposing thumb and prehensile grasp are refinements of hand control that have been major factor leading to dominance of the human species throughout the world in an extensive range of geographic and climatic domains.

The hand serves as an important creative tool, an extension of intellect, a means of non-verbal communication, and a major sensory tactile organ. The quality of performance in daily living skills, work related functioning and recreational activities is

determined to a large degree by hand function and manual dexterity. The hand has to be able to undertake extremely fine and sensitive movements and must also be able to perform tasks that requiring considerable force. The hand is most active and important part of upper extremity. The anatomy and functional biomechanics are extremely complex. The Hand undergoes many physiological and anatomical changes associated with aging. It has been proved that aging has a degenerative effect on hand function<sup>7</sup>.

Prehension is describes as act of seizing or grasping whereas prehensile describes the adaptation of an organ for grasping or wrapping round an object. In humans, the hand is the only prehensile organ, whereas in many primate this capability is also found in feet and in tail. The conventional classification of prehension according to Solleman and Sperling divides the hand grip into 3 main prehension -1) precision thumb – finger pinch grips (tip to tip, pad to pad, tip to pad and three fingers pad to pad) 2) passive palm pinch grips (butress pad to side, extended three jaw chuck, cradle four and five jaw chuck) 3) power grip (cylindrical – diagonal, spherical and hook – extension grip).

---

### Corresponding author:

**Ajin Jayan Thomas**

Senior Physiotherapist

Abu Dhabi

Contact No.: 00971563034581

E-mail: ajinj\_t\_physio@yahoo.com

ajinjphysio@gmail.com

Its fairly difficult to isolate any single prehension function as being the most important among those examined, grasp or hand grip and pinches are the most researched, possibly its because its easiest to test.

Effects of aging on motor function include a marked decline in strength and muscle mass, leading to impaired mobility, lack of independence in activities of daily living (ADL's), gait related problems and increased risk of falls.<sup>5</sup> The ability to grip and manipulate an object may be the most important function of the hand, and any deterioration in this ability can lead to impaired ability to perform ADL's.<sup>10</sup> Older individuals have decreased ability to maintain steady submaximal forces,<sup>3,9</sup> difficulty in determining the slipperiness of objects,<sup>2</sup> and increase in time required to manipulate small objects,<sup>1,4</sup> and a decrease in finger-pinch strength by an average of 14%.<sup>14</sup> Human manual function is largely reflected by skillful use of fingers in grasping, lifting and manipulating objects between the thumb and index finger. Hand muscle function correlates with functional dependency in elderly. Manual function can be determined by grip strength in addition to multiple available functional tools.<sup>6</sup> Grip strength, a simple measure, has been used by many researchers as an indicator as well as a predictor of old age disability.<sup>13</sup>

Hence grip strength and pinch strength were examined to assess the hand function in geriatrics and the hand function was compared with that of a younger population.

## METHODOLOGY

**Sample size :** 80

**Population:** 40 geriatric and 40 young adults

### Inclusion criteria

- 1) Healthy geriatric in the age group of 60-75 years.
- 2) Young healthy adults in the age group of 20-35 years.
- 3) Both males and females were included.

### Exclusion criteria

- 1) Upper limb abnormality in terms of sensation, mobility, strength, co-ordination or vascularity.

- 2) Subjects having any musculoskeletal problems of upper limbs.
- 3) Subjects having any neurological problems affecting hand function.
- 4) Subjects having any medical illness affecting hand function.

**Equipments used:** Jamar dynamometer and Jamar hydraulic Pinch gauge

## PROCEDURE

40 healthy young adults and 40 geriatrics were selected for the study.

They were explained about the study and requested to sign a consent form.

## GRIP STRENGTH

### Recommended Testing Position

A standard position for testing recommended by the American Society of Hand Therapists requires that the patient:

Sit in a straight-backed chair with feet flat on the floor

Shoulders adducted in neutral, Arms unsupported

Elbows flexed at 90 degrees with forearm rotation at neutral

Wrist 0-30 degrees dorsiflexion and 0-15 degrees ulnar deviated

The present position was used as it has been recorded that variations from this position significantly influence results.

### Maximum grip strength measurement

The Jamar dynamometer is a variable hand span instrument with five different positions for measurement. Maximal grip strength most commonly occurs in the second or third position and is usually tested at the second position (3.8cm). Second handle position was used for our study. The subjects were asked to press the handle as hard as possible and then relax. The readings were taken in Kgs. Three trials were given and then the peak value among the readings were taken.

**PINCH STRENGTH**

The three types of pinches that were measured were Tip to Tip , Pad to Pad and Lateral or Key pinch.

Tip to Tip - measured between thumb tip to index finger tip.

Pad to Pad - measured between thumb pad to pad of index finger.

Lateral / Key pinch - measured between thumb pad to lateral aspect of middle phalanx of index finger.

The subjects were asked to press as hard as possible and then relax. The readings were taken in kilograms.

Three trials were given and then the peak value among the values was taken.

**DATA ANALYSIS AND INTERPRETATION**

**Table 1: Grip Strength of the Dominant Hand**

Grip Strength Mean (Kgs)		t value	p value	Degree of freedom	Statistical significance
Young	Geriatric	3.168	0.0022	78	Yes
30.8	25				

The grip strength of dominant hand was compared between geriatric and young population and it was found to be more in young adults and the difference is statistically significant.

**Table 2: Grip Strength of the Non Dominant Hand**

Grip Strength Mean (Kgs)		t value	p value	Degree of freedom	Statistical significance
Young	Geriatric	3.605	0.0005	78	Yes
29.7	23.1				

The grip strength of non dominant hand of young and geriatric was measured and it was found to be more in young and the difference was found to be statistically significant.

**Table 3: Pinch Strength of Dominant Hand**

Pinch Strength Mean	Tip to Tip	Pad to Pad	Lateral
Young Adults	4.238	6.375	8.163
Geriatric	3.412	6.238	7.375

Pinch Strength (Kgs)	t value	p value	Degree of freedom	Statistical significance
Tip to tip	2.957	0.0041	78	Yes
Pad to pad	0.4504	0.6536	78	No
Lateral	1.910	0.0598	78	No

The pinch strength in dominant hand was found to be more in young adults than in geriatrics but however only the difference in tip to tip pinch strength was found to be statistically significant

**Table 4 Pinch Strength of Non Dominant Hand**

Pinch Strength Mean	Tip to Tip	Pad to Pad	Lateral
Young Adults	3.75	6.15	7.688
Geriatric	3.2	5.738	6.763

Pinch	t value	p value	Degree of freedom	Statistical significance
Tip to tip	2.201	0.0307	78	Yes
Pad to pad	1.296	0.1989	78	No
Lateral	2.389	0.0193	78	Yes

All the three pinch strength in the non dominant hand were assessed and they were found to be more in young adults than in geriatrics and the difference in tip to tip and lateral pinch strength was found to be statistically significant.

## RESULTS

The present study aimed at comparing the changes in hand function between geriatrics and young healthy adults as measured by grip strength and pinch strength.

The findings of the study showed that there is a decline in grip strength in geriatrics as compared to young adults in both dominant and non dominant hand and the difference is statistically significant.

There was also a decline found in pinch strength (Tip to Tip, Pad to Pad and Lateral) in both dominant hand as well as in non dominant hand between geriatrics and young healthy adults but however statistical significance was found only in Lateral pinch strength of non dominant hand and Tip to Tip pinch strength of both dominant and non dominant hand.

## DISCUSSION

It was seen that the grip strength and pinch strength was less in geriatric population as compared to young adults in both dominant as well as non dominant hand. However the difference in the strength was statistically significant for grips in both dominant and non dominant hand and the for tip to tip pinch strength in both dominant as well as non dominant hand and lateral pinch strength in non dominant hand.

The decline in the strength could be because of the various changes that takes place in nervous, muscular, and skeletal system with ageing.

The power grip that was measured was cylindrical grasp which is a type of palmar prehension where the thumb is used and the entire hand wraps around an object. A power grip requires firm control and gives greater flexor asymmetry to the hand. It is during power grip that the ulnar side of hand works with the radial side of the hand to give stronger stability. The ulnar digits tend to work together to provide support and static control. This grip is used whenever strength or force is the primary consideration. With this grip, the digits maintain the object against palm, the thumb may or may not be involved and the extrinsic muscles are more important for power grips.

The precision grips is an activity that is limited mainly to metacarpophalangeal joints and involves primarily the radial side of hand and is often used when accuracy and precision are needed. With precision grips the thumb and fingers are used and the palm may or may not be involved. The intrinsic muscles are more important in precision than in power grips. The types of pinches that were examined in the study were tip to tip, pad to pad and lateral or key pinch.

One of the most prominent changes with ageing is sarcopenia which results in decreased strength aerobic capacity and thus the functional capacity. With age there is a loss in lean body mass (LBM) which shifts the proportion of lean adipose tissue in favor of the latter. Loss of LBM is important because it is the most active tissue. Loss of LBM contributes to loss of muscle strength. The loss of muscle mass with ageing and or reduced physical activity represents a major shift in whole body protein distribution and a partial loss of a primary protein reservoir that may be utilized to supply amino acids for synthesis of new body protein. The reduced protein content from muscle cells results from increased rate of protein turn over with a rate of breakdown exceeding the rate of synthesis. Skeletal muscle is composed of two main fibre types. The type 2 fast twitch have a lower oxidative capacity, greater glycolytic potential and a faster twitch response than the slow twitch fibre type 1. The type1 fibres are also known as fatigue resistant fibres due to their metabolic qualities that include greater mitochondrial density, capillary density, and myoglobin content.

With ageing there appears to be a loss in type2 muscle fibres. Loss of motor units and innervating axons influences this process because it is believed to cause 'denervation – reinnervation' remodeling. That is, some muscle fibres lose their neural connections and become "denervated."

Denervation or loss of type 2 muscle fibres, results in increased innervation from collateral sprouting of axons from the type 1 muscle fibres. Basically, we end up with a predominantly type 1 muscle fibre pattern. The reduction and atrophy of type 2 motor units, along with a decrease in nerve conduction velocity and intrinsic changes in muscle fibre quality, results in a decline in peak muscle power with age. There is a greater decline in force produced by intrinsic hand muscle than extrinsic hand muscle with ageing<sup>11</sup>. Also maximum isometric voluntary force in adductor pollicis declined significantly after the age of 59<sup>12</sup>.



Studies were done that found that the decrease in muscle force is more than the decrease in cross sectional area of adductor pollicis.

With aging there is loss of motor neurons and a decrease in numbers of motor axons available to innervate the muscles. There is also a decrease in the speed of transmission of impulses, neurotransmission, and receptor numbers. Also elderly produce greater twitch tension and slower motor unit twitch contraction in thenar muscle<sup>15</sup>. Loss of motor units have an effect on contractile strength of muscle action<sup>16</sup>. Also the no of motor units in thenar muscles decreases with age which leads to decline in strength<sup>19</sup>.

All the above factors would have been responsible for the decline of grip strength and pinch strength of dominant as well as non dominant hand in geriatrics.

### CONCLUSION

It is concluded that ageing has an negative effect on hand function as seen by decline in grip strength and pinch strength. This decline in strength can affect the ability of an individual to undertake activities of daily living. Exercises concentrating on improving the strength of the hand will allow the geriatric person to have a ability to perform ADL in a better way thereby improving his quality of life. And since grip strength and pinch strength are determinants of hand function they should be used whenever possible.

The Jamar dynamometer and Jamar hydraulic pinch gauge are simple and reliable tool that measures grip strength and pinch strength respectively. Making use of the dynamometer and pinch gauge will provide an objective measurement of the function and should be used in assessment of a geriatric person on a daily basis. Further studies can be undertaken to estimate improvements in hand function after an exercise programme. Studies may also include EMG and NCV studies to determine neurological involvement in the decrease in hand function

**Acknowledgement:** The authors gratefully acknowledge the help and participation of all the study subjects and also of all the staff of Pad Dr D Y Patil Hospital and Research Centre, Medical College and Department of Physiotherapy

**Conflict of Interest:** None

**Source of Support:** Material support from the Department of Physiotherapy, Pad Dr D Y Patil University, Nerul, Navi Mumbai

**Ethical Clearance:** Ethics Approval from Ethics committee of Pad Dr D Y Patil University was received

### BIBLIOGRAPHY

1. Agnew PJ, Maas F. Hand function related to age and sex. *Phys Med Rehabil* 1982; 63: 269-271.
2. Cole KJ. Grasp force control in older adults. *J Motor Behav* 1991; 23: 251-258.
3. Galganski ME, A. J. Fuglevand, R. M. Enoka. Reduced control of motor output in a human hand muscle of elderly subjects during submaximal contractions. *J Neurophysiol* 1993; 69: 2118-2115.
4. Mary E Hackel, George A Wolfe, Sharon M Bang and Judith S Canfield . Changes in hand function in the ageing adults as determined by Jebsen Test of Hand Function. *Phys Ther* 1992;72:373-377.
5. Sandra Hunter, Michael White and Martin Thompson. Techniques to evaluate elderly human function : A Physiological basis. *J Gerontol A Biol Sci Med Sci* 1998;53A: B204-B216.
6. Incel, Nurgul Arinci; Sezgin, Melek; As, Ismet; Cimen, Ozlem Bolgen; Sahin, Gunsah. The geriatric hand: Correlation of hand muscle function and activity restriction in elderly. *Internantional Journal Of Rehabilitation Research*. Sep 2009 Vol 32 Issue 3.
7. Vinoth K. Ranganathan, Vlodek Siemionow, Vinod Sahgal, Guang H. Yue. Effects of Aging on Hand Function.
8. *Journal of the American Geriatric Society* Vol 49 Nov 2001 1478-1484.
9. Kallman DA, Plato CC, Tobin JD. The role of muscle loss in the age-related decline of grip strength: cross-sectional and longitudinal perspectives. *Journal of Gerontology* 1990 May;45(3):M82-8.
10. D. A. Keen, G. H. Yue, and R. M. Enoka. Training-related enhancement in the control of motor output in elderly humans. *Journal of Applied Physiology* December 1, 1994 vol. 77 no. 6 2648-2658
11. Hiroshi Kinoshita, Peter R. Francis. A comparison of prehension force control in young and elderly individuals. *European Journal of Applied*

- Physiology and Occupational Physiology, November 1996, Volume 74, Issue 5, pp 450-460
12. Shinohara M, Latash ML, Zatsiorsky VM. Age effects on force produced by intrinsic and extrinsic hand muscles and finger interaction during MVC tasks. *J Appl Physiol.* 2003 Oct;95(4):1361-9.
  13. Narici MV, Bordini M, Cerretelli P. Effect of aging on human adductor pollicis muscle function. *J Appl Physiol.* 1991 Oct;71(4):1277-81.
  14. Rantanen T, Guralnik JM, Foley D, Masaki K, Leveille S, Curb JD, White L. Midlife hand grip strength as a predictor of old age disability. *JAMA.* 1999 Feb 10;281(6):558-60.
  15. Sperling L. Evaluation of upper extremity function in 70-year-old men and women. *Scand J Rehabil Med.* 1980;12(4):139-44.
  16. Doherty TJ, Brown WF. Age-related changes in the twitch contractile properties of human thenar motor units. *J Appl Physiol.* 1997 Jan;82(1):93-101.
  17. Doherty TJ, Vandervoort AA, Taylor AW, Brown WF. Effects of motor unit losses on strength in older men and women. *J Appl Physiol.* 1993 Feb;74(2):868-74.
  18. Evans WJ, Campbell WW. Sarcopenia and age-related changes in body composition and functional capacity. *J Nutr.* 1993 Feb;123(2 Suppl):465-8.
  19. W F Brown. A method for estimating the number of motor units in the thenar muscles and changes in motor units with ageing. *J Neurol Neurosurg Psychiatry.* 1972 December; 35(6): 845–852.

# A Comparative Study of Nebivolol and Metoprolol on Blood Pressure and Heart Rate in Essential Hypertensive Patients

Ravibabu K<sup>1</sup>, Murthy KSN<sup>2</sup>, Lakshmana Rao N<sup>3</sup>, Jayasree P<sup>4</sup>, Akhila T<sup>5</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor, Department of Pharmacology, <sup>3</sup>Assistant Professor Department of Community Medicine, <sup>4</sup>Senior Resident, Dept of OBG, <sup>5</sup>Under Graduate Student, 3rd semester, G.S.L. Medical College & General Hospital, Rajahmundry

## ABSTRACT

**Objective:** To study and compare the effect of Nebivolol 5mg once daily versus Metoprolol 100mg once daily on Blood pressure and Heart rate in patients with essential hypertension.

**Materials and method:** This is a hospital based interventional study conducted at GSL General Hospital and Medical College which included 30 patients in each group with essential hypertension. After baseline assessment, each patient was randomly allocated to 5 mg once daily dose of Nebivolol or 100 mg once daily dose of Metoprolol for a treatment period of three months. Blood pressure and Heart rate were recorded at baseline, and every 30 days during treatment period.

**Results:** The baseline SBP and DBP were similar in the two groups. Both SBP and DBP decreased gradually and significantly in those upon treatment in each group. The two treatments had similar effects on the mean change from the baseline for both SBP ( $P < 0.0001$ ) and DBP ( $P < 0.0001$ ). A high proportion of responders were noted in both groups and there was no significant difference between the treatments. But fall in heart rate was significant ( $P < 0.0001$ ).

**Conclusion:** There was no statistically significant difference in reduction of blood pressure and heart rate with Nebivolol 5 mg and Metoprolol 100 mg, though the fall in blood pressure and heart rate from baseline was highly significant in each group.

**Keywords:** Nebivolol, Metoprolol Succinate, Essential Hypertension

## INTRODUCTION

Essential Hypertension is a condition where the cause for rise in blood pressure is not known.<sup>1</sup> It is estimated that 600 million people have HTN worldwide.<sup>2</sup> In India, the prevalence of HTN is about 20%, of whom 70% have stage I HTN.<sup>3-5</sup> HTN is responsible for 57% and 24% of all stroke- and coronary heart disease-related deaths, respectively.<sup>6</sup> It is sometimes associated with endothelial dysfunction which is caused by oxygen free radicals that destroy Nitric Oxide (NO) and impairs the protective and beneficial effects on vessel wall. The endothelial dysfunction may therefore contribute to the pathogenesis of atherosclerosis and thrombosis, contributing to cardiovascular events. Hypertension

is now considered as an important target for cardiovascular treatment.<sup>7</sup> Nebivolol a third-generation  $\beta$ -blocker has highest  $\beta_1$  selectivity and is devoid of intrinsic sympathomimetic activity.<sup>8</sup> In addition, it causes vasodilatation via interaction with endothelial L- arginine/nitric Oxide (NO) pathway. This dual mechanism of action underlies many of the haemodynamic properties of Nebivolol, which include reductions in heart rate and blood pressure, and improvement in systolic and diastolic function. In addition to reduction in blood pressure, the NO-mediated effects cause a reduction in peripheral vascular resistance and increase in stroke volume with preservation of cardiac output.<sup>9</sup> Metoprolol is also selective  $\beta_1$ -receptor blocker without known vasodilator properties.<sup>10</sup> Nebivolol and metoprolol are

widely studied in the management of essential HTN worldwide. However, it remains to be studied in Indian scenario. To the best of our knowledge, there are no studies available comparing the effect of Nebivolol and Metoprolol on blood pressure and heart rate in patients with essential hypertension, We therefore proposed to verify whether Nebivolol being a mixed beta blocker / nitrovasodilator, be more effective than Metoprolol.

### MATERIALS AND METHOD

This is a hospital based interventional study conducted between 08.01.2012 to 07.1.2013 on 71 patients with essential hypertension, attending medical outpatient department, GSL General Hospital & medical college, Rajamundry, AP, after getting approval from the Institutional Ethics Committee. The patients who met the inclusion criteria were explained in detail about the nature of the study, its purpose, procedure and follow-up. Informed consent was taken from all the patients included in the study. Patients of either gender in the age group of 21-70 yrs with blood pressure of 140-180/90 -110 mm of Hg were included in this study. The patients with blood pressure  $\geq$  180/110 mm of Hg, secondary hypertension, Diabetes mellitus, Bronchial asthma, chronic obstructive pulmonary disease , Hepatic or renal dysfunction, Sinus bradycardia, sick sinus syndrome, Prinzmetal’s angina, heart block, myocardial infarction, chronic heart failure and peripheral artery disease were excluded. Pregnant and lactating women and patients with history of hypersensitivity or allergy to Nebivolol /Metoprolol were also excluded. At the screening visit, patients were examined and medical history was obtained to determine patient’s eligibility for enrollment in the study. Patients belonging to both

stage 1 and stage 2 hypertension were selected as per JNC 7<sup>th</sup> report. Only newly diagnosed hypertensive patients without prior antihypertensive treatment and without any associated diseases are included. After initial screening, the demographic data, past medical history, findings of physical and clinical examination were recorded in the case report form. Diagnosed cases of essential hypertension were randomly allocated using random number table to either group A (Nebivolol 5mg) or Group B ( Metoprolol succinate 100mg ). On allocating the patients to respective group, Blood pressure and heart rate was measured after a 30 minute acclimation period, BP was measured 3 times to the nearest 2 mm Hg in the sitting position using a mercury sphygmomanometer and appropriately sized cuffs. The average of 3 measurements was used to calculate systolic and diastolic BPs. Before administering the drug, the base line blood pressure and heart rate were recorded. As per randomization, patients were advised to take medicines under study regularly. The patients were advised to come for follow-up at 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> month of treatment initiation. On each visit, blood pressure and heart rate were recorded. The laboratory investigations were repeated at the end of 3 months. The data obtained was analyzed using descriptive statistics paired and unpaired student’s ‘t’ test to compare results.

### RESULTS

Out of 71 patients enrolled, 60 completed the study and 11 lost to follow up (4 from the Nebivolol group and 7 from the Metoprolol group). Age for both groups ranged between 45 to 60 years, with mean age being 50.3 $\pm$ 3.15 years in the Nebivolol group and 51 $\pm$ 2.91 years in the Metoprolol group.

**Table 1: Demographic characteristics of Nebivolol and Metoprolol group**

Particulars of the patients	Nebivolol	Metoprolol succinate
Number	30	30
Mean age (yrs)	50.3 $\pm$ 3.15	51 $\pm$ 2.91
Sex (M/F)	21/9 (70/30)	18/12 (60/40)
Alcohol consumption	9(30)	11(36)
History of smoking	10 (33)	8 (26)
Family history of HTN	16 (53)	19(63)
Mean $\pm$ SD, number in parenstheses represents percentage		

Table 1 depicts the demographic data of the patients in each group. In the Nebivolol group, 70% were males and 30% were females with their mean age being 50.3±3.15 years and in Metoprolol group 60% were males and 40% females with mean age 51±2.91 years.

Nine male patients and seven female patient of Nebivolol group, eleven male and eight female patients of Metoprolol had family history of hypertension. Both the groups were comparable in other demographic characteristics.

**Table 2: Effect of Nebivolol and Metoprolol on Systolic, Diastolic blood pressure and heart rate**

Visit schedule	Nebivolol Group			Metoprolol Group		
	SBP mm Hg	DBP mmHg	HR/min	SBP mm Hg	DBP mmHg	HR/min
Baseline	160±7.94*	92.60±4.87*	78.3±5.3*	159±8.13#	93.33±4.08#	78.07±5.13#
1 <sup>st</sup> month	150±7*	87.2±4.71*	73.9±3.43*	149±8#	86±9.74#	73.7±3.28#
2 <sup>nd</sup> month	142.07±8.5*	83.20±4.47*	71.27±2.8*	140.8±9.19#	83.20±4.15#	71.17±2.82#
3 <sup>rd</sup> month	126±6.80*	77.2±4.57*	69.97±2.02*	127.23±8.16#	77.60±3.37#	65.75±1.81#

SBP, systolic blood pressure, DBP, Diastolic blood pressure, HR, heart rate, Mean ± SD, Statistical test used is descriptive statistics and paired and unpaired student's 't'-test to compare results within the group and between groups, respectively. \*P<0.0001 compared with baseline, #P<0.0001 compared with baseline, \$P<0.0001 compared between Nebivolol and Metoprolol.

Table 2 shows the effect of Nebivolol and Metoprolol on systolic blood pressure at the end of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> month. The values in Table 2 are represented as mean ± SD. There was a significant fall (p<0.0001) in SBP at the end of each month for both

groups. Table 2 show the effect of Nebivolol and Metoprolol on Diastolic blood pressure at the end of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> month. There is significant decrease of mean ± SD DBP from baseline to 3<sup>rd</sup> month and the mean difference was found to be statistically significant (p<0.0001) in both groups. Table 2 depicts the comparative effect of Nebivolol and Metoprolol on heart rate at the baseline and at the end of 3<sup>rd</sup> month of treatment. The mean heart rate at baseline in Nebivolol group was 78.30±5.3 and in Metoprolol group was 78.07±5.13. At the end of 3<sup>rd</sup> month, it was reduced to 69.97±2.02 in Nebivolol group and 65.75±1.81 in Metoprolol group (p<0.0001).

**Table 3: Effect of Nebivolol on Baseline Systolic blood pressure and Diastolic blood pressure**

Nabivolol	Paired Differences				P value
	Mean	Std. Deviation	95% Confidence Interval of the Difference		
			Lower	Upper	
Baseline SBP - 3M SBP	33.533	9.504	29.984	37.082	0.0001
Baseline DBP - 3M DBP	15.600	6.420	13.203	17.997	0.0001
Baseline HR – 3M HR	8.333	5.307	6.352	10.315	0.0001

Table 3 depicts difference between Nebivolol baseline and 3<sup>rd</sup> month SBP with mean difference of 33.53±9.50 and between baseline and 3<sup>rd</sup> month DBP

with mean difference of 15±6.42, both are statistically significant ( p<0.0001).

**Table 4: Effect of Metoprolol on Baseline Systolic blood pressure and Diastolic blood pressure**

Metoprolol succinate	Paired Differences				P value
	Mean	Std. Deviation	95% Confidence Interval of the Difference		
			Lower	Upper	
Baseline SBP -3M SBP	31.867	10.637	27.895	35.839	0.0001
Baseline DBP -3M DBP	15.733	5.502	13.679	17.788	0.0001
Baseline HR -3M HR	12.333	5.358	10.332	14.334	0.0001



Table 4 represent the difference between baseline and 3<sup>rd</sup> month SBP with mean difference of  $31.86 \pm 10.63$  and between baseline and 3<sup>rd</sup> month DBP with mean difference of  $15.73 \pm 5.50$ , both of which are statistically significant ( $p < 0.0001$ ), During the study period, the common adverse events observed with both drugs were headache, dizziness, fatigue, nausea and vomiting.

## DISCUSSION

The initial drug management of hypertension is a contentious issue. The report of the Joint National Committee on detection, evaluation and treatment of high blood pressure also recommends  $\beta$  blockers as one of the initial antihypertensive agents<sup>11</sup>.  $\beta$  blockers have become one of the first choice drugs for antihypertensive therapy in various countries, unless there are any clinical conditions contraindicating their use.<sup>12</sup> Nebivolol, has been shown to have the vasodilator effect by stimulating the release of potent vasodilator, NO from endothelial cells.<sup>13-16</sup> A possible antioxidant property of Nebivolol has also been suggested as an additional factor in increasing NO bioactivity or reducing endothelin release.<sup>17-18</sup> In our study, we have analyzed the effect of Nebivolol 5mg once daily and Metoprolol succinate 100mg once daily in essential hypertensive patients. The patients were in the age group of 45-60 years in both the groups. In both the groups, there was a reduction of SBP, DBP and heart rate and the effect was observed at the end of one month of treatment and was maintained till the treatment end period of three months. These results are similar to the other studies.<sup>(19-26)</sup> When heart rate was compared between Nebivolol and Metoprolol groups, there was significant fall ( $p < 0.0001$ ) in the heart rate in Metoprolol group, this could be because of Metoprolol being sympatholytic, Nebivolol decreases the sympathetic activity and the vasodilator property may reflexly accelerate the parasympathetic activity. Hence, fall in the heart rate with Nebivolol is less as compared to Metoprolol. The results of this study showed that Nebivolol 5mg and Metoprolol succinate 100mg had similar antihypertensive effect. Although there was no difference between the groups with respect to reduction of SBP and DBP, decrease in HR was significantly greater in patients receiving Metoprolol in this study. Though, theoretically Nebivolol improves NO availability and prevents the endothelial dysfunction that predisposes to essential hypertension, clinically significant benefit was not evident in the

current study. Further studies with larger patient sample size and may be higher doses of Nebivolol may throw more light on this particular aspect.

## CONCLUSION

There was no statistically significant in blood pressure lowering effect between the groups. Both Nabivolol and Metoprolol appear to have similar antihypertensive effects in the short term.

**Acknowledgement:** The authors are deeply indebted to all patients in this study, Dr. Gani Bhaskara Rao, Chairman, Dr. Y.V Sharma, Principal, Dr. Gupta, Assistant professor, Dept. of Medicine GSL medical College & General hospital, Rajahmundry for their whole hearted support in completion of this study.

**Conflicts of Interest:** No potential conflicts of interest in this article

**Source of Funding:** Nil

## REFERENCES

1. Camm AJ. Cardiovascular diseases: Systemic hypertension. In: Parveen kumar, Clark M, editors. Kumar and clark clinical medicine. 5<sup>th</sup>ed. Edinburgh: WB Saunders; 2002. p. 818-27.
2. Vikrant S, Tiwari SC. Hypertension - Pathogenesis and Pathophysiology. Indian Acad Clin Med 2001;2:141-61.
3. Gupta R. Meta-analysis of prevalence of hypertension in India. Indian Heart J 1997;49:450.
4. Gupta R. Trends in hypertension epidemiology in India. J Hum Hypertens 2004;18:73-8.
5. Mohan V, Deepa M, Farooq S, et al. Prevalence, awareness and control of hypertension in Chennai -The Chennai Urban Rural epidemiology study (CURES-52). J Assoc Physicians India 2007;55:326-32.
6. Murray CJ, Lopez AD. Alternative projections of mortality and disability by cause 1990-2020: global Burden of Disease Study. Lancet 1997;349:1498-504.
7. Taddei S, Virdis A, Ghiadoni L, Sudano I, Salvetti A. Effects of antihypertensive drugs on endothelial dysfunction: clinical implication. Drugs 2002;62:265-84.
8. Dawes M, Brett SE, Chowienczyk PJ, Mant TG, Ritter JM. The vasodilator action of Nebivolol in forearm vasculature of subjects with Essential hypertension. Br J Clin Pharmacol. 1999; 48:460-3.

9. Kamp O et al. Nebivolol: haemodynamic effects and clinical significance of combined beta blockade and nitric oxide release. *Drugs* 2010;70(1):41-56.
10. Zanchetti A. Clinical pharmacodynamics of nebivolol: new evidence of nitric oxide-mediated vazodilating activity and peculiar haemodynamic properties in hypertensive patients. *Blood Press Suppl* 2004; 1: 17-32.
11. Lenfant C, Chobanian AV, Jones DW, et al. seventh report of the Joint National Committee on the prevention, detection, evaluation, and treatment of high blood pressure (JNC 7): resetting the hypertension sails. *Hypertension* 2003;41:117-9.
12. Tomlinson B, Dalal JJ, Huang J, et al. The role of beta blockers in the management of hypertension: an Asian perspective. *Curr Med Res Opin* 2011;27:1021-33.
13. Broeders MA, Doe evendans PA, Bekkers BC, Bronsaer R, Van Gorsel E, Heemskerk Jw, et al. Nebivolol: A third generation beteblocker that augments vascular nitric oxide release: endothelial beta (2) – adrenergic receptor mediated nitric oxide production. *Circulation* 2000, 102: 677-84.
14. Cominacini L, Fratta Pasini A, Garbin U, Nava C, Davoli A, Criscuoli et al. Nebivolol and its 4-keto derivative increases nitric oxide in endothelial cell by reducing its oxidative inactivation. *J AM Coll Cardiol* 2003; 42:1838-44.
15. Dawes M, Brett SE, Chowienczyk PJ, Mant TG, Ritter JM. The vasodilator action of Nebivolol in forearm vasculature of subjects with essential hypertension. *Br J Clin Pharmacol* 1999; 48: 460-3.
16. Kalinowski L, dobrucki LW, Szczepanska-Konkel M, Jankowshi M, Martynicl, Angielski S et al. Third generation beta blockers stimulate nitric oxide release from endothelial cells through ATP efflux: A novel mechanism for antihypertensive action. *Circulation* 2003; 107: 2747-52.
17. Troost R, Schwedhelm E, Rojczyk S, Tsikas D, Frolich JC. Nebivolol decreases systemic oxidative stress in healthy volunteers. *Br J clin Pharmacol.* 2000;5:377-9.
18. Brehm BR, Bertsch D, Vonfallois J, Wolf SC. Beta blockers of the third generation inhibit endothelin -1 liberation, mRNA production and proliferation of human coronary smooth muscle and endothelial cells. *J Cardiovasc Pharmacol* 2000; 36:S401-3.
19. Oguz et al. Effect of Nebivolol and Metoprolol treatments on serum asymmetric dimethylarginine levels in hypertensive patients with type 2 diabetes mellitus. *Anadolu kardiyol Derg* 2007; 7:383-7.
20. P Kampus et al. Nebivolol but not Metoprolol decreases central blood pressure and left ventricular wall thickness in patients with essential hypertension. *Journal of Hypertension: June 2010 - Volume 28 - Issue - p -173*
21. K Brixius, M Middeke, A Lichtenthal, E Jahn, R H G Schwinger. Nitric oxide, Erectile dysfunction and Beta-Blocker treatment (MR NODE study): Benefit of Nebivolol verse Metoprolol in Hypertensive Men. *Clinical and Experimental pharmacology and physiology* (2007) 34, 327-331
22. Ramprasad kandavar, yusuke Higashi, Weichen et al. The effect of Nebivolol versus Metoprolol succinate extended release on Asymmetric dimethylarginine in hypertension. *J Am soc Hyperten.*2011; 5(3):161-165.
23. Priit Kampus, Martin serg, Jaak kals et al. Differential effects of Nebivolol and Metoprolol on central aortic pressure and left ventricular wall thickness. *Hypertension.*2011; 57:1122-1128.
24. Vinereanu D, Gherghinescu C, Ciobanu AO, Magda S, Niculescu N, et al. Reversal of subclinical left ventricular dysfunction by antihypertensive treatment: A prospective trial of nebivolol against metoprolol. *J Hypertens* 2011;29(4):809-17.
25. Uhlir O, Fejfusa M, Havranek K et al. Nebivolol verse Metoprolol in the treatment of hypertension. *Drug Invest* 1991; 3 suppl. 1: 107-10.
26. Celik, Turgay, Iyisoy et al. Comparative effects of Nebivolol and Metoprolol on oxidative stress, Insulin resistance, plasma adiponectin and soluble p- selectin levels in hypertensive patients. *Journal of Hypertension.* 2006;24:3: 591-596

# Antibiogram of *Pseudomonas Aeruginosa* in a Tertiary Care Hospital in South India

Chandan N G<sup>1</sup>, S Manju Bhargavi<sup>2</sup>, Venkatadri T V<sup>3</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Tutor, <sup>3</sup>Professor & HOD, Department of Pharmacology, MVJ Medical College & Research Hospital, Hoskote, Bangalore

## ABSTRACT

**Aim:** The aim of the present study is to evaluate the antibiotics susceptibility pattern of *Pseudomonas aeruginosa* in a tertiary care hospital in South India.

**Materials & Method:** It is a retrospective record based study conducted in a tertiary care hospital in rural Bangalore from December 2011 to July 2012. Various clinical samples like pus, urine, sputum, endotracheal secretions, blood and eye swab were investigated for *P. aeruginosa* and antibiotic sensitivity was done by standard microbiologic methods.

**Results:** A total of 110 samples with positive culture for *P.aeruginosa* was obtained during this study period. Commonest clinical sample from which *P.aeruginosa* was isolated was from pus (52.7%), followed by urine (22.7%) and sputum (16.36%). The percentage of resistance to different antibiotics were: ciprofloxacin 67.27%, ofloxacin 63.64%, levofloxacin 57.28%, imipenem 24.55%, meropenem 34.54%, piperacillin 58.18%, piperacillin & tazobactam 30.9%, cefpodoxime proxetil 80%, ceftazidime 62.72%, cefoperazone 70.9%, ceftriaxone 74.54%, cefipime 69.09%, gentamicin 60%, tobramycin 54.54%, amikacin 20.9%.

**Conclusion:** Thus in the present study, it was concluded that *P.aeruginosa* was highly resistant to third generation cephalosporins, fluoroquinolones and monotherapy with piperacillin. Co-administration of  $\beta$ -lactamase inhibitors like tazobactam has increased the sensitivity. Carbapenems like imipenem & meropenem were also found to have higher antimicrobial activity against *P.aeruginosa*. Among aminoglycosides the organism is found to be highly sensitive to amikacin.

**Keywords:** *Pseudomonas Aeruginosa*, Antibiotic Susceptibility

## INTRODUCTION

*Pseudomonas aeruginosa*, an opportunistic Gram-negative bacterial pathogen found in most environments including water reservoirs and soil, is one of the leading nosocomial pathogens worldwide. *P.aeruginosa* is responsible for localized infections of a variety of organ systems including the respiratory tract, urinary tract, gastrointestinal tract, skin, eye, ear and joints and also systemic infections in susceptible individuals. Because *P. aeruginosa* is tolerant to a variety of physical conditions and is highly adaptable to survive in common environments, the hospital environments and equipments such as mechanical

ventilators, intravenous lines, urinary or dialysis catheters, pacemakers, endoscopes, sinks and likewise can be potential reservoirs for *P. aeruginosa* infections. Given its ubiquitous presence, it is understandable that the healthy immune system is quite capable to control infections with *P. aeruginosa*. However, susceptible individuals, particularly those with an impaired immune system frequently suffer from infections with *P. aeruginosa*<sup>1</sup>. *P. aeruginosa* has become a leading cause of gram negative bacterial infections especially in immunosuppressed patients, where prolonged hospitalization is required<sup>2,3</sup>. It was also noted that *P. aeruginosa* bacteremia is associated with higher mortality than other gram negative bacteremia<sup>4</sup>.

Despite considerable advances in antimicrobial therapy, effective treatment and control of *P. aeruginosa* infections remains a persistent problem, primarily because of the natural resistance of the organism and its remarkable ability to acquire resistance to multiple antimicrobial agents by various mechanisms<sup>5</sup>. Serious infection due to strains of *P. aeruginosa* that exhibit resistance to all common antipseudomonal antimicrobials is an increasingly serious problem<sup>6</sup>.

The present study was conducted to evaluate the prevalence and antibiotic susceptibility pattern of *P. aeruginosa* in our hospital.

## MATERIALS & METHOD

The present study was conducted at MVJ Medical College & Research Hospital, Banaglore rural. This study was conducted from December 2011 to July 2012. It is a retrospective record based study which was carried based on reports of bacterial isolates. Samples were obtained from patients who were hospitalized in various departments. Various clinical specimens obtained were urine, pus, sputum, endotracheal secretions, eye swab and blood. Identification of *P. aeruginosa* was done by standard microbiologic methods<sup>7</sup>. Antibiotic susceptibility was confirmed by disc diffusion technique performed according to CLSI guidelines<sup>8</sup>.

Information regarding patient age, gender, date of admission were collected from the case records of the patient.

### Statistical analysis

After collection of data it was entered in Microsoft excel sheet and the susceptibility data were compared using Chi-square test. Both the resistance and susceptibility were calculated as percentages. Statistical significance was established when the probability value was less than 0.05.

## RESULTS & OBSERVATIONS

A total no. of 110 clinical samples of *P. aeruginosa* were obtained from various sources during the study period. Various specimens from which *P. aeruginosa* has been isolated is listed in table-1 with their frequency of occurrence expressed as percentages. In

our study it was found that *P. aeruginosa* was more frequently isolated from pus (52.7%) followed by urine (22.7%) and sputum (16.3%).

Each isolate was evaluated for susceptibility to different antibiotics as listed in Table-2.

We found that *P. aeruginosa* was found to be highly sensitive to carbapenems like imipenem (S = 75.45%) & meropenem (S = 65.45%) which is found to be statistically significant ( $P < 0.001$ ). It was also found that *P. aeruginosa* was found to be resistant to extended spectrum penicillins like piperacillin (R = 41.81%) when used alone, but the combination of piperacillin with beta-lactamase inhibitors like tazobactam was found to have more antibacterial activity against *P. aeruginosa* (S = 69.09%) which is found to be statistically significant ( $P < 0.001$ )(Figure-1).

We also found that *P. aeruginosa* was found to be resistant to most of the third generation cephalosporins like cefpodoxime proxetil, ceftazidime, cefoperazone, ceftriaxone and cefipime ranging from 62% to 80% as shown in table -2 which is found to be statistically significant ( $P < 0.001$ )(figure-2).

It was also found that *P. aeruginosa* was found to be resistant to fluoroquinolones like ciprofloxacin (R = 67.27%,  $P < 0.001$ ), ofloxacin (R = 63.64%,  $P < 0.001$ ) and levofloxacin (R = 57.28%,  $P < 0.05$ ), which is found to be statistically significant(figure-3).

Among the aminoglycosides group of antibiotics we found that *P. aeruginosa* was highly sensitive to amikacin (S = 79.09%,  $P < 0.001$ ) and less sensitive to gentamicin (S = 40%,  $P < 0.05$ ) and tobramycin (S = 45.45%) which was not found to be statistically significant ( $P > 0.05$ )(figure-3).

**Table 1: Frequency of various specimens from which *Pseudomonas aeruginosa* was isolated**

Specimen	Number of specimens	Percentage (%)
Pus	58	52.7
Urine	25	22.7
Sputum	18	16.3
Endotracheal secretions	05	4.5
Blood	02	1.8
Eye swab	02	1.8

Values shown are percentage of total (n = 110 cases)



**Table 2: Antibiotic sensitivity pattern of *Pseudomonas aeruginosa***

Antibiotics	Sensitive [S] (%)	Resistant [R] (%)
Ciprofloxacin	32.73	67.27
Ofloxacin	36.36	63.64
Levofloxacin	42.72	57.28
Imipenem	75.45	24.55
Meropenem	65.45	34.54
Piperacillin	41.81	58.18
Piperacillin + Tazobactam	69.09	30.9
Cefpodoxime proxetil	20.0	80.0
Ceftazidime	37.27	62.72
Cefoperazone	29.09	70.9
Ceftriaxone	25.45	74.54
Cefipime	30.9	69.09
Gentamicin	40.0	60.0
Tobramycin	45.45	54.54
Amikacin	79.09	20.9

Values shown are percentage of total (n = 110 cases)

## DISCUSSION

*P. aeruginosa* is primarily a nosocomial pathogen<sup>9</sup>. The minimal nutritional requirements of *P. aeruginosa*, its tolerance of a wide variety of physical conditions, and its relative resistance to antimicrobial agents contribute to its ecologic success and to its role as an effective opportunistic pathogen<sup>10</sup>. There are a limited number of antimicrobial agents with reliable activity against *P. aeruginosa*, including antipseudomonal penicillins and carbapenems, cephalosporins, aminoglycosides, and fluoroquinolones. Resistance to antimicrobials is an increasing clinical problem and is a recognized public health threat<sup>11</sup>. Nowadays, the prevalence of *P. aeruginosa* and the new resistant strains continue in both community acquired pathogens and hospital originated infections<sup>12</sup>. Thus, the present study was conducted to evaluate the susceptibility pattern of *P. aeruginosa* in a tertiary care centre.

In our study it was found that *P. aeruginosa* was resistant to piperacillin. Production of  $\beta$ -lactamase is the most commonly encountered mechanism of resistance of bacterial pathogens to  $\beta$ -lactam antibiotics.  $\beta$ -Lactam resistance is due to a variety of mechanisms; AmpC  $\beta$ -lactamase production<sup>13, 14</sup>, extended-spectrum  $\beta$ -lactamases<sup>15</sup>, including carbapenemases, a barrier to diffusion at the outer membrane, and efflux mechanisms are among those

described<sup>16</sup>. We also found that with the addition of beta-lactamase inhibitors like tazobactam to ureidopenicillins like piperacillin increased the susceptibility of the organism which was found to be statistically significant and similar observations were seen in another study also<sup>17</sup>.

We also found that the carbapenems like imipenem & meropenem found to be more effective against *P. aeruginosa* but there were some resistant cases isolated which were found to be more with meropenem (R = 34.54%) than with imipenem (R = 24.55%). Resistance to carbapenems results from the production of carbapenemases and by expression of efflux mechanisms<sup>16</sup>. Another similar study conducted in Spain has also shown imipenem resistance (R = 14%)<sup>18</sup>.

There was significant resistance to third generation cephalosporins observed in our study ranging from 62% to 80%. The probable mechanism of resistance may be due to production of extended spectrum  $\beta$ -lactamases<sup>19</sup>. Similar outcome was also observed in another study by Holloway et al<sup>20</sup>.

Widespread use of quinolones has led to a rapid increase in the incidence of resistance in many pathogenic bacteria. Prevalence of resistance to ciprofloxacin, a commonly used fluoroquinolone, ranges from 5 % to over 80 % amongst hospital isolates of important nosocomial pathogens as observed by Jacoby in 2005<sup>21</sup>. Similarly, we found in our study that *P. aeruginosa* was highly resistant to fluoroquinolones like ciprofloxacin (R = 67.27%), ofloxacin (R = 63.64%) and levofloxacin (R = 57.28%). The possible mechanism of fluoroquinolones resistance is by mutations in DNA gyrase A, which is the primary target of quinolones in gram- negative bacteria<sup>22</sup>.

Among aminoglycosides the organism is found to be highly sensitive to amikacin (S = 79.09%). Whereas the sensitivity to gentamicin (S = 40%) and tobramycin (S = 45.45%) is found to be less when compared to amikacin. Similar observations of amikacin sensitivity was also observed in a study by Smitha S et al<sup>23</sup>. As, amikacin seems to be a promising therapy for pseudomonas infection, its use should be restricted to severe nosocomial infections<sup>24</sup>.

Thus from the above discussion it is clear that there is an increase in antibiotic resistance which may be because of inappropriate and irrational use of antibiotics. The prospect for bringing new and specifically novel antipseudomonal drugs to clinical



use in the near future is not promising. Therefore, the challenge facing us today is to slow or prevent the emergence of resistance through optimizing therapy with currently available drugs.

### CONCLUSION

Thus, it can be concluded that treatment of infectious diseases are becoming more challenging with each passing year due to increase in drug resistance as seen with opportunistic pathogens like *P.aeruginosa*. Hence, there is a need to emphasize the rational use of antimicrobials and the indiscriminate use of antibiotics should be avoided to prevent the emergence and spread of drug resistance. In addition regular antimicrobial susceptibility surveillance is essential for area wise monitoring of the resistance patterns. An effective national and state level antibiotic policy and draft guidelines should be introduced to preserve the effectiveness of antibiotics and for better patient management.

**Acknowledgement:** The authors wish to express their acknowledgement to the Department of Microbiology and Medical Superintendent of MVJMC&RH, Bangalore.

**Conflict of Interest:** None declared

**Source of Funding:** Self

**Ethical Clearance:** Obtained

### REFERENCES

1. Anurag Sharma, Anja Krause and Stefan Worgall. Recent developments for *Pseudomonas* vaccines. *Human Vaccines* 7:10, 999-1011; October 2011; Landes Bioscience.
2. Schimpff SC, Moody M., Young VM. Relationship of colonization with *Pseudomonas aeruginosa* to development of *Pseudomonas aeruginosa* bacteremia in cancer patients. *Antimicrob Agents Chemother* 1970; 240.
3. Korvick JA, Marsh JW, Starzl TE, et al. *Pseudomonas aeruginosa* bacteremia in patients undergoing liver transplantation: an emerging problem. *Surgery* 1991;109: 62-68.
4. Young LS, et al. The clinical challenge of infections due to *Pseudomonas aeruginosa*. *Rev Infect Dis* 1984; 6 : 603-7.
5. Tenover FC. Mechanisms of antimicrobial resistance in bacteria. *Am J Infect Control* 2006; 34:3-10.
6. Linden PK, Kusne S, Coley K., et al. Use of parenteral colistin for the treatment of serious infection due to antimicrobial resistant *Pseudomonas aeruginosa* 2003; 37: 154-60.
7. Gencer S, Ak O, Benzonana N, Batirel A, Ozers. Susceptibility pattern and cross resistance of antibiotics against *Pseudomonas aeruginosa* in a teaching Hospital of Turkey. *Ann Clin Microbial Antimicrob* 2002,1:2.
8. National committee of clinical laboratory standards. Performance standards for antimicrobial disk susceptibility test. The national committee for clinical laboratory standards. M7-A5, 2000;20.
9. Harris A, Torres-Viera C, Venkataraman L, DeGirolami P, Samore M, Carmeli Y. Epidemiology and clinical outcomes of patients with multiresistant *Pseudomonas aeruginosa*. *Clin Infect Dis* 1999;28:1128-33.
10. Pollack M. *Pseudomonas aeruginosa*. In: Mandell GL, Bennett JE, Dolin R, editors. Principles and practice of infectious diseases. Vol. 2. Philadelphia: Churchill Livingstone; 2000. p. 2310-35.
11. Troillet N, Samore MH, Carmeli Y. Imipenem-resistant *Pseudomonas aeruginosa*: risk factors and antibiotic susceptibility patterns. *Clin Infect Dis* 1997;25:1094-8
12. Maniatis AN, Trougakos IP, Katsanis G et al. Changing patterns of bacterial nosocomial infections: a nine year study in a general hospital. *Chemotherapy* 1997; 43: 69-76.
13. Marchandin H, Carriere C, Sirot D, Pierre HJ, Darbas H. TEM-24 produced by four different species of Enterobacteriaceae, including *Providencia rettgeri*, in a single patient. *Antimicrob Agents Chemother* 1999;43:2069-73.
14. Ben-Mahrez K, Rejiba S, Belhadj C, Belhadj O. Beta-lactamase-mediated resistance to extended spectrum cephalosporins among clinical isolates of *Pseudomonas aeruginosa*. *Res Microbiol* 1999;150:403-6.
15. Nordmann P, Guibert M. Extended-spectrum  $\beta$ -lactamases in *Pseudomonas aeruginosa*. *J Antimicrob Chemother* 1998;42:128-31.

16. A. C. Gales, R. N. Jones, J. Turnidge, R. Rennie, and R. Ramphal. Characterization of *Pseudomonas aeruginosa* Isolates: Occurrence Rates, Antimicrobial Susceptibility Patterns, and Molecular Typing in the Global SENTRY Antimicrobial Surveillance Program, 1997–1999. *Clin Infect Dis.* (2001) 32 (Supplement 2): S146-S155.
17. Chitnis SV, Chitnis V, Sharma N, Chitnis DS. Current status of drug resistance among gram negative bacilli isolated from admitted cases in a tertiary care centre. *J Assoc Physicians India* 2003;51:28-32.
18. Pfaller MA, Jones RN. MYSTIC (Meropenem yearly susceptibility test information collection) results from the Americas: resistance implications in the treatment of serious infections. *J Antimicrob Chemother.* 2000; 46:25-37.
19. Mathur P, Kapil A, Das B, Dhawan B. Prevalence of extended spectrum  $\beta$ -lactamase producing gram negative bacteria in a tertiary care hospital. *Indian J Med Res* 2002;115:153-7.
20. Holloway WJ, Palmer D. Clinical application of new parenteral antibiotic in treatment of severe bacterial infection. *Am J Med* 1996;52:525-595.
21. Jacoby, G. A. (2005). Mechanisms of resistance to quinolones. *Clin Infect Dis* 41 (Suppl. 2), S120–S126.
22. Alex Wong, Rees Kassen. Parallel evolution and local differentiation in quinolone resistance in *Pseudomonas aeruginosa*. *Microbiology* April 2011 vol. 157 no. 4 937-944.
23. Smitha S, Lalitha P, Prajna VN, Srinivasan M. Susceptibility trends of *Pseudomonas* species from corneal ulcers. *Indian J Med Microbiol* 2004;53:653-6.
24. Hancock RE, et al. Resistance mechanism in *Pseudomonas aeruginosa* and other nonfermentative gram negative bacteria. *Clin Infect Dis.* 1998; 27: 289-99.

# The Sample Size Estimation and its SAS Code for Binary Response Endpoints Clinical Study- a Review

Singh Rajneesh<sup>1</sup>, Namdev Kuldeep Kumar<sup>2</sup>, Deepak<sup>3</sup>, Rao Shireen<sup>4</sup>

<sup>1</sup>Biostatistician, <sup>2</sup>Pharmacokinetic Scientist, <sup>3</sup>Group Leader, <sup>4</sup>Head Bio-Analytical, Fortis Clinical Research Ltd., Sunflag Hospital & Research Centre, Sector 16-A, Faridabad, India

## ABSTRACT

The aim of this article is to provide basic idea about sample size estimation in clinical study of binary response endpoints. Every clinical trial must be planned and it describes the objective, primary and secondary endpoint, method of collecting data, inclusion & exclusion criteria, sample size with scientific justification, statistical methodology. The calculation of sample size with sufficient levels of significance and power is an essential part of protocol which needs to be submitted to drug authorities for approval. In this review emphasis has been made to describe the different kind of design i.e. equivalence, non-inferiority, superiority and equality and their SAS codes for sample size calculation in clinical study.

**Keywords:** Significance Level ( $\alpha$ ), Power, Margin, Non-inferiority, Superiority

## INTRODUCTION

The most important aspire of a sample size calculation is to determine the number of participants needed to detect a clinically relevant treatment effect. The determinants of sample size are the study design and the clinical end point's scale level.

However, information needed to determine sample sizes are power, level of significance; size of the treatment effect, variation and others factors (e.g. drop-out rate or withdrawn rate). Statistical study designs are available to achieve objectives. Typical designs that may be employed are parallel group design, crossover design etc. The description of primary study end point should cover whether it is discrete or continuous or time-to-event. Sample size is estimated differently for each of these end points. Sample size is adjusted if primary end point involves multiple comparisons. The sample size estimation is challenging for complex designs such as non-inferiority and/or time to event end points.<sup>1,2</sup>

### Statistical Considerations

1. **Null Hypothesis ( $H_0$ ):** The null hypothesis typically corresponds to a general or default position. For example, the null hypothesis might

be that there is no relationship between two measured phenomena or that a potential treatment has no effect or no difference in the response exists between treatment and control groups.

2. **Alternative Hypothesis ( $H_a$ ):** The alternative hypothesis is what we are attempting to demonstrate in an indirect way by the use of our hypothesis test. If the null hypothesis is rejected, then we accept the alternative hypothesis. If the null hypothesis is not rejected, then we do not accept the alternative hypothesis or a difference of a specified amount ( $\delta$ ) exists between treatment and control.
3. **Significance Level ( $\alpha$ ):** The Probability of detecting the false effect. The probability of rejecting  $H_0$  given that  $H_0$  is true,  $\alpha = 0.1, .05, .025, .001$ . However the investigator is willing to accept a 5% chance of erroneously reporting a significant effect. In "traditional statistics" a probability of something occurring of less than .05 (= 5% = 1 chance in 20) is conventionally considered "unlikely".
4. **Power ( $1 - \beta$ ):** The probability of detecting of true effect. We can also calculate a power needed to

detect a difference of  $\delta$  as statistically significant, with N participants. The power of a statistical hypothesis test measures the test's ability to reject the null hypothesis when it is actually false.

5. **Margin ( $\delta$ ):** smallest difference hopes to detect
6. **Test Statistics:** Test statistics is nothing but it is function of sample values. For Ex.  $z =$  test statistic,  $z_a =$  critical value: If  $|z| > z_a$ : Reject  $H_0$ .
7. **Others:** Missing data elements in retrospective studies, Loss to follow-up in prospective studies.

### Type of Testing

1. **Test for equivalence:** This is a trial with the primary objective of showing that the response to two or more treatments differs by an amount which is clinically unimportant. This is usually demonstrated by showing that the true treatment difference is likely to lie between a lower and an upper equivalence margin of clinically acceptable differences.
2. **Test for Non-inferiority:** To demonstrate that the new drug is as less effective as the Standard treatment (i.e. the difference between the new treatment and the standard is less than the smallest clinically meaningful difference). It is not possible to perform a non-inferiority trial in all situations. The decision to perform non-inferiority trial should be justified considering both the therapeutic area and the profile of the reference product.
3. **Test for Superiority:** This is a trial with the primary objective of showing that the response to the investigational product is superior to a comparative agent (active or placebo control). To demonstrate that the new treatment is more superior than Standard treatment (i.e. the difference between the new treatment and the standard is greater than the smallest clinically meaningful difference).

To show the superiority is the gold standard in clinical trial research. Of the three types of trials, the results of a superiority trial are the simplest regarding interpretation. Due to the difficulty of launching more powerful drugs on the market, it is not easy to prove superiority.

### The Method for Calculation of Sample Size

Here we illustrating the sample size based on the

binary clinical endpoints. The protocol should provide below information and justification of sample size.<sup>4,5</sup>

1. Statements of the (primary) objectives of the study.
2. Desired level of significance: However the investigator is willing to accept a 5% chance of erroneously reporting a significant effect.
3. Desired power: Power = 0.80, 0.90, it should be at least 0.80 for design.
4. Assumptions made about the distribution of the outcomes.
5. Summary of test statistic will be used for analysis.
6. Smallest difference (margin): Selection of the margin is based upon a combination of statistical reasoning and clinical importance

#### A. Equivalence Trial

**Defining "Equivalence":** Since no two treatments are exactly equal, we must define what difference in effects would be clinically important. This clinically important effect size (delta) will differ depending on the condition being studied.

Formula of calculating sample size is

$$N = [(Z_a + Z_\alpha)^2 \times \{(P_T (1 - P_T) + (P_R (1 - P_R)))\}] / (|P_T - P_R| - \delta)^2$$

#### B. Non-inferior Trial

The methodology for sample size and power calculations is developed based on an exact unconditional test of non-inferiority. It may be possible to justify a wider non-inferiority margin for efficacy if the product has an advantage in some other aspect of its profile.<sup>11</sup>

$$N = [(Z_a + Z_\alpha)^2 \times \{(P_T (1 - P_T) + (P_R (1 - P_R)))\}] / (P_T - P_R - \delta)^2$$

For Example  $\delta = -0.10$ , Non-inferior margin, based on clinical relevance.

#### C. Superior Trial

A superiority trial is one where we desire to demonstrate that one treatment or intervention is better than another. The methodology for sample size and power calculations is developed based on an exact unconditional test of superiority.

$$N = [(Z_a + Z_\alpha)^2 \times \{(P_T (1 - P_T) + (P_R (1 - P_R)))\}] / (P_T - P_R - \delta)^2$$

For Example  $\delta = 0.10$ , Superiority margin, based on clinical relevance. Above formula for sample size determination published in different published articles <sup>3, 4, 7, 8, and 9</sup> Where  $N$  = sample size required in each group,  $P_T$  = proportion of subject cured by Test Drug,  $P_R$  = proportion of subject cured by Reference Drug  $Z_\alpha$ : This depends on level of significance, for 5%  $Z_\beta$ : This depends on power, for 80%.  $\delta$  = degree of difference.

**SUMMARY**

Clinical trials should have sufficient statistical power to detect difference between groups considered to be of clinical interest. In general, an increase in sample size will be caused by either decreasing the significance level  $\alpha$ , by raising the statistical power  $1-\beta$ , by demanding smaller minimum detectable differences  $\delta$  and by larger variation. A minimum necessary group size based on this consideration, however, ensures that a mean group difference  $\delta$  can be detected at the significance level  $\alpha$  with a minimum statistical power of  $1-\beta$ <sup>6</sup>

It is important to investigate the sensitivity of the sample size estimate to a variety of deviations from these assumptions and this may be facilitated by providing a range of sample sizes appropriate for a reasonable range of deviations from assumptions <sup>5</sup>.

Planning the sample size of a clinical study requires prior information. The type of prior information depends on the statistical methods which are to be used. If the desired parameters cannot be estimated, it may be desirable to perform a pilot study in advance, in order to estimate the appropriate population parameters. The sample size is one of the critical steps in planning a clinical study and any negligence in its estimation may lead to rejection of an efficacious drug and an ineffective drug may get approval<sup>2</sup>. If there is no sample size planned, this indicates that the quality of the study is poor.<sup>10</sup>

**Key Messages**<sup>10</sup>

- Sample size planning is an essential step in the performance of clinical studies.

- Sample size planning requires the expert knowledge of clinicians or physicians, who provide an estimate of the relevant effect.
- Sample size planning depends on the planned method of statistical evaluation and thus on the medical question to be answered.
- The chances of success in a clinical study and the quality of the research results are highly dependent on sample size planning.
- Sample size planning should always be carried out in collaboration with an expert statistician or biometrician

**SAS Procedure for Estimation of Sample Size:** To test the responses of two binary variables, we used TWOSAMPLEFREQ statement in Proc Power for estimation of sample size. In Proc Power we have several statements.<sup>13</sup>:

**Title2 "SAS Program of Sample Size of Non-Inferiority Trial";**

```
Proc Power ;
TwoSampleFreq
Test = PChi
Sides = U
Alpha = 0.05
NullProportionDiff = -.10 /* Margin*/
ProportionDiff = 0.10 /* Difference of corresponds to
responses between group */
RefProportion = 0.65 /* proportion for Reference group
A */
Power = 0.80
Ntotal = .
Run ;
```

**Title2 "SAS Program of Sample Size of Superiority Trial";**

```
Proc Power ;
TwoSampleFreq
Test = PChi
Sides = U
Alpha = 0.05
NullProportionDiff = .10 /* Margin*/
ProportionDiff = 0.20 /* Difference of corresponds to
responses between group */
RefProportion = 0.65 /* proportion for Reference group
A */
Power = 0.80
Ntotal = .
Run ;
```



**Table 1: QC Program- Sample Size of Non-Inferiority Trial**

```

Data Sample ;
MARGIN = -0.10;
PT = 0.85;
PR = 0.65;
ZALPHA = 1.64;
ZBETA = 0.84;
POWER = 80 ;
ARM = 2 ;
DROPOUT = 60 ;
run;

Data SS ;
Set Sample ;
Denom = (PT-PR)- (margin) ;
Denom1 = Denom*Denom ;
Zstatistic = (Zalpha+Zbeta)**2 ;
SS1 = PT*(1-PT)+ PR*(1-PR);
SS2 = Zstatistic* SS1 ;
SS3 = SS2/Denom1 ;
SS = SS3*ARM ;
SSFINAL = (SS*(DROPOUT/100)+SS);
run;

Proc Print data = SS ;
Var PT PR MARGIN POWER SS SSFINAL ;
Format SS SSFINAL 10.0 ;
Label PT = 'Efficacy Rate of Test Product' ;
Label PR = 'Efficacy Rate of Reference Product' ;
Label MARGIN = 'Non-Inferiority Margin';
Label POWER = 'Power of Study' ;
Label SS = 'Sample Size Without Drop-out Rate ' ;
Label SSFINAL = 'Sample Size Including Drop-out Rate' ;
run;

```

**Table 2: QC Program- Sample Size of Superiority Trial**

```

Data Sample ;
MARGIN = 0.10;
PT = 0.85;
PR = 0.65;
ZALPHA = 1.64;
ZBETA = 0.84;
POWER = 80 ;
ARM = 2 ;
DROPOUT = 60 ;
run;

Data SS ;
Set Sample ;
Denom = (PT-PR)- (margin) ;
Denom1 = Denom*Denom ;
Zstatistic = (Zalpha+Zbeta)**2 ;
SS1 = PT*(1-PT)+ PR*(1-PR);
SS2 = Zstatistic* SS1 ;
SS3 = SS2/Denom1 ;
SS = SS3*ARM ;
SSFINAL = (SS*(DROPOUT/100)+SS);
run;

Proc Print data = SS ;
Var PT PR MARGIN POWER SS SSFINAL ;
Format SS SSFINAL 10.0 ;
Label PT = 'Efficacy Rate of Test Product' ;
Label PR = 'Efficacy Rate of Reference Product' ;
Label MARGIN = 'Superiority Margin';
Label POWER = 'Power of Study' ;
Label SS = 'Sample Size Without Drop-out Rate ' ;
Label SSFINAL = 'Sample Size Including Drop-out Rate' ;
run;

```

**Acknowledgement:** We have taken efforts in this research paper. However, it would not have been possible without the kind support and help of Fortis Clinical Research LTD. I would like to extend my sincere thanks to all of them.

**Conflicting Interest:** There is no conflict of interest assign with this article.

**Source of Funding:** We did not need financial support from any agency to make this article

**Ethical Clearance:** The article is under review category and any human or animal subject are not involve in this research hence there is nix function of ethics committee however we have clearance from internal committee.

### REFERENCES

1. Shein-Shung C, Jun S, Hansheng W. Sample Size Calculation in Clinical Trial. New York: Marcel Dekker Inc; 2003. Chapter 1, page 11, section 1.2.3.
2. Tushar Vijay Sakpal Sample Size Estimation in Clinical Trial, *Perspect Clin Res*, v.1(2); Apr,Jun 2010
3. Lehana Thabane, Sample Size Determination in Clinical Trials *HRM-733 Class Notes*
4. Pamela J. Atherton Skaff, Sloan, Mayo Clinic, Rochester, MN 55905, Design and Analysis of Equivalence Clinical Trials Via the SAS® System, SAS.
5. ICH E 9 Statistical Principles for Clinical Trials.
6. KP Suresh, S.Chandrashekar, Sample Size Estimation and Power Analysis for Clinical Research Study: *Journal of Human Reproductive Science/volume 5*.
7. Laura Lee Johnson, Ph.D, Sample Size and Power, Presentation, National Center for Complementary and Alternative Medicine in NIH USA
8. Lihong Qi, Division of Biostatistics, EPP 246 Clinical Biostatistics, Lecture 3, Jan 19, 2007
9. F Krummenauer, B Dick, O Schwenn, and N Pfeiffer, The determination of sample size in controlled clinical trials in ophthalmology, *Br J Ophthalmol*. 2002 September; 86(9): 946-947.
10. Bernd Röhrig, Dr. rer. nat., Jean-Baptist du Prel, Dr. med. MPH, Daniel Wachtlin, Dipl.-Kfm., Robert Kwiecien, Dr. rer. nat., and Maria Blettner, Prof. Dr. rer. nat. Sample Size Calculation in Clinical Trials, *Dtsch Arztebl Int* v.107(31-32); Aug 2010.
11. Committee For Medicinal Products For Human Use: Guideline On The Choice Of The Non-Inferiority Margin.
12. Emmanuel Lesaffre, Dr.Sc., Superiority, Equivalence, and Non-Inferiority Trials: *Bulletin of the NYU Hospital for Joint Diseases* 2008;66(2):150-4
13. Proc Power: The Power Procedure (Experimental) Chapter-56

# Assessment of Supplementary Nutritional Programme in Anganwadi Centre of Kolar District, Karnataka State

Nagaraja G M<sup>1</sup>, Ravishankar S<sup>2</sup>, Anil NS<sup>3</sup>, Muninarayana C<sup>4</sup>

<sup>1</sup>Asst. Professor in Sociology, <sup>2</sup>Asst. Professor in Statistics, <sup>3</sup>Associate Professor, <sup>4</sup>Professor, Department of Community Medicine, SDUMC, Tamaka, Kolar

## ABSTRACT

Poor Health nutrition may impair both the growth and intellectual development of children, Parent's expectation and their satisfaction regarding food supply, to fulfill the needs of children and lactating mothers.

**Objectives:** The study supplementary nutrition services provided under ICDS, the study was undertaken to find out parents expectation, Anganwadi workers and their satisfactory regarding the food supply to the Anganwadi center.

**Design:** The study was carried out at ICDS Mulbagal project area Dec 1999to Jan2000.

**Method:** The study was observational in nature through interview of the parents of Anganwadi going child. The beneficiaries were contacted and interviewed by trained doctors with the help of pretested and semi structured questionnaire.

**Results:** 14(37.83) Anganwadi workers express that there was an interruption in food supply; the reasons are lorry strike, fraud in weightage, old stock or bad smell and below average. The quality of rice supplied and if no fire wood, Anganwadi worker distribute powder to children, children will eat and get stomach pain, and parents would not send children to Anganwadi center. Very late, administrative lapse, fraud in weightage of bags and also there to check the food articles. Anganwadi workers strongly agree that the quality of food was very poor and low quality.

**Keywords:** AWW, Beneficiaries, Quality of Food Supply, Fraud, ICDS

## INTRODUCTION

William words worth said that The Child , is father of the man, what he obviously meant was that the productiveness of an adult depends on the opportunities he has to grow and develop as a child, from this follows that ultimately the quality of a nation depends on the attention it pays to its children. Our Prime Minister went beyond regarding children as national asset, describing them as a potential cementing force in the world given by blinkered jingoism. To quote him children are one, the world over and could become a unifying failure, world that is torn apart by narrow nationalism. Children are a reminder that man is immortal although men may be

mortal. A nation realizes its potentialities through children and is judged by what it does for children. Protecting the physical and mental development of the children is the most important of all investments in the social and economic development of our societies.

National policy on child development, government of India launched the integrated child development services which have a comprehensive approach for all round development of child up to school going age, the scheme was initiated on 2<sup>nd</sup> October 1975<sup>1</sup>. The programme provides a package of service facilities like supplementary nutrition, Vitamin-A, Iron and Folic acid tablets, Immunization, health checkups, treatment of minor ailments, referral services, non-formal pre-

school education, health and nutrition to mothers. Preschool education to children 3 to 6 years old and convergence of other supportive health services like water, sanitation, under nutrition among preschool children is an important public health problem in rural India; however there exists scanty information of the prevalence of under nutrition among preschool children in India <sup>2</sup>.

## OBJECTIVES

The study of supplementary nutrition service provided under ICDS, The study was undertaken to find out parents expectation, Anganwadi workers and their satisfactory regarding the food supply to the Anganwadi Center.

## MATERIALS

The study was observational in nature through interview of the parents of Anganwadi going child, beneficiaries and their opinion of the food supply to the Anganwadi Centre from December 1999 to January 2000. The study population comprised of the beneficiaries multi stage sampling was adopted, out of five Taluks of Kolar district Mulbagal Taluk was a total of 369 Anganwadi centers, a total of 37 Anganwadi Centers in 40 Villages were randomly selected for the study. Situated in the field practice area of Department of Community Medicine of Sri Devaraj Urs Medical College Kolar, Karanataka, and South India.

The beneficiaries were contacted and interviewed by trained doctors with the help of pretested and semi-structured questionnaire. The profile of the beneficiaries such as socio demographic data, periodical supply of quality food items, interruption in the supply of food items to the Anganwadi Centre, reasons of interruption and satisfaction of Anganwadi center was collected.

**Table 1(a): Socio-demographic profile of beneficiaries (parents):**

Sl No	Caste	No.	%
1	Hindu Upper caste	5	2.23
2	Hindu Intermediary caste	105	46.87
3	Hindu Lower Caste	6	2.67
4	SC, ST	91	40.63
5	Muslims	6	2.67
6	Converted Christians	2	0.9
	Total	224	100.00

1	Profession	0	0.00
2	Semi profession	2	0.9
3	Clerical/ Shop owner / Farmer	130	58.03
4	Skilled Worker	8	3.57
5	Semiskilled Worker	3	1.34
6	Unskilled Worker	3	1.34
7	Unemployed	78	34.82
	Total	224	100.00

**Table 1 (c): BG Prasad Socio-economic class**

1	₹. 3653	10	4.46
2	3652-1826	3	1.34
3	1825-1096	6	2.67
4	1095-548	18	8.03
5	< 547	187	83.48
	Total	224	100.00

**Table 1 (d): Family type**

1	Nuclear Family	137	61.16
2	Joint Family	87	38.84
	Total	224	100.00

**Table 1 (e): Educational background of the parents**

SL No	Status	Father	Mother
1	Illiterates	128(57.14)	161(71.87)
2	Literate without schooling	6(2.67)	9(4.01)
3	Primary	19(8.48)	12(5.35)
4	Middle	16(7.14)	15(6.69)
5	High School	42(18.75)	27(12.05)
6	PUC/Diploma	11(4.91)	0
7	Graduates	1(0.44)	0
8	P G	10(4.46)	0
	Total	224	224

**Table 2: Periodical supply of food items in the last six months (37Anganwadi workers respond)**

Sl. No	No items	Total No	%
1	One time	1	0.44
2	Two times	1	0.44
3	Three time	5	2.23
4	Four times	5	2.23
5	Five times	7	3.12
6	Six times	15	6.69
7	No supply	3	1.33
	Total	37	100.00

## RESULTS

The above table expressed the views of 37 Anganwadi workers represents the number of times food was supplied during the last six months. The Anganwadi workers say that within six months 2 times

the food was supplied by contractors, 5 Anganwadi workers says that only three times, 7 respondents says that five times the food was supplied within six months.

15 Anganwadi workers says that every month regularly the food was supplied in time, 3 Anganwadi worker says that there was no food supply in the last six month period. It was observed that the functioning of Anganwadi is very irregular leading to irregular distribution of supplementary nutrition<sup>4</sup>. Therefore, if the nutrition supplementation activity of ICDS is properly maintained along with nutrition educators, a reduction in the nutritional deficiency disorders could be achieved.

The main problems faced by A.W.W in giving supplementary nutrition were procurement of food articles delay and distributions of food at the Anganwadis<sup>5</sup>. According to A.W.W. the staff itself demands cleaned rice, Egg, Ragi, thoordhal, Mills etc. to distribute to Centre directly<sup>6</sup>.

Anganwadi workers express there is interruption in the supply food items<sup>7</sup>.

**Table 3: Interruption in the supply of food items (AWW)**

Sl. No	Supply	Total No	%
1	Yes	14	37.83
2	No	23	62.17
	Total	37	100.00

**Table 4: Reasons for Irregular supply of food (Multiple answer)**

Sl. No	Reasons	No	%
1	Due to lorry strike.	7	18.92
2	Contractors did not supply in time.	13	35.14
3	Administrative lapse.	8	21.62
4	At the time of food supply (AWW) Is absent.	1	2.70
5	Fraud in the weightage of food supply.	10	27.02
6	Only oil rice, energy food, and no other ingredients.	3	1.33
	Total	42	100.00

**Table 5(a): Quality of Food supplied to the Anganwadi center**

Sl. No	Quality of food	No	%
1	Very good	0	-
2	Good	10	27.02
3	Average	12	32.43
4	Very poor	15	40.55
Total	37	100.00	

**Table 5(b): (Multiple Answers)**

Sl. No	Food items	No.	%
1	Rice Bath	34	91.81
2	Energy food	32	86.48
3	Sweet Pongal	02	5.41

**Table 5(c): Ingredients used in the preparation of food items (Multiple Answers)**

Sl. No	Ingredients	No's	%
1	Rice, Oil, Salt, Chilly, muster seeds, onion	33	89.18
2	Gram dhal, Jaggery	1	2.70

**Table 5(d): Community perception**

Sl. No	Advantages	Total	%
1	Children attend the A.W.C regularly	11	29.72
2	Mental development of the children	13	35.13
3	Poor children get good food	16	43.24
4	To avoid malnourishment problem among children	14	37.83

**Table 5 (e): Community's opinion**

Sl. No	Difficulties	Total	%
1	Low quality of food supply at A.W.C.S.	1	0.44
2	Not properly boiled the rice or energy food	2	0.89
3	Well to do children also taking food from the A.W.C.	4	1.78
4	Food items became unusable due to over storage in the god owns	2	0.89
5	Needy children's don't get the supplementary nutrition's food	3	1.33

Table 3 Shows that the 14 (37.83) Anganwadi workers say that there was an interruption and insufficient in food supply. the reasons are The table5, shows that the 7 (18.92) Anganwadi workers says that due to lorry strike the food supply was very late, during that time some days, Anganwadi Centre may closed 13 (35.13) Anganwadi workers respond that contractors did not supply the food in time, 8 respondents response that there is administrative lapse also there to check the food articles.one Anganwadi worker says that at the time food supply Anganwadi worker is not in the Centre or may be absent<sup>3</sup>.

According to Anganwadi workers views that frauds in the weightage of food supply, rice, Thurdhal and Jaggery are old stock 6(16.21). 3(8.10) Anganwadi workers express only oil, rice and energy food but no other Ingredients. 4 respondents say that delay of food



supply to the center at least 15 days to 20 days minimum. An Assessment says that in 91 (73.4%) A.W. Centers food was available only 250 days, in 25 (20.2%) centers it was available only 150-200 days and is the remaining 8 (6.4%) centers it was available for less than 150 days. The food shortage or late supply of food is common<sup>7</sup>.

10(27.07) Anganwadi workers express that the quality of food is average. 15 (40%) AWW strongly agree that the quality of food was very poor and low. The above statement said that below average and poor quality of food was supplied to the Anganwadi Centre. Type of food, Food items prepared and provided to the beneficiaries at Anganwadi Centre in the last one month<sup>8</sup>.

The above table 4 says various food items distributed to the beneficiaries at Anganwadi Centre in the last one month, (34+32) respondent express that most of the time the rice bath and energy food will be gives to beneficiaries always without ingredients, few days the sweet pongal will be distributed. The above table shows that only few Anganwadi centers 33 (89.18) used side ingredient for preparing food items called rice, oil, salt, Chilly, muster seeds, and onion not gram dhal and jaggery boiled and given to the beneficiaries. 17 Anganwadi workers directly allow the beneficiaries to take food to the home because of fuel problem, when the food is not prepared, 20 Anganwadi workers says that food will not be sent to home, all beneficiaries including mothers and children will eat food in the Anganwadi center only.

11 Anganwadi workers describe that if regular food supplies to the A.W center the children attend regularly, advantage of the providing supplementary nutrition food it gives Physical and mental development of the children. 16 A.W.W. express that the poor children also get good food. 14 Anganwadi workers say that supplementary nutrition is very important to avoid malnourishment problem among below poverty line children. 8(21.62) AWW expressed various reasons about the disadvantages of using the special nutrition food. 1(2.70) respondent express middle man or food contractors brought the ration to the center it may be dirty or old stock etc. The Anganwadi workers are preparing the food; children will eat and may be food poison. The next day the parents will not sent children to the center and bad impression on Anganwadi Centre 2(5.40) respondents says that not properly boiled the rice and energy food lack of fire stick or kerosene, the community will not provide fuel. 4 respondents say that economically

dominant community children also taking food from the Anganwadi Centre.

## DISCUSSION

Catch them young is the proverb for inculcating the appropriate characteristics in children as early childhood in the period of rapid growth and development. The facilities of Childs physical, mental, emotional and social development are all at their peak growing curve in the first 5 years of the child's life span. The period is more commonly known as the preschool years, the most formative stage and therefore the nation at policy on education and has placed high priority on early childhood care and education and has emphasized on its integration into ICDS programme. There, pre-school education has become an important intervention in programmes for pre-school children; ICDS is the largest programme of early childhood development with non-formal pre-school education as its most important social component. It not only emphasizes on all round development of the child

Only a few research studies have been conducted in relation to pre-school education and child development in ICDS blocks. One of the reasons may be that it is comparatively difficult to assess the psychosocial development of children. However, the studies related to the subject have indicated improvement in the educational and developmental states of children in ICDS areas.

The role of pre-school education in improving scholastic performance was reflected in the study<sup>3</sup>. It was observed the pre-school education resulted in higher enrollment as two percent enrolled in the primary school. The enrolment of male children and there from higher castes was slightly better than female children and there from lower castes. Once in school, the majority of these children were well adjusted as compared to other children<sup>8</sup>.

Pre-school education also brings about as improvement in the various interrelated dimensions of child development such as social, emotional and cognitive development. Although there is some evidence to show that malnutrition hampers cognitive development, yet it is difficult to determine the extent of its adverse effects. The age group 3-5 years, there were significant difference between cognitive and language abilities and anthropometric measurements of children, such as weight, height, mid arm circumference and head circumference<sup>8</sup>, reported that

the cognitive abilities of children could be improved with intervention programmes. Cognitive and social development of urban was comparatively better than that of rural children and it was related to variables like educational and occupational levels of the parents<sup>9</sup>.

Play has its own importance in the life of a child. It enhances physical, intellectual emotional, social, aesthetic, motor language and attitudinal development. It is through play that children learn to explore construct, create and also destroy<sup>10</sup>.

### CONCLUSION

To sum up, it can be said that non-formal pre-school education, a crucial component of ICDS has improved the enrolment and scholastic performance of children and has had positive impact on their cognitive and language development. It strengthened; it can help in reaching children from the most vulnerable section of society and enhance their all-round development objectivity and health care of the pre-school child.

### ACKNOWLEDGMENT

1. Anganwadi teachers of Kolar district, for providing valuable facts
2. Child Development Project Officer, Kolar district, for providing technical support
3. Interns of department of community medicine, Sri Devaraj Urs Medical College

**Conflict of Interest:** Nil

**Source of Funding Agency:** Nil

**Ethical Clearance:** Taken

### REFERENCES

1. Sachdev AVSM. Neeru Gandhi, Tondon BN. Krishnamurthy KS. 1995: Integrated child Development services scheme and Nutritional status of Indian children. Journal of tropical medicine 41:123-128.
2. Biswas k. Bose, A Mukhopadhyay 2009. High prevalence of stunting among integrated child development service ICDS scheme children aged 1 years of Chapara block Naiad district West Bengal, The internet Journal of Biological anthropology Vol 3 No.2.
3. Sunder Lal Rajesh Kumar 1985 Mothers reaction to the services of Integrated child development services scheme. Journal of Health and population 8(2); 117 -122.
4. Garg Singh, Bhatnagar, Chopra 1997, Nutritional Status of children (1-yrs) in slums of Ghaziabad city. Indian Journal of community Medicine 2.xx11 April-june
5. Shanker Prinja Ramesh Verma, Sundar Lal 2008 Role of ICDS Programme in delivery of nutritional services and functional integration between Anganwadi and health worker in north India. The internet journal of nutrition and wellness vol5no2.
6. Aswini Kumar, veena G Kamath Asha kamath, chythra R Rao, Sanjay Pattanashetty 2010. Nutritional status assessment of under-five beneficiaries of Integrated child development services programme in rural Karnataka, Australian Medical Journal (online)
7. Michele Gagnolati, Crayn Bredenkamp, Monica DasGupta, YKyoung Lee Meera Sheka 2006: ICDS and persistent under nutrition strategies to enhance the impact, Economic and Political weekly 1193-1201.
8. Sukhadeo Thorat Nidhi Sadana 2009, Discrimination and children's nutritional status in India, Institute of Development Studies Bulletin vol40-no4.
9. Barun Kanji Lal, Papiya G Muzumdar, Moumita Mukherjee Hafizur Rahaman 2010. Nutritional Status of Children in India; Household Socioeconomic condition the contextual determinant. International journal of Equity in Health 9-19.
10. Samridhi Arora, Shaveta Bharathi, Arti Mahajan 2006. Evaluation of Non-formal preschool educational services provided at Anganwadi centers (urban slums of Jammu city) Journal of social science, 12(2)135-137.

# Oral Health Care and Dental Caries Experience among 9-14 Year Old Children in Mangalore

Bhagat TK<sup>1</sup>, Rao A<sup>2</sup>, Shenoy R<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Community Dentistry, B. P. Koirala Institute of Health Sciences, Dharan,

<sup>2</sup>Professor and Head, <sup>3</sup>Associate Professor, Department of Public Health Dentistry, Manipal College of Dental Sciences, Mangalore, Manipal University

## ABSTRACT

**Objective:** To determine the oral health care and dental caries experience among 9-14 year old school going children in Mangalore

**Materials and method:** The study was conducted among 532 school going children aged 9-14 years. A questionnaire regarding snacking and other oral habits of the children as well as oral health knowledge of parents, to be filled in by the parents, was given after the clinical oral examination of the children.

**Results:** The mean number of permanent "decayed teeth (DT)" was  $0.53 \pm 1.08$  and "filled teeth (FT)" was  $0.27 \pm 0.78$  whereas the mean number of deciduous "decayed teeth (dt)" was  $0.71 \pm 1.31$  and "filled teeth (ft)" was  $0.14 \pm 0.54$ . The mean "DMFT" was  $0.79 \pm 1.27$  and mean "dft" was  $0.87 \pm 1.47$ . Knowledge of parents regarding role of fluoride in toothpaste and the dental caries experience of their children was found to be statistically significant.

**Conclusion:** Most of the parents had good knowledge regarding oral health as well as the oral health practice of their children. Although the relationship between the parents knowledge and their children's oral health was not statistically significant, dental caries experience was low.

**Keywords:** Oral Health, Dental Caries, School Children

## INTRODUCTION

Dental caries is a lifetime disease, with highest risk group between 11–14 years of age. Environmental factors such as culture, socioeconomic status, life style and dietary pattern can have a great impact on caries-resistance or development.<sup>1</sup> Oral diseases are considered a public health problem due to their high prevalence and significant social impact. Dental caries is a very frequent oral disease which may be prevented by acting on its basic causes, cariogenic diet and poor oral hygiene. In the last 50 years, the epidemiological profile of dental caries has changed as a result of oral health promotion programmes, as well as increased use of fluoridated toothpastes. Oral health knowledge, attitude and practice has been directly related to reduction in caries and tooth extractions.<sup>2</sup>

Knowledge, attitudes, and beliefs have been mentioned as factors that precede health behavior. Among adolescents, favorable self-reported oral

health-related attitudes have been found to be associated with favorable self-reported oral health behavior; and unfavorable oral health-related knowledge has been associated with unfavorable self-reported oral health behavior. With regard to sugar consumption, however, some studies have suggested that among adolescents, total sugar consumption and dental caries are either not associated or are at best only loosely associated. Parental and other family characteristics also influence health-related behavior and oral health. Children's poor oral health has been found to be associated with low socio-economic status of the family and parents' poor oral health-related behaviors. In addition, parent's health-related attitudes, knowledge, and health have been found to influence children's oral health behavior and oral health.<sup>3</sup>

Many industrialized countries have experienced a decline in dental caries prevalence among children over the past decades. This trend of caries reduction

may be ascribed to several factors of which the most important are improved oral hygiene, a more sensible approach to sugar consumption, effective use of fluorides, and school-based preventive programmes. Against this, increasing levels of dental caries have been found in some developing countries; especially for those countries where preventive programmes have not been established.<sup>4</sup>

### AIM

To determine the oral health care and dental caries experience among 9-14 year old school children in Mangalore.

### MATERIALS AND METHOD

It was a descriptive cross-sectional study which included students from the private schools of Mangalore. Convenience sample of 600 was taken.

#### a) Selection of children

Out of six hundred school children aged 9-14 years 532 children who got the questionnaires duly filled by their parents were included in the study. Others were not included in the study but checkup and referral for treatment was done whenever necessary.

#### b) Clinical examination

Examination of children was carried out in the schools. Permission from the schools and written informed consent was taken from the parents. The clinical examination was carried out under natural light aided by flashlight with the help of a mouth mirror and probe. Dental caries was diagnosed visually at the cavitation level. Radiographs were not taken. Calibration of the examiner was done in the school by examining 50 students. Intra-examiner reliability was calculated after re-examining 20% of the children. Kappa statistic was obtained at 0.8.

#### c) Questionnaire

A questionnaire, to be filled in by the parents, was given to the children after the clinical examination. It contained questions regarding snacking and other oral habits of their children as well as oral health knowledge of parents. The completed questionnaires were collected on the following day. The response rate was 88.66%.

#### d) Statistical analysis

Statistical Package for Social Sciences version 11.5 was used to record the data in the computer. Chi square test was used to determine the correlation. Level of significance was taken as  $p \leq 0.05$ .

### RESULTS

**Table 1: Questionnaire and responses with frequency and percentage**

Characteristic	Frequency	Percentage
Age group		
9-10 years	201	37.38
11-12 years	319	59.96
13-14 years	12	2.26
<b>Q1. How often does your child take snacks in-between meals?</b>		
Do not take	175	32.90
Once	245	46.05
Twice	107	20.11
>2 times	5	0.94
<b>Q2. Does your child rinse his/her mouth after every meal?</b>		
Yes	451	84.78
No	34	6.39
Rarely	47	8.83
<b>Q3. How many times does your child brush his/her teeth?</b>		
Once in the morning	180	33.84
Once at night	4	0.75
Twice a day	339	63.72
Thrice a day	9	1.69
<b>Q4. How long does her child brush his/her teeth?</b>		
2 minutes	230	43.23
5 minutes	272	51.13
10 minutes	30	5.64
<b>Q5. What material is used to clean your child's teeth?</b>		
Toothpaste	527	99.06
Toothpowder	4	0.76
Charcoal	-	-
Salt	1	0.18
Ash	-	-
<b>Q6. Sugar food should be eaten.....</b>		
At meal times	147	27.63
In-between meal times	118	22.18
Anytime	159	29.89
Don't know	108	20.3
<b>Q7. What is the role of fluoride in toothpaste?</b>		
Prevents bad breath	72	13.52
Prevents gum diseases	45	8.45
Prevents tooth decay	318	59.77
Don't know	97	18.23
Prevents bad breath	72	13.52

The total number of 9-10 years old children was 210, 11-12 years old was 319 while 12 children were



13-14 years old. Nearly 47 % of the children had snacks in-between meals, 84.47% the children rinsed their mouth after every meal, and 40 % of the children brushed their teeth twice a day. Majority (56.76%) of the children brushed their teeth for 5 minutes followed by 43.28% who brushed their teeth for 2 minutes. Almost all (99.06 %) children used toothpaste for cleaning their teeth. Regarding sugar food, only 27.63% consumed at meal times, 22.18% consumed in-between meal times, 29.88% consumed anytime and 20.30% said don't know. Most (59.77%) of the parents knew about the role of fluoride in toothpaste. It was observed that 27.8% of the children had decayed

permanent teeth and 33.8% had decayed deciduous teeth. Fifteen percent of the children had one or more filled permanent teeth compared to 8.5% of the children who had filled deciduous teeth. The mean number of permanent "decayed teeth (DT)" was  $0.53 \pm 1.08$  and "filled teeth (FT)" was  $0.27 \pm 0.78$ . In deciduous dentition the mean number of "decayed teeth (dt)" was  $0.71 \pm 1.31$  and "filled teeth (ft)" was  $0.14 \pm 0.54$ . The mean "DMFT" was  $0.79 \pm 1.27$  and mean "dft" was  $0.87 \pm 1.47$ . When the knowledge of parents was compared with the caries experience of their children, it was found to be significant in relation to the role of fluoride (Table2).

**Table2: Correlation between oral health knowledge, practice and corresponding DMFT value**

	Sugar food	Snacks in-between meals	Rinse mouth after meals	Brushing frequency	Brushing duration	Material used for brushing	Role of fluoride in toothpaste
$\chi^2$ value (DMFT)	21.76	18.20	20.84	25.69	13.04	14.85	34.87
p value (DMFT)	0.41	0.92	0.10	0.21	0.52	0.38	0.02

## DISCUSSION

Parents are a child's primary source of information about oral health. Parents' practice of oral hygiene as well as their knowledge of oral health is reflected in their children.<sup>5</sup> The importance of parents' knowledge has been supported by the fact that these children had a very low DMFT/dft. The results showed that majority of children were caries free. Among the children having caries, only 27.8% had decayed permanent teeth whereas 33.8% had decayed deciduous teeth which was very less compared to 87.62% in the study by *Rehman et al*<sup>1</sup> and *Mahejabeen et al*.<sup>6</sup> This may be attributed to the widespread and frequent use of fluoride toothpaste. Filled permanent teeth were found in 15% of children and filled deciduous teeth were seen in 8.5% children. None of the children had missing permanent teeth due to caries. The mean DMFT was  $0.79 \pm 1.27$  which was very less compared to the study by *Rehman et al*<sup>1</sup> and *Hegde et al*.<sup>5</sup> This was similar to the study by *Sayedain et al*<sup>7</sup> and *Momeni et al*.<sup>8</sup> Twice a day brushing was seen in 63.72% of the children which was similar to the study by *Rehman et al*.<sup>1</sup> *Kuusela et al*<sup>9</sup> which found considerable differences in tooth brushing frequency among children in Europe where 23-86% of the children brushed more than once a day in different countries. It was in contrast to the study by *Al-Omiri et al*<sup>10</sup> where they found 17.6% of the children brushed twice a day. Nearly 44% of the children brushed their teeth for 2 minutes which was in contrast to the study by *Al-Omiri*

*et al*<sup>10</sup> where they found 71% of the children brushing for 2 minutes. The relationship between sugar food and dental caries was not found to be statistically significant which was similar to the studies by *Burt et al*<sup>11</sup> and *Aleksejuniene et al*.<sup>12</sup> There was no statistical significant relationship between frequency of snacking which was in contrast to the study by *Rehman et al*.<sup>1</sup> It was observed that 99.06% of the children used toothpaste which was similar to the study by *Al-Omiri et al*<sup>10</sup> but in contrast to the study by *Rehman et al*<sup>1</sup> where 62% of the children used other oral hygiene aids besides toothbrush and toothpastes. Regarding the role of fluoride 59.77% of the parents gave correct response which was similar to the study by *Smyth et al*.<sup>2</sup>

## CONCLUSION

Most of the parents seem to have had good knowledge regarding oral health. They also had the knowledge about the oral health practice of their children. Although the relationship between the parents knowledge and their children's oral health was not statistically significant, dental caries was low in their children. The "DMFT" was 0.79 and "dft" was 0.87 which is well below the "WHO" as well as "Indian Oral Health Goals". Prevalence of dental caries was 61%. Hence, it can be said that oral health education of the parents is also important for better oral health of children and it should be emphasized upon by the stakeholders like government, private, NGOs and INGOs.



**Acknowledgement:** NONE

**Conflict of Interest:** NONE

**Source of Funding:** NONE

**Ethical Clearance:** Ethical clearance was obtained from the Institutional Ethics Committee

#### REFERENCES

1. Rehman MM, Mahmood N, Rehman B. The relationship of caries with oral hygiene status and extra-oral risk factors. *J Ayub Med Coll Abbottabad* 2008; 20(1); 103-108.
2. Smyth E, Caamaño F, Riveiro PF. Oral health knowledge, attitudes and practice in 12-year-old schoolchildren. *Med Oral Patol Oral Cir Bucal* 2007 Dec 1; 12(8):E614-20.
3. Poutanen R, Lahti S, Seppa L, Tolvanen M, Hausen H. Oral health-related knowledge, attitudes, behavior, and family characteristics among Finnish schoolchildren with and without active initial caries lesions, *Acta Odontol Scand* 2007; 65: 87-96
4. Peterson PE. Dental caries and oral health behaviour situation of children, mothers and school teachers in Wuhan, People's Republic of China; *Intl Dent J* 1998; 48: 210-216.
5. Hedge PP, Ashok Kumar BR, Ankola VA. Dental caries experience and salivary levels of *Streptococcus mutans* and *lactobacilli* in 13-15 years old children of Belgaum city, Karnataka. *J Indian Soc Prev dent* 2005; 23(1): 23-6.
6. Mahejabeen R., Sudha P., Kulkarni S. S., Anegundi R. Dental caries prevalence among preschool children of Hubli: Dharwad city; *J Indian Soc Pedod Prev Dent* - March 2006; 19-22.
7. Seyedein M, Zali MR, Golpaigani MV, Yazdani H, Nourhalouchi S. Oral health survey in 12-year-old children in the Islamic Republic of Iran (1993-1994). *Eastern Mediterranean Health J* 1998; 4 (2): 338-42.
8. Momeni A, Mardi M, Pieper K. Caries Prevalence and Treatment Needs of 12-year-old Children in the Islamic Republic of Iran. *Med Princ Pract* 2006; 15: 24-8.
9. Kuusela S, Honkala E, Kannas L, Tynlala J, Wold B. Oral Hygiene habits of 11-year-old Schoolchildren in 22 European Countries and Canada in 1993/1994. *J Dent Res* 1997; 76 (9): 1602-1609.
10. Al-Omiri MK, Al-Wahadni AM, Saeed KN. Oral Health Attitudes, Knowledge, and Behavior Among School Children in North Jordan. *Journal of Dental Education* 2006; 70(2); 179-187.
11. Burt B, Szpunar S. The Michigan study: the relationship between sugar intake and dental caries over 3 years. *Int Dent J* 1994; 44: 230-40.
12. Aleksejuniene J, Arneberg P, Eriksen H. Caries prevalence and oral hygiene in Lithuanian children and adolescents. *Acta Odontol Scand* 1996; 54: 75-80.

# Study of Opportunistic Infections in HIV Seropositive Patients Attending Government General Hospital Vijayawada

Swetha R<sup>1</sup>, J Ravikumar<sup>2</sup>, R Nageswara Rao<sup>2</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor, Department of Community Medicine, Siddhartha Medical College, Vijayawada, Andhra Pradesh

## ABSTRACT

**Introduction:** Human immunodeficiency virus (HIV) is one of the greatest challenges faced by the mankind. Since the beginning of the human immunodeficiency virus epidemic, opportunistic infections (OIs) have been recognized as common complications of HIV. Opportunistic infection cause substantial morbidity, hospitalization and shortens the survival of people with HIV infection.

**Objectives:** To study the prevalence of opportunistic infection in HIV seropositive patients. To study the factors influencing the opportunistic infection in HIV seropositive patients

**Material and Method:** A cross-sectional study was conducted in government general hospital Vijayawada from a period of August 2010 to November 2010 and 150 confirmed HIV seropositive patients were randomly selected and interviewed by using structured questionnaire. Relevant investigations like CD4 count, microbiological smears & staining, chest X-ray were carried out to confirm the opportunistic infections.

**Results** Out of 150 patients 59 (39.3%) had opportunistic infections. Most common OI was tuberculosis in 35 (59.3%) patients and second commonest infection was candidiasis in patients 20 (33.9%).

**Conclusions:** Tuberculosis was the most common opportunistic infection in the present study and CD4 counts level was significantly associated in causation of opportunistic infection.

**Keywords:** HIV, Opportunistic Infections, CD 4 Counts

## INTRODUCTION

The human immunodeficiency virus (HIV) infection leading to acquired immunodeficiency syndrome (AIDS) has now emerged as a major public health problem. In HIV-infected patients, progressive decline in their immunological response makes them susceptible to variety of common opportunistic infections.<sup>1</sup>The predominant causes of morbidity and mortality among patients with late-stage HIV infection

are opportunistic infections, i.e. severe infections induced by agents that rarely cause serious disease in immune-competent individuals.<sup>2</sup>

Some of the most common opportunistic infections include bacterial diseases such as Mycobacterium tuberculosis, Cholera, Pneumonia and septicemia (blood poisoning). Protozoan infections such as Pneumocystis carinii Pneumonia (PCP), Toxoplasmosis, Isosporiasis, Leishmaniasis and Giardiasis are associated with HIV. Common fungal infections include candidiasis, cryptococcosis. Viral infections associated with HIV/AIDS include cytomegalovirus (CMV), Herpes simplex and Herpes zoster viruses. Other opportunistic infections include HIV associated malignancies such as kaposi's sarcoma Lymphoma and squamous cell carcinoma.<sup>3</sup>

---

### Corresponding author:

Swetha R

Sridevi Nilaya, Near Manjushree Convent,  
Manjunatha Nagar, Sira, Tumkur, Karnataka- 572137  
E-mail id: drswetha226@gmail.com

The CD4+ T cell count is the laboratory test generally accepted as the best indicator of the immediate state of immunologic competence of the patient with HIV infection. This measurement can be made directly or calculated as the product of the percent of CD4+ T cells (determined by flow cytometry) and the total lymphocyte count.<sup>4</sup> A decrease in CD4+ count is responsible for the profound immunodeficiencies that lead to various opportunistic infections in HIV-infected patients.<sup>5</sup> At present, the initiation of primary prophylactic therapies for opportunistic infections is based chiefly on the absolute CD4+ count which has been shown to be an excellent predictor of the short-term overall risk of developing AIDS among HIV infected patients.<sup>6</sup>

Because of progressive decline in immune response, these patients are extremely susceptible to variety of common opportunistic infections. Therefore this study was aimed at assessing the common opportunistic infections in HIV sero positive patients.

## MATERIALS AND METHOD

A Cross-sectional study was conducted in Government general hospital Vijayawada from a period of August 2010 to November 2010. The study group consisted of subjects of either sex, more than 18 years of age with confirmed serodiagnosis of HIV. 150 HIV seropositive patients were selected by simple random method by using list of patients available in the hospital. After taking an informed consent, 150 confirmed HIV seropositive patients were interviewed by using structured questionnaire. Then depending on presenting symptoms specimens were collected which included sputum, stool, CSF and oral swab and relevant investigations like CD4 count, microbiological smears & staining, stool examination, chest X-ray were carried out to confirm the opportunistic infections. Confidentiality of the patients was maintained and ethical clearance was been taken from the institution before conducting the study.

Analysis was done by using MS excel spread sheet. Chi-square test was applied to test the significance. Statistical significance was accepted at  $P < 0.05$ .

## FINDINGS

Among 150 HIV sero-positive patients 71(47.3%) were males, 78(52.0%) were females and 1(0.7) was transgender. Majority of patients were in age group between 20-40 years (78%), 20 % were between 40-60 years and only 2% of patients were more than 60 years. Most of them were illiterates (77.3%) and married (58.7%) as shown in the table 1.

Most common route of transmission was heterosexual route in 87% and 5% of transmission was through blood transfusion, 5% attributed to male to male sexual contact and 3% did not know the route of transmission. Prevalence of opportunistic infection was 39.3%. Most common opportunistic infection was tuberculosis in 59.3% in which 14.3% had extra pulmonary tuberculosis and 85.7% had pulmonary tuberculosis. Among pulmonary tuberculosis 53.3% were smear negative and 46.7% were smear positive. Tuberculosis was common in males i.e. in 60%. Candidiasis was next common opportunistic infection in 33.9% among which 5.1% had tuberculosis and candidiasis. Other opportunistic infections included cryptosporidial diarrhea in 6.7%, herpes zoster in 3.4% and Pneumocystis Carinii Pneumonia in 1.7% of patients.

Opportunistic infections were more common among the age group less than 30 years and in females. Higher number of illiterates had opportunistic infections compared to literates. CD 4 counts less than 200/ $\mu$ l was observed in 54.7% of patients, among which 58.3 % had opportunistic infections. There was significant relationship between opportunistic infections and CD4 counts ( $p < 0.000$ ).

**Table 1. Socio demographic characteristics of HIV seropositive patients**

Variable	Number (%)
<b>Age</b>	
20-40 yrs	117(78)
40-60yrs	30(20)
60-80yrs	3(2)
<b>Sex</b>	
Males	71(47.3)
Females	78(52.0)
Transgender	1(0.7)
<b>Education</b>	
Literates	34(22.7)
Illiterates	116(77.3)
<b>Occupation</b>	
Employed	124 (82.7)
Unemployed	26(17.3)
<b>Income</b>	
Above poverty line	48(32.0)
Below poverty line	102(68.0)
<b>Marital status</b>	
Married	88(58.7)
Divorced	23(15.3)
Widow	34(22.7)
Single	5(3.3)

**Table 2. Prevalence of opportunistic infections**

Opportunistic infection	Number	Percentage
Tuberculosis	32	54.2
Candidiasis	17	28.8
TB & Candidiasis	3	5.1
Cryptosporidial Diarrhea	4	6.7
Herpes zoster	2	3.4
PCP	1	1.7
Total	59	100

**Table 3. Relationship between CD4 count & opportunistic infections**

CD4 count	OI present No (%)	OI absent No (%)	Total No (%)
<200	48(58.5)	34(41.5)	82(100)
>200	11(16.2)	57(83.8)	68(100)
Total	59(39.3)	91(60.7)	150(100)

Chi - square = 27.95 df = 1 p = 0.0000001

## DISCUSSION

In the present study majority of the patients were between 20-40 years of age group, these findings were consistent with other study results.<sup>7-10</sup> Most common route of transmission was heterosexual route in 87% similar to other Indian studies<sup>7-9, 11</sup> were as in United States 49% of them attributed to male to male sexual contact this may be due to fact that homosexuality is not culturally accepted in India and hence homosexuals will not disclose their sexual preference.<sup>4</sup>

Prevalence of opportunistic infection in our study was 39.3% which was lower compared to other studies this may be due to increased awareness among the patients.<sup>3,7,8</sup> Tuberculosis was the most common type of opportunistic infection observed in this study in 59.3% patients this may be because of the fact that tuberculosis is the most common infectious disease in India and patients with HIV and TB rapidly downgrade with high mortality and multidrug resistance.<sup>7,8</sup> Similar results were observed in other studies.<sup>7,12,8</sup> In Sharma.S et al<sup>9</sup> study done in Nepal and Singh.A et al<sup>13</sup> study most common opportunistic infection was candidiasis and Saidu.A et al<sup>3</sup> found sexually transmitted infections as the most common type of opportunistic infection. Candidiasis was the second most common opportunistic infection in our study similar to Kaur.A et al<sup>14</sup> study done in vellore. Pneumocystis carinii pneumonia was found only in 1.7% of patients this may be due to initiation of trimethoprim-sulphamethoxazole as primary prophylaxis for PCP in patients CD4 count less than 200/ $\mu$ l. Higher rate of Pneumocystis carinii

pneumonia was found by other studies.<sup>8,13,15</sup> In our study CD 4 counts less than 200/ $\mu$ l was observed in 54.7% of patients were as in Takalkar et al<sup>8</sup> study 46.3% of patients and in Tej.D et al<sup>16</sup> study 66.3% of patients were with < 200/ $\mu$ l CD4 counts. There was significant association between CD4 counts and the appearance of opportunistic infection in our study. Sharma.S et al<sup>9</sup> found Significant relationship between low CD4 count (<200/ $\mu$ l) and the appearance of oral candidiasis.

## CONCLUSION

Tuberculosis was the most common opportunistic infection in our study followed by candidiasis. Less CD 4 count was significantly related in occurrence of opportunistic infections. HIV infected patients should be provided with all the necessary treatments and control measures to boost their deteriorating immune responses and improved hygienic environmental sanitation to reduce the level of opportunistic parasitic disease transmission.

**Acknowledgement:** We thank our lecturer in statistics and the postgraduates for their kind assistance in conducting this study.

**Conflict of Interest:** None

**Source of Support:** Self

## REFERENCES

1. Mulla SA, Patel MG, Vaghela G, Motala N, Desai V, Shrivastava RK. A study of opportunistic infection in HIV-seropositive patients. Indian J Community Med 2007; 32:208-209.
2. Jawez, Melnick, Adelberg. AIDS and lentiviruses. In: G.F.Brooks, J.S.Butel, S.A.Morec, editors. Medical Microbiology. 23<sup>rd</sup> edition. Boston : Mc Graw-Hill ;2004.605-660.
3. Saidu A.S, Bunza M.D.A, Abubakar.U, Adamu.T, Ladan.M. J and Fana.S.A. A survey of opportunistic infections in hiv seropositive patients attending major hospitals of Kebbi state, Nigeria. Bayero journal of pure and applied sciences 2009;2:70-74.
4. A.S.Fauci, H.C.Lane. Human immunodeficiency viral diseases. In: D.L.Lango, A.S.Fauci, D.L.Kasper, S.L.Hauser, J.L.Jamesone, J.Loscalzo, editors. Harrison's principles of internal medicine. 18<sup>th</sup> edition: Newyork: Mc Graw-Hill;2012.1506-1583.
5. Talib.V.H, Khurana.S.K, Pandey.J, Verma.S.K.

- Current concepts: Tuberculosis and HIV infection. Indian J Pathol Microbiol 1993; 36: 503–511.
6. Stein.D.S, Korvick.J.A,Vermund.S.H. CD4+ lymphocyte cell enumeration for prediction of clinical course of human immunodeficiency virus disease: a review. J Infect Dis 1992; 165: 352–363.
  7. Vajpayee.M,Kanswal.S,Seth.P,Wig.N. Spectrum of opportunistic infection and profile of CD 4 counts among AIDS patients in north India. Infection 2003;31(5):336-340.
  8. Takalker.A.A, SaiPrasad.G.S, Prasad.V.G, Madhekar.N.S. Study of Opportunistic Infections In HIV Seropositive Patients Admitted to Community Care centre (CCC), KIMS Narketpally. Biomedical Research 2012; 23(1): 139-142.
  9. Sharma.S , Dhungana.G.P, Pokhrel .B.M, Rijal.B.P. Opportunistic infections in relation to CD4 level among HIV seropositive patients from central Nepal. Nepal Med Coll J 2010;12(1):1-4.
  10. Kallol Saha, Rushna Firdaus, Poonam Santra, Jyotirmoy Pal, Arnab Roy, Mihir K Bhattacharya et al. Recent pattern of Co-infection amongst HIV seropositive individuals in tertiary care hospital, Kolkata. *Virology journal* 2011; 8:116.
  11. National AIDS Control Programme, Ministry of Health and family Welfare Government of India: country scenario: an update 2001. New Delhi, India 2001.
  12. Kong.B.N, Harwell.J.I, S uos.P, Lynen.L, Mohiuddin.S, Reinert.S, Pugantch.D. Opportunistic infections and hiv clinical disease stage among patients presenting for care in phnom penh, Cambodia. Southeast Asian J Trop Med Public Health 2007;38(1):62-68.
  13. Singh.A, Bairly.I, Shivanand .P.G. Spectrum of opportunistic infection in AIDS cases. Indian J Med Sci 2003; 57:16-21.
  14. Kaur A, Babu PG, Jacob M, Narashimha.C, Ganesh.A, Saraswathi.N.K et al. Clinical and laboratory profile of AIDS in India. J Acquir Defic Synd 1992; 5:883-91.
  15. Wadhwa.A, Kaur.R, Agarwal.S.K, Jain.S, Bhalla.P. AIDS related opportunistic mycoses seen in a tertiary care hospital in North India. Journal of Medical Microbiology 2007;56 : 1101-1106.
  16. Teja.D, Sudha.T, Lakshmi.V. Cases and pattern of mortality in HIV infected hospitalized patients in a tertiary care hospital : A fourteen year study. Indian J Med Sci 2007;61:555-561 .



# Study of Nutritional Status and Schooling among Children of Construction Workers in Bangalore City

Ashoojit Kaur Anand<sup>1</sup>, Margaret Menzil<sup>2</sup>, Puttaswamy M<sup>3</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor, Department of Community Medicine, <sup>3</sup>Assistant Professor, Biostatistics, Department of Community Medicine, Dr B. R. Ambedkar Medical College, K G Halli, Bangalore

## ABSTRACT

**Background:** Construction workers are the migratory population belonging to an unorganized sector. Their children who move along with them are exposed to various health hazards at the sites, malnutrition being the most common. Being migratory they are unable to attend regular schools and hence a large number of them are out of formal schooling system.

**Aims and Objectives:** 1. To assess the nutritional status of the children of construction workers. 2. To find out the schooling status of these children.

**Materials and method:** It was a cross sectional study of 180 children living at two construction sites in Bangalore city. A predesigned questionnaire was used to collect the data about schooling status, morbidity, immunization and anthropometric measurements.

**Results:** Of the 180 children, 56 were below the age of 5 years and 124 were in the age group of 6-15 years. Of the 124 children only 24(19.3%) of girls and 67(54%) of boys were attending school. Maximum number of children, 53 (29.5%) were suffering from upper respiratory tract infection. Of the 56 children below 5 years, 44(78.6%) were malnourished based on Gomez classification and of 124 children, 122(98.4%) were underweight as per their BMI calculations.

**Conclusion:** The number of children malnourished (78.6%) is very high as against the National figure of 48% (NFHS3) among under fives. There is a great need for mainstreaming these children in the current National Nutritional Programs to tackle the problem of malnutrition. Being a migratory population a large number of children (26%) were not attending school. Government and NGO's should have facilities for providing formal education to these children. Despite the 'Building and construction workers (Regulation of employment and conditions of service) Act, 1996, that stipulates that if more than fifty female workers are employed, rooms should be provided for use of their children, there is no system to take care of these children at construction site<sup>1</sup>. Strict legislations to improve the living conditions of construction workers and access to health care and social insurance benefits for those working in unorganized sectors needs to be emphasized. More NGO's such as 'Mobile Crèches' in Mumbai and 'Good Neighbors' in Bangalore need to concentrate on these issues and develop a public private partnership to provide regular schooling and screening with regular follow-ups, for health related issues like malnutrition.

**Keywords:** Construction Workers, Migratory, Under Fives, Malnutrition, Formal Schooling

---

## Corresponding author:

**Ashoojit Kaur Anand**

Assistant Professor  
Department of Community Medicine,  
Dr B R Ambedkar Medical College,  
K G Halli, Bangalore, Karnataka - 560045, India  
E-mail: ashoojit@gmail.com.  
Mobile : +919449164036

## INTRODUCTION

India is fast changing its face, Urbanization, being the most visible aspect. New structures are springing up on mass scale i.e. Malls, High rise building, construction of highways and Metro rail Projects etc. There is a boom in the construction industry, "but this boom is on the back of the poor and lower caste, who are building this New India."<sup>1</sup>

Construction workers build our roads, houses, work places and repair /maintain our nation's physical infrastructure. This work exposes them to conditions such as excessive hard work, heights, excavations, noise, dust, power tools and equipments, confined spaces and electricity hazards.

Lack of employment opportunities in rural India and natural disasters have drawn large number of the rural population to the cities where construction work is booming. These migrant workers are spread across the country and travel from one area of work to another, at times along with their families. They live in temporary settlements for the duration of the construction process and then move to another site or city. Being migrants they do not get registered, hence, are denied the basic government facilities.

Being unskilled and illiterates, they are vulnerable to exploitation. Being part of an unorganized sector their bargaining power is low and are subjected to injustice at the hands of the contractors and construction companies. They are paid meager wages with long working hours. Their working conditions are very poor with no or inadequate provision of safety equipment. They live with their families, which includes children, in insanitary and unsafe environments, which lack even the basic facilities of safe drinking water and toilets.

The children of these workers suffer from malnutrition, accidents and innumerable health problems. They either do not attend school or are school dropouts to help their parents take care of younger siblings, while parents are at work. This results in a large number of children being out of formal schooling system. In a survey conducted by Door Step School in parts of Pune, an estimated 40000 children at such construction sites had no access to education.<sup>2</sup> Very limited literature is available on growth and health situation of children belonging to the underprivileged section of community in India. Furthermore no data is available to compare nutritional status of these children to WHO standards.<sup>3</sup> Belonging to a migratory population, these children are not even immunized completely.

### AIMS AND OBJECTIVES

- 1) To assess the nutritional status of children of the construction workers.
- 2) To find out the schooling status of these children.

### MATERIALS AND METHOD

**STUDY DESIGN:** It was a cross sectional study conducted at two different construction sites within the Bangalore City, which was the place of temporary settlement for the workers and their families.

**STUDY PERIOD:** The study was conducted from December 2012 to Feb 2013.

**SAMPLE SIZE:** Based on the prevalence of malnutrition among the under five children, which was 48% (NFHS 3), a sample size of 180 was calculated.

**METHODOLOGY:** All the children at these two construction sites were included after taking an informed consent from the parents to collect the data for the study. Data was collected using a predesigned questionnaire. The mothers of children less than five years were asked the details about their children's illness and their immunization status. A general physical examination of all the children was taken up.

Anthropometric measurements like height and weight of children were taken. Weight was measured by standard weighing machine having an accuracy of 0.1 kg . Height was measured by standard measuring scale having an accuracy of 1 cm. BMI was used to assess the nutritional status of children above 5 years of age .For assessing the nutritional status of children less than 5 years, Gomez classification, was used. Gomez classification is based on weight retardation. It locates the child on the basis of his or her weight in comparison with a normal of the same age.<sup>3</sup>

Weight between 90 and 110%	: Normal nutritional status
Between 75 and 89%	: 1 <sup>st</sup> Degree, mild malnutrition
Between 60 and 74%	: 2 <sup>nd</sup> Degree, moderate malnutrition
Under 60%	: 3 <sup>rd</sup> Degree, severe malnutrition

**DATA ANALYSIS:** Data entry and analysis was done using statistical software EPI INFO. Percentages and chi square test was used wherever applicable.

### RESULTS

In the Study Population of 180 children; 56 were below the age of 5 years of which 26 were female children and 30 were male children. Among the 107, who were in the age group of 6-10 years, 39 were female children and 68 male children. In the age group of 11-15 years there were 16 male children and only 1

girl child. ( $\chi^2 = 9.2377, P < 0.01$ , Statistically significant) as shown in Table 1.

Of the 124 children who were above 5 years of age 24 (19.3%) of girls and 67 (54%) of boys were attending school at the time of study. There were 8 (6.5%) of girls and 9 (7.2%) of boys, who were school drop outs and an equal number of girls and boys 8 (6.5%) who had never attended school, which is statistically not significant ( $\chi^2 = 5.4509, P > 0.05$ ) as shown in Table 2.

Distribution of morbidity pattern among children of construction workers is as shown in Table 3. This shows that, among the study population, maximum number of children 29.5% (95% CI 93.3-100) were suffering from upper respiratory tract infection. Anaemia was seen among 2.3% (95% CI 30.5-34.9) children. Rickets was found among another 2.3% (95% CI 30.5-34.9) of the children belonging to the same family. There were 90 (50%) children who did not have any complaints at the time of the study, but were either underweight or malnourished.

Among the 56 children who were less than 5 years of age, 44 (78.6%) were malnourished as shown in Table 4. Of these 28 (50%) were belonging to II Degree malnutrition, 14 (25%) were in the I Degree and 2 (3.6%) were in III Degree malnutrition as per Gomez classification, as shown in Table 5. Among the 44 children who were malnourished, 21 (37.5%) are girls and 23 (41%) are boys. The 2 children who were in III Degree malnutrition were both girls, this is statistically not significant ( $\chi^2 = 0.7905, P > 0.05$ ) as shown in Table 6.

It was seen that among the 124 children (above 5 years), 122 (98.4%) of the children were underweight with a BMI of less than 18.5 & Only 2 (1.6%) were of normal weight with a BMI of 18.5- 24.9 as shown in Table 7.

Immunization status- None of the children had the immunization card with them. Among the 180 children 69 (38.33%) had only the BCG scar, of which 14 (20.2%) were children below 5 years of age. Only 20 (11.1%) of children were partially immunized with BCG, measles and OPV and these were below 5 years of age. There were 88 (48.8%), who had not received any immunization and 3 (1.6%) who had received only OPV during the Pulse Polio Program.

## DISCUSSION

This was a small observational study conducted among only 2 construction sites. But, it made us aware of the poor health status and poor schooling among the children of construction workers. It brought out the need for reforms in the present 'Building and construction workers Act, 1996' to improve education and health status of these children living on construction sites.

**Malnutrition:** Malnutrition among the children below 5 years was 78.6% which is similar to a study, which shows that 67.2% of children of construction workers were underweight and 11.9% were severely underweight<sup>3</sup>. Studies conducted by an NGO 'Mobile Crèches' also states that 70% of children living on construction sites suffer from malnutrition<sup>5</sup>.

Children belonging to 6-15 years, 98.4% were underweight; there are no similar studies in India to support this. Most of the studies assess the nutritional status of children below 5 years, making it important to have more studies involving children above 5 years. These children are left to fend for themselves at the construction sites exposing them to Hazards like accidents, dust allergies etc. Their nutritional status is neglected as they are busy taking care of younger siblings in the crèches or at home.

**Schooling Status:** There are not many studies about the schooling status of children living at construction sites. Of the 124 children above 5 years of age, 74% were attending regular schools, 13.7% had dropped out of school for reasons like, frequent migration and to take care of younger siblings. There were 13% of children who had never attended school. Though this was statistically not significant, it was a matter of concern when the Government of India (MDG 2015) has made primary education for children up to 14 Years compulsory and free we still have a large number of children who have never been to a school and 26% who were not attending school at the time of the study. Similar findings were made by a study conducted by the NGO 'Mobile crèches'. This result was analyzed for children above 5 years, as the children below 5 years were attending the crèche at the construction site and was having non formal education.

Morbidity pattern: It was seen that 29.5% of the children were suffering from upper respiratory tract infections, 4.5% had anaemia and 2.3% had rickets. Rickets with classical findings of Rickette Rossae, bossing of forehead, bow legs was seen among 4 children belonging to the same family. The upper respiratory tract infection can be contributed to exposure to dust at the construction sites. A study conducted by Chawada et al found that a child had about 12 episodes of diarrhoea and fever, 6 episodes of cough during the previous 3 months<sup>3</sup>.

Immunization: None of the children had the immunization card and only 69(38.3%) had the BCG

vaccination scar. There were 88(48.9%) of children who had not received any immunization and the rest of 92 (51.1%) had incomplete immunization. Not even one child was completely immunized or had age appropriate immunization. This was at par with a study conducted by Niraj Pandit<sup>6</sup>, which reports that only 2 children had vaccination card, 78% of children had BCG vaccination scar and all others vaccination was incomplete. This suggests that expanding the availability of fixed health infrastructure is unlikely to achieve the goal of universal coverage, but reforming the community outreach activities might be a better strategy for increasing immunization coverage<sup>7</sup>.

**Table No1: Age and sex wise distribution of study population**

	0-5 yrs	6-10 yrs	11-15 yrs	Total
F	26	39	1	66
M	30	68	16	114
Total	56	107	17	180

$\chi^2 = 9.2377, P < 0.01$ , Statistically Significant

**Table No 2: Sex wise distribution of schooling status of children of above 5 years:**

Sex	Attending school	%	Stopped schooling (Drop outs)	%	Never attended School	%	Total
F	24	19.3	8	6.5	8	6.5	40
M	67	54.0	9	7.2	8	6.5	84
Total	91	73.3	17	13.7	16	13	124

$\chi^2 = 5.4509, P > 0.05$ , statistically not significant

**Table No 3: Morbidity pattern among the study population**

Diagnosis	Frequency = 180	Percentage (%)
Upper Respiratory Infections	53	29.5
Anaemia	8	4.5
Worm Infestation	4	2.3
PLE	7	3.9
Rickets	4	2.3
Diarrhoea	3	1.6
Lower Respiratory Infection	2	1.2
Viral Fever	1	0.5
Skin Warts	1	0.5
Dermatitis	1	0.5
Herpes labialis	1	0.5
Wound	1	0.5
# metatarsal	1	0.5

**Table No 4: Distribution of nutritional status among under five children**

Weight	Frequency	Percentage (%)
Normal	12	21.4
Underweight	44	78.6
Total	56	100

**Table No 5: Grading of malnutrition among under five**

Degree of Malnutrition	Frequency	Percentage (%)
I	14	25
II	28	50
III	2	3.6
Normal	12	21.4
Total	56	100

**Table No 6: Sex wise Distribution of Nutritional status among Under five**

Sex	Underweight	Percentage (%)	Normal weight	Percentage	Total
F	21	37.5	4	7.2	25
M	23	41.0	8	14.3	31
TOTAL	44	78.5	12	21.5	56

$\chi^2_1=0.7905, P>0.05$ , Statistically not significant

**Table No 7: Distribution of BMI among children above 5 years**

	BMI <18.5 (Underweight)	Percentage	BMI 18.5-24.9 (Normal)	Percentage	Total	Percentage
6-10 yrs	105	84.7	2	1.6	107	86.3
11-15 yrs	17	13.7	0	0	17	13.7
Total	122	98.4	2	1.6	124	100

**Acknowledgement:** We extend our acknowledgement to the NGO 'Good Neighbours' for their cooperation in carrying out this study.

**Conflict of Interest:** Nil

**Source of Support:** Nil

**Ethical Clearance:** Was taken from the ethical committee of the college

#### REFERENCES

1. <http://www.washingtonpost.com>
2. [projects.vibha.org/projects/n-te-classes-for-construction-workers-children](http://projects.vibha.org/projects/n-te-classes-for-construction-workers-children)
3. Bansari Liladhar Chawada, Anjali Modi, Shantilal Lalichand Kantharia, Sanjeev Rao. Exploring health status and care practices among children of female workers in unorganized sector. *International Journal of Medicine and Public Health*. Jan- Mar 2013; **3(1)**: 38-43.
4. Park, K., Nutrition and Health. Textbook of Preventive and Social Medicine, Edition: 22<sup>nd</sup> 563-619.
5. <http://www.karmayog.com/ngos/mobile.htm>
6. Niraj Pandit, Ashish Trivedi, Das Bidisha. A study of maternal and child health issues among migratory construction workers. *Healthline ISSN 2229-337X*. Jul- Dec 2011; **2(2)**: 16-18.
7. Ashlesha Datar, Arnab Mukherji, Neeraj Sood . Health Infrastructure and immunization coverage in rural India. *Indian J Med Res* 125. Jan 2007: 31-42



# Prevalence of Protein Energy Malnutrition among Primary School Children in Govt. Schools of Thiruvananthapuram Corporation - a Cross Sectional Study

Shyla J<sup>1</sup>, Athirarani M R<sup>2</sup>, Sara Varghese<sup>3</sup>

<sup>1</sup>Lecturer, Govt. College of Nursing, Mulamkunnathukavu P.O Thrissur, <sup>2</sup>Assistant Professor, Govt. College of Nursing,

<sup>3</sup>Professor, Department of Community Medicine, Medical College P.O, Thiruvananthapuram

## ABSTRACT

The study 'Prevalence of Protein Energy Malnutrition among Primary School Children in Govt. Schools of Thiruvananthapuram Corporation -A Cross Sectional study' was indented to estimate the Prevalence of Protein Energy Malnutrition (PEM) among Primary School Children in Government Schools of Thiruvananthapuram Corporation. The design adopted was Descriptive design. Sample size was 600 with multi stage cluster sampling. Interview schedule, weighing machine, stadiometer, and growth charts were used as the tools for the study. 2000 CDC growth charts were used for measuring weight for age (Underweight), height for age (Stunting), and weight for height (Wasting). Less than 5th percentile is considered as abnormal. The overall Prevalence of PEM was Stunting 21.8%, Wasting 33.4%, and Underweight 38.5%.

*Keywords: Prevalence, Protein Energy Malnutrition, Primary School Children*

## INTRODUCTION

Protein Energy Malnutrition is a global health problem. This is the primary cause of ill-health and premature mortality among Children and is more prevalent in the developing countries.<sup>1</sup> Out of the 120 million Children in India, over 75 million are estimated to suffer from observable Protein Energy Malnutrition. It often starts in the womb and ends in the tomb. Severe malnutrition represents only the tip of the iceberg. Many suffer from invisible Protein Energy Malnutrition which is difficult to monitor and makes prevention and cure difficult. It has been estimated that for every diagnosed case of Protein Energy Malnutrition, there are 10 others with borderline Malnutrition, undetected in the community.<sup>2</sup>

As Primary School is the beginning step of academic life, proper nourishment is very important for good academic performance. Malnourished Children are less likely to perform well in School and more likely to grow into malnourished adults, at greater risk of disease and early death.<sup>2</sup> The prevalence of underweight Children in India is among the highest in the world, and is nearly double that of Sub-Saharan Africa with consequences for morbidity, mortality,

productivity and economic growth. UN estimates that 2.1 million Indian Children die before reaching the age of 5 every year – i.e it is at a rate of four Children per minute.<sup>3</sup> According to recently released National Family Health Survey- 3 (NFHS-3) carried out in 2005-06, 40% of India's Children under the age of three are underweight, 45% are stunted and 23% are wasted. In NFHS-2 it was 43%, 51%, and 20% respectively.<sup>4</sup>

In Kerala, both chronic and acute under nutrition are moderate. More than 25% of all Children under four years of age are under weight and 27% are stunted, 27 % of the Children are under nourished and 1.6% of Children who die under the age of five.<sup>3</sup> The proportions of Children who are severely undernourished are more in the case of height for age (9%) than in case of weight for age (6%). Perhaps the most serious nutritional problem measured (wasting) affects 12% of the Children in Kerala.<sup>4</sup>

## MATERIALS AND METHOD

The research approach is used for this study is quantitative and design was Descriptive. In which Cross Sectional survey was used. The setting was Government Primary Schools of Thiruvananthapuram

Corporation. The population under the study consisted of students between the age group of 5- 10 years studying in Thiruvananthapuram Corporation. The sample size was 600, assuming  $p = 25\%$  and  $q = 75\%$ , with 20% of precision; the obtained sample size was 300 after adjusting for design effect, Sample size is taken as 600. The sampling technique used here is multi stage cluster sampling. The primary sampling units were the classes. The population was scattered around 22 Primary Schools of Thiruvananthapuram Corporation. 12 Schools were selected by Lottery method. The cluster was a division and its size varied from 5 to 40. This one division of each class from standard 1 to 4 was selected through the same method. More than one child from the same family and children with co morbidities such as Down syndrome, and known hormonal abnormalities were excluded from the study.

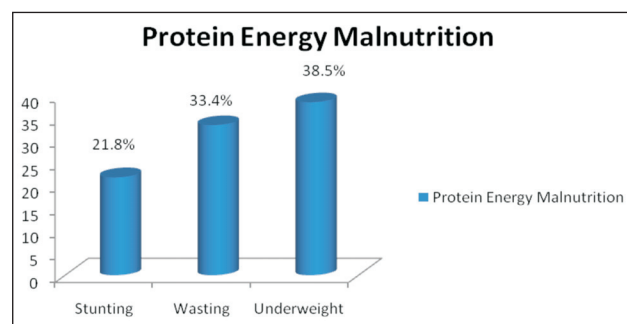
Tools used for the study were weighing machine and a stadiometer, a standardized weighing machine, Phoenix e.100g, 99376 (EWM C-III 160kg) electronic weighing machine was used to find weight of students; it was standardized from Legal Metrology Department, Thiruvananthapuram. The error of the instrument was 100g. Stadiometer is used for assessing the height of the students. The error of the instrument was 1cm. 2000 CDC growth charts are used for measuring weight for age (Underweight), height for age (Stunting), weight for height (Wasting) and BMI for age. Separate charts are there for boys and girls. Less than 5th percentile is considered as abnormal. Height was assessed by a stadiometer. After removing the shoes child was placed on the flat surface of the stadiometer. Child was to stand upright with heels slightly separated so that the weight was borne evenly on the feet. Heels, buttocks and back are brought in contact with the stadiometer. The head piece of the stadiometer is kept firmly over the vertex to compress the hair. The measurement noted in the stadiometer was then recorded.

Weight was assessed by an electronic weighing machine. After removing the shoes, child was to stand on the weighing platform. Make the child in a straight position with head straight. Weight recorded in the weighing machine recorded.

## FINDINGS

The baseline characteristics of the participants are given below (Table 1)

Sl. No	Variable	Number (%)
1	<b>Age</b>	
	5-6 years	132 (21.9%)
	7-8 years	289(48.0%)
	9-10 years	181(30.1%)
2	<b>Sex</b>	
	Boys	274 (45.5%)
	Girls	328 (54.5%)
3	<b>Religion</b>	
	Hindu	486 (80.7%)
	Christian	39 (6.5%)
	Muslim	77 (12.8%)
4	<b>Family type</b>	
	Nuclear	411 (68.38%)
	Joint	84 (14.08%)
	Extended nuclear	107 (17.88%)
5	<b>Number of family members</b>	
	<=4	<=4 383 (63.6%)
	>4	>4 219 (36.4%)
6	<b>Number of child</b>	
	1	75 (12.5%)
	2	463 (76.9%)
	3	58 (9.6%)
	>3	6 (0.10%)
7	<b>Monthly Income</b>	
	4000 – 5000	389 (64.6%)
	5001 – 10000	156 (25.9%)
	10001 – 15000	33 (5.5%)
	> 15000	24 (4.0%)
8	<b>Mothers age</b>	
	<20	87 (14.5%)
	21 -25	264(43.8%)
	26 – 30	209 (34.7%)
	31 – 35	36 (5.9%)
	>35	6 (0.10%)
9	<b>Weight of mother</b>	
	Below 45Kg	122 (20.3%)
	Above 45Kg	413 (68.6%)
	Do not remember	67 (11.1%)
10	<b>Birth weight</b>	
	<2.5 kg	238 (39.5%)
	>2.5 kg	364 (60.5%)



In this study Protein Energy Malnutrition is explained in terms of Stunting, Wasting and Underweight. It was found that 21.8% children were malnourished in terms of Stunting. 33.4% children were malnourished in terms of Wasting and 38.5% children were malnourished in terms of Underweight.

### CONCLUSION

Based on the above findings of the study the following conclusions were drawn. Overall prevalence of Protein energy Malnutrition in terms of underweight, stunting and wasting was stunting and wasting are 38.5%, 21.8%, 33.4% respectively.

Malnutrition among children is a major public health problem in India. Besides poverty, there are other factors that directly or indirectly affect the nutritional status of children. The present study highlights the prevalence of Protein Energy Malnutrition among Primary School going Children in Thiruvananthapuram Corporation. The prevalence can be reduced by increasing awareness in mother regarding the nutritional intake of the child. Also, there is a great need to focus the attention of policy-makers on the nutritional status of children as one of the main indicators of development and as a precondition for the socioeconomic advancement of societies in the long term. Strengthening of the school health services and creating awareness among parents about the nutritional requirements of their children is required.

**Acknowledgement:** The investigators would like to thank the Deputy Director of Nursing Education of Kerala state, Prof. Prasannakumari Y, Dr. Lucyamma Joseph, Associate Professor, Govt. College of Nursing, Thiruvananthapuram, Dr. Geetha S, Associate Professor, Department of Pediatrics, Sree Avittom Thirunal hospital, Thiruvannthapuram and Dr.

Santhosh, NNMB Unit, State Nutrition Bureau, Thiruvananthapuram, and Mr. Muraleedharan Nair, Associate Professor (Rtd.), consultant Biostatistician, CERTC, Medical College, Thiruvananthapuram.

**Conflict of Interest Statement:** In the present study, the researcher, researcher's institution, reviewer, or the editor didn't influence the study participants in any ways. Since the study participants are priary school children and design for this study was Descriptive design and cross sectional survey, the study participants are not observed for a long time. Also lottery method was used for the selecting the schools.

**Source of Funding:** Kerala State Council for Science, Technology and Environment, Thiruvananthapuram supported the study by giving the financial assistance of Rs.10000/-, and the other expenses of the study was met by myself.

**Ethical Clearance:** Ethical clearance was obtained from Institutional Human Ethics Committee, Govt.College of Nursing, Thiruvananthapuram.

### REFERENCES

1. Nandy S, Irving M, Gordon D, Subramanian SV, Smith GD. Poverty, child undernutrition and morbidity: new evidence from India. *Bull World Organ* 2005; 83 (3): 210-216.
2. Elizabeth K E. Nutrition and child development. New Delhi: Paras Medical Publisher; 2010.
3. UNICEF India -The children- Nutrition. Available from URL: [http://www.unicef.org/india/children\\_2356.htm](http://www.unicef.org/india/children_2356.htm)
4. Ghai O P, Piyush Gupta, VK.Paul. Essential Pediatrics. 8<sup>th</sup> edition. New Delhi: CBS Publishers: 2009

# A Study on Lifestyle Modifications among Patients with Select Non Communicable Diseases

Harsha Kumar H N<sup>1</sup>, Anshika Agarwal<sup>2</sup>, Mohamed Shamheed<sup>2</sup>,  
Jefrin Roy Mathew<sup>2</sup>, Palki Dewan<sup>2</sup>, Anshul Arora<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Community, <sup>2</sup>2nd year MBBS Students, Kasturba Medical College, Mangalore

## ABSTRACT

**Introduction:** There are no published reports exploring the magnitude and pattern of lifestyle changes among the patients with non-communicable diseases from India. So this study was conducted with the objectives to Know 1. Lifestyle modifications among patients with select non-communicable disease (Diabetes Mellitus, Hypertension & IHD) about components like Diet ,Physical Activity, Alcohol and Tobacco Consumption. 2. The reasons for not being able to make changes in the above mentioned lifestyle components.

**Materials and method:** A cross sectional study was conducted on patients with hypertension, diabetes mellitus & Ischemic Heart Disease presenting to KMC hospitals (wenlock and attavar). The study subjects were interviewed using a semi structured interview schedule which covered: 1.Basic socio demographic data 2. Modification in various lifestyle components (diet, physical activity etc.) 3. Problems faced by them for changes in lifestyle. After obtaining permission, interviews were conducted on willing subjects. .

**Analysis:** Data was entered in SPSS version 11 and analyzed. Results are expressed in proportions in charts and tables.

**Results:** Totally 120 patients participated. The following dietary changes were observed (%): Reduced Salt intake (62.2), Reduced Sugar intake (54.2), Reduced Rice intake (42.7), Increased Wheat intake (48.9). Physical Activities undertaken by the study subjects were as follows (%): Walking (63.4), Jogging (4.6), Yoga (13.7). Habits of the subjects were as follows (%): Tobacco Chewing (12.5), Smoking (10.9) , Alcohol Consumption (16). Old age and locomotory problems have limited their capacity to bring lifestyle changes even after the diagnosis was made.

**Conclusion:** Dietary changes were satisfactory while there is a scope for improvement in physical activities. Subjects were not successful in reducing alcohol and tobacco consumption.

**Keywords:** *Non-Communicable Diseases, Lifestyle Modifications*

## INTRODUCTION

In India the prevalence of diabetes is high in urban population (4-11.6%) as compared to rural population (2.94%).<sup>1</sup> The statistical data showing the prevalence of Hypertension is- 59.9 and 69.9 Per 1000 males and females respectively in urban population and 35.5 and 35.9 per 1000 males and females respectively in rural population.<sup>1</sup> Since India is the second most populous country this proportion includes a high number of diabetics and hypertensives.<sup>1</sup>

Certain guidelines have been developed under the Government of India-WHO Collaborative Programme (2008- 2009) for prevention and control of selected non communicable diseases. The guidelines of "National Programme for Prevention and Control of Diabetes, Cardiovascular Disease and Stroke" are followed by the Government of India.<sup>2</sup> Lack of exercise, a poor diet, current smoking, and abstinence from alcohol use are all associated with a significantly increased risk of diabetes.<sup>3</sup> A study on risk factors enable us to find out the proportion of people who made an attempt to

prevent the outcome of the diseases. Exercise includes yoga practices, which have a role to play in the prevention of type 2 diabetes.<sup>4</sup> Unhealthy dietary habits including place and way of taking meals, number of daily meals and excessive salt intake from processed foods also contribute to body mass gain.<sup>5</sup>

The above information is essential in planning better management strategies for these cases to improve the outcome of the disease and to adopt appropriate measures for the prevention of the same. As there are no reported studies from India examining the magnitude of lifestyle modifications among people with selected non communicable diseases this study was done with the objective To know 1. The self-reported lifestyle modifications among patients with non-communicable disease (diabetes mellitus, hypertension, ischemic heart disease) about following components like diet, physical activity, alcohol and tobacco reduction. 2. The reasons for not being able to make changes in the above mentioned lifestyle components.

## MATERIALS AND METHOD

**Background:** This study was conducted in tertiary care teaching hospitals of Kasturba Medical College, Mangalore. The hospitals provide outpatient & inpatient services for all patients from Mangalore city, Other districts of Karnataka & Referred patients from the neighbouring state of Kerala. Apart from Government District Wenlock Hospital which is attached to the college, there is another private teaching hospital at Attvar.

**Study design & subjects:** This is an interview based Cross-sectional study conducted on patients with select Non-Communicable conditions. The inclusion criteria for the subjects are as follows:

- 1) Out patients, patients of medicine and surgery wards of. KMC Hospitals (Government Wenlock District Hospital and KMC Hospital, Attavar) with any one or more following conditions: Diabetes Mellitus, Hypertension, Ischemic heart disease.
- 2) Patients who visited the outreach clinics for the follow up with any one of the following conditions of Diabetes Mellitus, Hypertension, Ischemic heart disease.

**The exclusion criteria were as follows**

1. Patients who were not willing to participate in the study,

2. Patients who were newly diagnosed at present admission .

**Study duration:** The study was conducted in the month of March of 2012.

**Sample size & Sampling:** Using the formula for infinite population ie,  $N = \frac{Z^2 pq}{d^2}$ , assuming 'p' of 71%, for 95% confidence interval and power of 90% & accounting for 10% non-response the sample size came out to be 174. Non-random, sequential inclusion of all the cases that met our study criteria till the required sample size was reached.

**Study instrument & Pretesting:** A semi structured interview schedule was devised to obtain information regarding the following components

- 1) Basic socio demographic data of the study population.
- 2) Modification of lifestyle of the patients.
- 3) Problems faced by the patients for change in lifestyle. This was translated to kannada which is the local language. The kannada version was then back translated to English and both the versions were compared for conceptual equivalence. This was pretested and some modifications were made.

**Data collection:** Permission was obtained from the Institutional Ethics Committee (IEC) for conducting the study. Patients were approached in KMC hospitals and outreach clinics attached to department of community medicine of Kasturba Medical College and were informed about the details, nature and purpose of the study in the local language. Written informed consent was taken from those who volunteered for participation in the study. If the patient refused to respond, the reasons for the same were noted down.

**Data Analysis:** The data collected in the interview was entered in MS excel spreadsheet. Data was analyzed using SPSS version 11. The results were expressed as proportion and represented in appropriate tables and graphs.

## RESULTS

We obtained information from 131 patients out of 174 giving us a response rate of 75.28%. Most of the study subjects were males (51.5%) belonging to older age group who are not pursuing any occupation and had some schooling (41.2%). Other socio-demographic characteristics are presented in Table 1.



**Table no 1: Socio demographic characteristics of the study subjects.**

Variables	Number (%) [N=120]	Variables	Number (%) [N=120]
<b>Age Group (Years)</b>		<b>Education</b>	
< 30	2 (1.7)	Illiterate	36 (30)
31 – 40	3 (2.5)	Primary	36 (30)
41 – 50	19 (15.8)	Secondary	18 (15)
51 – 60	40 (33.3)	Graduate	22 (18.3)
61 – 70	39 (32.5)	Post-Graduate	8 (6.7)
>70	17 (14.2)		
<b>Gender</b>		<b>Socio-Economic Status according to Kuppaswamy Scale [n=84]</b>	
Male	67 (55.8)		
Female	53 (44.2)		
<b>Occupation</b>			
Unemployed	23 (19.2)	Upper	2 (2.4)
Housewife	50 (41.2)	Upper Middle	15 (17.8)
Unskilled	30 (25)	Lower Upper	15 (17.8)
Semi-skilled	16 (13.3)	Lower Middle	47 (55.9)
Skilled	1 (0.8)	Lower lower	5 (5.9)

Majority of the patients were advised about the dietary changes and physical activities while only a few were told to bring about changes in their habits. The pattern of the advices given is presented in Table 2.

**Table No 2: Pattern of non-communicable diseases and the advices about different lifestyle components.**

Lifestyle components	Diabetes mellitus [N=58] (%)	Hypertension [N=95] (%)	Ischemic heart disease [N=7] (%)
Diet	56 (96.5)	66 (69.5)	6 (85.7)
Physical Exercise	48 (82.7)	49 (51.6)	6 (85.7)
Tobacco	8 (13.7)	12 (12.6)	3 (42.8)
Alcohol	7 (12)	9 (9.5)	3 (42.8)
Weight Loss	19 (32.7)	20 (21)	3 (42.8)

Most of the patient attempted to bring about dietary modifications after the diagnosis was made, the pattern of which is presented in Table 3. About 30% of our study population consumed junk foods like chips, aerated drinks etc. at least 1-2 times a week. It was found that they did not have a good knowledge about the impact of such items on their health. Physical

activities undertaken by the study subjects mostly consisted of walking (63.4%) and yoga (13.7%). About 43% of the study subjects spent around 2 hours watching television. The proportion of study subjects who made an attempt to adopt certain physical exercises are presented in Table 4.

**Table No 3: Changes in dietary patterns among patients with NCDs after the diagnosis of the disease.**

Type of Dietary Changes Made by Patients	Number (%) [n=120]
Reduced salt intake (HTN)	82 (68.3)
Reduced fine sugar intake (DM)	71 (59.2)
Reduced rice intake (DM)	56 (46.7)
Increased wheat intake (DM)	64 (53.3)
Increased vegetables	77 (64.2)
<b>If yes how often (n=77)</b>	
1. daily	36 (46.7)
2. 3-4 times a week	20 (26)
3. 1-2 times a week	20 (26)

**Table No 3: Changes in dietary patterns among patients with NCDs after the diagnosis of the disease. (Contd.)**

Type of Dietary Changes Made by Patients	Number (%) [n=120]
Increased fruits	75 (62.5)
<b>If yes how often (n=75)</b>	
1. Daily	26 (34.7)
2. 3-4 times a week	13 (17.3)
3. 1-2 times a week	35 (46.7)
<b>Oil used</b>	
1. Coconut Oil	73 (60.8)
2. Sunflower Oil	32 (26.7)
3. Ghee	0
4. Any other	15 (12.5)
<b>Any difference in oil usage after diagnosis</b>	
1. Yes	14 (11.7)
2. No	106 (88.3)

**Table no 4: Adoption of various physical activities after the diagnosis of disease**

Types of Physical Activities adopted	Number (%) [n=120]
<b>Walking</b>	
1. Yes	83 (69.2)
2. No	37 (30.8)
<b>Frequency (n=83) :</b>	
1. daily	62 (74.7)
2. 1-2 times a week	9 (10.8)
3. 3-4 times a week	10 (12)
<b>Duration in Minutes per day (n=83):</b>	
1. 30 mins	68 (81.9)
2. 45 mins	9 (10.8)
3. 60 mins	4 (4.8)
<b>Jogging</b>	
1. Yes	6 (5)
2. No	114 (95)
<b>Frequency (n=6):</b>	
1. Daily	5 (83.3)
2. 1-2 times a week	0
3. 3-4 times a week	1 (16.7)
<b>Duration in Minutes per day (n=6):</b>	
1. 30 mins	4 (66.7)
2. 45 mins	1 (16.7)
3. 60 mins	1 (16.7)
<b>Practice Yoga:</b>	
1. Yes	18 (15)
2. No	102 (85)
<b>Frequency of practice of yoga (n=18)</b>	
1. Daily	16 (88.9)
2. 1-2 times a week	2 (11.1)
3. 3-4 times a week	0
<b>Duration in Minutes per Day (n=18)</b>	
1. 30 mins	15 (83.3)
2. 45 mins	0
3. 60 mins	3 (16.7)

Majority of our study subjects did not have the habit of smoking or consuming alcohol. A few people who consume alcohol or tobacco have been consuming it since a long period of time.

**Table No 5: Problems faced by the Patients**

Various types of Problems faced	Number (%)
<b>Problems faced in Dietary changes [N=117]</b>	
1. Yes	10 (8.5)
2. No	107 (91.4)
<b>Type of Dietary Problem faced (n=10)</b>	
1. Not able to control their diet	6 (60)
2. Apprehension of becoming weak	2 (20)
3. No support from family	2 (20)
<b>Problems faced while doing Physical exercise [N=119]</b>	
1. Yes	20 (16.8)
2. No	99 (83.2)
<b>Type of problem faced [n=20]</b>	
1. No time	2 (10)
2. Joint Pain	11 (55)
3. Not able to do because of severe joint problem / disability	7 (35)
<b>Problems faced in Reduction of consumption of Alcohol [n=9]</b>	
7 (77.8)	
<b>Type of problem faced [n=7]</b>	
1. Sleep Disturbances	3 (42.8)
2. Withdrawal symptoms	4 (57.1)
<b>Problems faced in tobacco reduction [n=12]</b>	
7 (58.3)	
<b>Type of Problem faced [n=7]</b>	
1. Headache	4 (57.1)
2. Tremors	3 (42.8)

Proportion who consumed alcohol (16%) was higher compared to tobacco users (10.9%). Majority of them have made an attempt to control the consumption of these substances but were not successful due to certain reasons. Various problems were encountered by the study subjects to bring about changes in their lifestyle patterns, which are presented in Table 5.

## DISCUSSION

There are no comparable studies from India regarding lifestyle modifications among patients with select non-communicable diseases. Majority of the study subjects made an attempt to bring about changes in their dietary habits after the diagnosis was made. Hu-frank et al have reported that the proportion of subjects with type 2 diabetes who made dietary changes was less than those found in our study.<sup>3</sup> Our study subjects were living with their children and hence had better social security which made it easier for them to bring about the changes as compared to previous studies. According to Sahay et al reduced

risk of type 2 diabetes is associated with a higher intake of cereal fibre and polyunsaturated fat and that an increased risk is associated with a higher intake of trans fat (formed during the partial hydrogenation of vegetable oils) and a higher glycaemic load (which reflects the effect of diet on the blood glucose level).<sup>4</sup> In our study many of the subjects have made an attempt to modify their dietary patterns which will help in reducing the chances of developing complications.

In terms of physical activity, low risk is defined as an average of at least one half-hour per day of moderate activity, including brisk walking.<sup>2</sup> Nola et al have reported we see that not many people do regular physical exercises which probably lead to obesity.<sup>5</sup> Majority of our study subjects belonged to older age group and hence walking was the major physical activity undertaken by them, while a few of them enrolled yoga as well. Low proportion of population doing physical exercises was reported from England among the age group (25-75).<sup>6</sup> Louise et al have reported the proportion of people on physical

activity index according to nationality as follows (%): European men (52), Indians (71), Pakistanis (88) & Bangladeshis (87). It is clear that European Men did not meet current guidelines for participation in physical activity compared with Indians, Pakistanis and Bangladeshis. South Asians in Newcastle report significantly lower levels of habitual physical activity than Europeans. This is likely to contribute to the higher levels of diabetes and cardiovascular risk in these populations. Measures to increase physical activity in these populations are urgently needed. <sup>6</sup>

Out of the total population we studied we found that majority of people don't consume alcohol or tobacco and the people who consumed such products were advised to quit the same.

### Limitations

The non-response rate encountered in our study was higher than anticipated. Most of our study subjects were out patients who cited lack of time and other personal commitments at home for not participating in the study.

### CONCLUSION

Thus we see that majority of the patients have been advised about lifestyle modification patterns and they have also made an attempt to bring about changes in their lifestyle patterns. This study also identifies areas of further research mentioned above.

**Acknowledgement** We are grateful to our study subjects who spent their valuable time in sharing their information regarding their health with us. We would like to express our sincere gratitude towards the Department of Community Medicine, Kasturba

Medical College, Mangalore for enabling us to work on this study.

**Conflicts of Interest:** None

**Source of Funding:** This was not a funded study.

### REFERENCES

1. K. Park. Textbook Of Preventive And Social Medicine 21<sup>st</sup> Edition. Banarsidas Bhanot.Jabalpur, 2011;362-66.
2. www.pib.nic.in [Internet]. The Government of India-WHO Collaborative Programme (2008-2009). National Programme for Prevention and Control of Diabetes, Cardiovascular Disease and Stroke. Available from URL: <http://www.pib.nic.in/newsite/erelease.aspx?relid=63087> [Cited March 3<sup>rd</sup> 2012]
3. Hu Frank, Manson JA, Stampfer M, Colditz G, Liu S, Solomaon C, et al. Diet, Lifestyle, and the Risk of Type 2 Diabetes Mellitus in Women. N Engl J Med 2001; 345:790-797.
4. Sahay B.K., Sahay R.K. Lifestyle modification in management of diabetes mellitus. J Indian Medical Assoc 2002;100(3):178-80.
5. Nola IA, Doko JJ, Bergovec M, Ruziæ A, Persiæ V. Dietary habits and cardiovascular diseases. Acta Med Croatica 2010; 64(2): 89-95.
6. Hayes Louise, White M, Unwin N, Bhopal R, Colin F, et al. Patterns of Physical activity and relationship with risk markers for cardiovascular disease and diabetes in Indian, Pakistani, Bangladeshi and European adults in UK population. Journal of Public Health 2002;24(3): 170-78

# A Study on Depression & its Determinants among Undergraduate Medical Students from Coastal South India

Harsha Kumar H N<sup>1</sup>, Vinod Malipatil<sup>1</sup>, Supriya H<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Community Medicine, <sup>2</sup>Assistant Professor, Department of Psychiatry, Kasturba Medical College, Manipal University, Mangalore

## ABSTRACT

**Background:** Depression is known to occur among medical undergraduates. There are no reported studies to explore depression & its correlates among medical undergraduates from India. So this study was undertaken.

**Materials and Method:** This is a questionnaire based cross sectional study conducted in Kasturba Medical College, Mangalore. All the students of the college were considered for the study. Depression was assessed & graded using Beck's Depression Inventory II. In addition to basic socio-demographic information, information related to family, sources of stress & adverse life events were collected. Participation in the study was voluntary.

**Analysis:** Chi-Square test was used to know if the observed difference in proportions were statistically significant. Determinants of depression were obtained by Multiple logistic regression which yielded adjusted odds ratios with its 95% confidence intervals.

**Results:** About 19.74% had depression. Mild depression was common (46.2%). Gender, academic year, place of residence & family problems did not have significant association with depression. Addictions, perceived stress due to academics, peer pressure had significant independent association with depression.

**Conclusion:** Addictions, Perceived stress due to academics, Peer Pressure are important determinants of Depression among medical undergraduate students.

**Keywords:** Depression, Medical Students, Determinants

## INTRODUCTION

Depression among medical students is known to occur.<sup>[1-9]</sup> Depression among medical students is more than the general population.<sup>[10,11]</sup> Life time risk of depression among medical students is three times higher than general population.<sup>[12]</sup>

Stress is associated with depression.<sup>[13]</sup> Medical students are exposed to a lot of stressful factors like staying in hostel, high parental expectations, vastness of syllabus, tests/exams, lack of time and facilities for entertainment.<sup>[14]</sup> Unlike adults, depressed youths may

choose to engage in risky behaviours including risk of committing suicide.<sup>[15]</sup>

Few studies done to explore the magnitude of depression and the stressful life factors associated with it among medical undergraduates were conducted outside India.<sup>[2,16]</sup> None has been reported from India. Such studies serve the purpose of developing screening protocols helping in early diagnosis and treatment. It also helps us to evolve strategies aimed to reducing the magnitude of depression among the undergraduate students.



So this study was undertaken to find out the magnitude of depression and the stressful life factors associated with it in a medical college in coastal south India.

## MATERIALS AND METHOD

**Background:** This study conducted in Kasturba Medical College, Mangalore. Every batch consists of 250 students. There will be about 1000 students form four batches in the college.

**Study design:** This is a questionnaire based qualitative study. This study was conducted from April 3 to April 30, 2008. All the medical undergraduate students of the college were considered for the study. Participation was voluntary.

**Study instrument:** A semi-structured anonymous questionnaire was devised to collect the following three components of information from the students: 1. Basic socio-demographic information (like Age, Gender, Semester, Occupation of the parents etc.)

2. To asses the depression levels a depression inventory scale called Beck Depression Inventory-II(BDI-II). 3. Stressful life factors based on the review of literature,<sup>[2,9,13,14,16]</sup> that are known to be associated with depression (like alcoholism in any family members, drug addiction in any family members, staying away from home etc ). In addition, questions related to their self report on stress, exams & academics were included. A paragraph explaining the purpose of the study, seeking their consent & requesting their participation in the study was added at the beginning of the questionnaire

**Beck Depression Inventory-II (BDI-II):** This is a 20 item inventory where each item is scored from 0 to 3. So the total scores would range from 0 to 60. Grading of Depression was as follows: A score of < 5 (Denial), 5-9 (Normal), 10-18 (Mild), 19-29 (Moderate), 30-39 (Severe), >40 (Exaggeration). (17)

**Pretesting:** This questionnaire was pre-tested on some students. Certain modifications had to be made like, rephrasing some questions, making some questions open ended & permitting multiple responses to some questions etc.) to suit our purpose..

**Data collection:** After obtaining permission from the department, the students were approached in the class rooms. The purpose of visit was explained & it was emphasized that the participation in the study was

voluntary.

As the students did not have to mention their names or their Registration numbers, the confidentiality of their responses was assured. Questionnaires were distributed. Thirty minutes were allotted to answer the questionnaire. The questionnaires were then collected back. If some students did not want participate in the study, then the reasons for the same were to be mentioned in the beginning of the questionnaire.

## DATA ANALYSIS

Data was entered in SPSS version 11.5 and analysed. Results have been expressed in proportions. Those students whose BDI-II scores were <5, 5-9 & >40 were not included for conducting tests of significance. Analysis was done to know the distribution of stressful life factors that are associated with various grades of depression. To know the effect various life factors on the outcome variable ie, Depression (Yes/No), Univariate analysis was done to get the unadjusted Odds Ratios. To remove the effect of confounding & to know the independent effects of the study variables Multiple logistic regression was done. This gave us the adjusted Odds ratios with its 95% Confidence Intervals. 'p'<0.05 was considered to be statistically significant.

## RESULTS

From four batches, 471 students responded giving a response rate of 47.1%. The main reasons for Non-Response were: Fed up of filling questionnaires (28%), not interested in research (24%), don't like psychiatry (21%), shortage of time (17%), No specific reason (10%). Response rate was higher for 2<sup>nd</sup> year students (56.8%) & lowest for final year part-II students (38.4%). Proportion of Males respondents (58.3%) was higher than females (44.6%). Local students constituted 9.5%.

Totally 93 students had depression (19.74%). Proportions of Mild (n=43), Moderate (n=36) & Severe (n=14) depression were 46.2%, 38.7% & 15.05 respectively. Depression was higher among (%): males (17.15), hostel students (20.4), students with addictions (52.67), family history of addictions (25.2), financial problems (22.8), perceived stress due to academics (58.21), Competition / Peer pressure (64.3), high parental expectations (52.21) (Table 1). Difference in proportions (%) of depression among 1<sup>st</sup>(17.69), 2<sup>nd</sup>/(19.01), & Final years (Part I & II) students (21.6%)

was not statistically significant (Table 1).

Results of Univariate & Multivariate analysis have been presented in Table 2. On multivariate analysis the following variables had significant independent effect on the outcome variable: Students with addictions, Perceived stress due to academics, Competition / Peer pressure, High parental expectations.

**Table 1: Distribution of Study sample according various life factors & depression.**

Characteristics of the study sample (n)(n=471)	Denial BDI 5-9	Normal BDI 5-9	Mild BDI 10-18	Moderate BDI 19-29	Severe BDI30-39	Exaggeration BDI> 40
<b>Gender</b>						
Male (267)	78	117	31	22	5	14
Female (204)	69	98	22	9	4	2
<b>Academic Year</b>						
I Year (130)	41	45	12	7	4	21
II Year (142)	41	56	16	8	3	18
III Year Part I(103)	39	42	11	3	2	6
III Year Part II(96)	28	48	12	9	6	2
<b>Place of Residence</b>						
Home (45)	7	29	3	3	0	0
Hostel (426)	178	165	59	24	4	10
<b>Addictions among students</b>						
Yes (131)	28	29	47	19	3	5
No (340)	187	112	18	6	0	17
<b>Addictions in the family</b>						
Yes (115)	48	19	18	11	0	0
No (356)	196	106	35	29	0	9
<b>Financial Problems in the Family</b>						
Yes (101)	44	11	17	6	0	1
No (371)	246	75	40	29	1	2
<b>Feel stressed due to academics</b>						
Yes (134)	46	10	40	29	9	0
No (337)	291	28	7	8	0	3
<b>Pressure due to competition / Peer performance</b>						
Yes (126)	37	8	39	32	10	0
No (345)	290	40	7	5	0	0
<b>Parental Expectations are high</b>						
Yes (113)	51	3	31	26	2	0
No (358)	301	22	28	6	0	1

**Table 2: Determinants of Depression among medical students - Results of Univariate & Multivariate analysis**

Determinant/ Factors	Univariate – Unadjusted Odds Ratio (OR) with 95% CI		Multivariate – Adjusted Odds Ratio (OR) with 95% CI		'p' value*
	OR	(95% CI)	OR	(95% CI)	
<b>Sex</b>					
Male	2.89	1.13 – 3.86	1.13	0.34 – 2.13	0.67
female					
<b>Addictions among students</b>					
Yes					
No	5.75	3.54 – 9.33	3.53	1.89 – 3.39	0.01
<b>Addictions in the family</b>					
Yes					
No	4.95	3.05 – 8.04	1.89	0.56 – 2.81	0.38

**Table 2: Determinants of Depression among medical students - Results of Univariate & Multivariate analysis**

Determinant/ Factors	Univariate – Unadjusted Odds Ratio (OR) with 95% CI		Multivariate – Adjusted Odds Ratio (OR) with 95% CI		'p' value*
	OR	(95% CI)	OR	(95% CI)	
<b>Financial Problems in the Family</b>					
Yes					
No	5.4	3.28 – 8.51	2.13	0.74 – 5.38	0.12
<b>Feel stressed due to academics</b>					
Yes	13.84	8.1 – 19.31	4.58	3.81 – 8.94	0.01
No					
<b>Pressure due to competition / Peer performance</b>					
Yes	12.96	7.66 – 19.73	3.73	2.45 – 6.44	0.02
No					
<b>Parental Expectations are high</b>					
Yes	5.46	3.35 – 8.89	2.29	1.33 – 4.01	0.05
No					

\*p of <0.05 was considered to be significant

## DISCUSSION

We did not get a comparable study from India. The prevalence of Depression among medical undergraduates found in this study falls within the range reported from previous studies (12% - 60%).<sup>[1-9,12]</sup> Except for the study from Pakistan,<sup>[3]</sup> which has reported a prevalence of 60%, the remaining studies report prevalence (%) of 12 – 38.3. Studies using BDI have reported prevalence (%) ranging from 13.9 – 38.2.<sup>[4,5,7,9]</sup> Study from Pakistan on anxiety & depression does not specify what proportion had anxiety & depression separately so the prevalence is not comparable.

Mild Depression is reported to be more common which is similar to the findings of this study.<sup>[6]</sup> Though males were found to have higher proportions of depression difference was not statistically significant (Table 1, 2). Though some published studies suggest that female undergraduate medical students to have higher proportions of depression,<sup>[2,6,7]</sup> the association between gender and depression is not consistent across the studies.<sup>[8,14]</sup> The differences in proportions of depression across the academic years were not statistically significant (Tables 1,2). Most of the studies have reported higher proportions of depression among the final year students as compared to first years.<sup>[2,5-7,9]</sup> Though the reason for this difference is not clear, low response rates from the final year students could have played a role.

There was a significant association between depression and students with addictions (Tables 1,2). Alcohol abuse & Smoking are reported to be associated with depression.<sup>[4,8]</sup> From this cross sectional study it is not possible to ascertain whether depression is a consequence of addiction or addiction a coping mechanism. Proportions of depression among students with financial problems in family was found to be higher though the differences were not statistically significant (Table 2). There are no comparable results from previous studies. Adverse life circumstances are known to be associated with depression.<sup>[4]</sup> Further studies are needed to explore this association. Perceived stress due to academics & competition was found to be significantly associated with depression (Tables 1,2). Academics are known to precipitate stress & are associated with depression.<sup>[2,8,13,14]</sup>

There are some limitations. The response rates decreased from 1<sup>st</sup> year to final years. Low response rates from final year students have limited the interpretations of the results. There could be response bias. Because of the cross sectional design of the study we cannot differentiate between associations & risk factors. In spite of these limitations this study does give sufficient inputs for planning student support systems especially among the newly joined students. This study brings out the need for having a student cell / helplines for those who need counseling services.

## CONCLUSION

Depression among medical undergraduate students is a problem that requires detailed longitudinal studies to differentiate associations & risk factors. It also highlights the need to have student support systems to identify the problem in medical colleges.

**Conflicts of Interest;** We (Corresponding Author and all the Co-Authors) declare that we do not have any conflicts of interest.

**Funding;** This is not a funded study

**Acknowledgement;** We thank the students without whom cooperation it would not have been possible to conduct this study.

## REFERENCES

1. Zoccolillo M, Murphy GE, Wetzel RD. Depression among medical students. *J Affect Disord* 1986;11:91-6
2. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: a cross-sectional study. *Medical Education* 2005; 39(6); 594-04
3. Inam SNB, Saqib A, Alam E. Prevalence of Anxiety and Depression among Medical Students of Private University. *Journal of Pakistan Medical Association* 2003;53:46-9
4. Curran TA, Gawley E, Casey P, Gill M, Crumlish N. Depression, suicidality and alcohol abuse among medical and business students. *Ir Med J* 2009;102:249-52
5. Ahmed I, Banu H, Al-Fageer R, Al-Suwaidi R. Cognitive emotions: depression and anxiety in medical students and staff. *J Crit Care* 2009;24: e1-7
6. Goebert D, Thompson D, Takeshita J, Beach C, Bryson P, Ephgrave K, et al. Depressive symptoms in medical students and residents: a multischool study. *Acad Med* 2009;84:236-41.
7. Baldassin S, Alves TC, de Andrade AG, Nogueira Martins LA. The characteristics of depressive symptoms in medical students during medical education and training: a cross-sectional study. *BMC Med Educ* 2008;11:60.
8. Aniebue PN, Onyema GO. Prevalence of depressive symptoms among Nigerian medical undergraduates. *Trop Doct* 2008;38:157-8.
9. Mehanna Z, Richa S. Prevalence of anxiety and depressive disorders in medical students. Transversal study in medical students in the Saint-Joseph University of Beirut. *Encephale* 2006;32:976-82
10. Firth J. Levels and sources of stress in medical students. *Br Med J* 1986;292:1177-80.
11. Stecker T. Well-being in an academic environment. *Med Educ* 2004;38:465-78.
12. Tyssen R, Vaglum P, Gronvold NT, Ekeberg O. The impact of job stress and working conditions on mental health problems among junior house officers: A nationwide Norwegian prospective cohort study. *Med Educ* 2000;34:374-84.
13. Monroe SM, Harkness KL. Life stress, the "kindling" hypothesis, and the recurrence of depression: considerations from a life stress perspective. *Psychol Rev* 2005;112:417-45.
14. Chandrashekhar T S, Pathiyil R S, VS Binu, Chiranjoy M, Ray B, Ritesh G M. Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal. *BMC Medical Education* 2007;7:26
15. Csorba J, Sorfozo Z, Steiner P, Ficsor B, Harkany E, Babrik Z et al. Maladaptive strategies, dysfunctional attitudes and negative life events among adolescents treated for the diagnosis of "suicidal behaviour". *Psychiatr Hung* 2007;22:200-11.
16. Hammen C. Stress and depression the role of stress in depression. *Annu Rev Clin Psychol* 2005;1:293-319.
17. Beck AT, Steer RA, Brown GK: Beck Depression Inventory, second edition Manual, Psychological Corporation. 1996.

# A Study on Socio Demographic and Psychological Risk Factors for Depression among Adult Population of Karimnagar District

K Padma<sup>1</sup>, G Kashi Ram<sup>2</sup>, B Sita Rama Rao<sup>3</sup>, K Chandra Sekhar<sup>4</sup>, P G Deotale<sup>5</sup>

<sup>1</sup>Assistant Professor Dept. of Community Medicine, at Alluri Sita Rama Raju Academy of Medical Sciences, Eluru,

<sup>2</sup>Professor & HOD, <sup>3</sup>Professor of Community Medicine, at Pratima Institute of Medical Sciences, Karimnagar,

<sup>4</sup>Associate Professor, <sup>5</sup>Professor & HOD of Community Medicine, at Alluri Sita Rama Raju Academy of Medical Sciences, Eluru

## ABSTRACT

**Background:** Mental and physical health make up two fundamental ingredients of life that are intimately blended together and mutually interdependent. Mental disorders of depression are always neglected due to non-specificity in diagnosis, vague clinical presentations, long-term and varied treatment, and various myths and beliefs leading to social stigma.

**Objectives:** To assess the prevalence of depression among the general population and to study the socio demographic and psychological factors in relation to depression.

**Results:** Prevalence of depression was 12.74% in the study population. In the study population, the age group 41-60 years were more depressed 5.7%. Female respondents were at higher risk of depression as compared to male. Out of these 54 (4%) depressed respondents were having family history of depression. Family history of depression was associated with an outcome of depression ( $P < 0.001$ ). 7.4% depressed people were having financial difficulties.

**Conclusions:** Based on the above results, this study showed the high prevalence of depression among adults to be 12.8% in Karimnagar district. This reflects strengthening of family relations, social factors like gender difference, economic status and financial problems and other factors to be rectified with existing resources. Ultimately awareness, importance of depression problem and its early identification to be educated to the adult population by medical and paramedical workers.

**Keywords:** Age, Sex, Economic Status, Financial Difficulties, Family History

## INTRODUCTION

The World Health Organisation has chosen the theme for the World Health Day 2001: "Mental Health: Stop Exclusion-Dare to Care". The recent evidence for the importance of mental health has been so striking that the WHO decided to give it a priority during year 2001, the beginning of 21<sup>st</sup> century. Depression is a

common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration. These problems can become chronic or recurrent and lead to substantial impairments in an individual's ability to take care of her or his everyday responsibilities<sup>24</sup>. The general term depression is often used to describe the disorder, but since it is also used to describe a temporary depressed or sad mood, more precise terminology is preferred in clinical use and research.

Depression is an illness that affects both the mind and the body and is a leading cause of disability, workplace absenteeism, decreased productivity and high suicide rates<sup>1,2</sup>. Depression is the most common

---

### Corresponding author:

**K Chandra Sekhar**

Associate Professor

Department of Community Medicine, Alluri Sita Rama Raju Academy of Medical Sciences, Eluru- 534005.

E-mail: cskalevaru@yahoo.com

Mobile No: 09849360226



psychiatric disorder in general practice and about one in ten patients seen in the primary care settings suffer from some form of depression<sup>3,4</sup>. In a study by the World Health Organization conducted at 14 sites, the most common diagnosis in primary care was depression (10%)<sup>5</sup>.

Depression is estimated to affect 340 million people globally<sup>6</sup>. Depression is now the fourth-leading cause of the global disease burden accounting for 4.4% of total DALYs in the year 2000, and the leading cause of disability worldwide. While it is not a significant cause of mortality, depression seriously reduces the quality of life for individuals and their families, is a risk factor for suicide, and often worsens the outcome of other physical health problems. The World Mental Health Survey Initiative<sup>8</sup> carried out cross-national research in mental health, especially in developing countries. The prevalence of depression in a population based study conducted in urban Pakistan was 45.9%<sup>9</sup>, while in rural Bangladesh, it was reported to be 29%<sup>10</sup> and in a peri-urban clinic based study in Uganda, it was reported to be 6.1%<sup>11</sup>. Earlier Indian studies have reported prevalence rates of depression that vary from 21–83% in primary care practices<sup>12</sup>. Our study attempts to identify the prevalence of depression and associated risk factors among adults in a community setting as there were no earlier studies done in the district.

### OBJECTIVES

1. To assess the prevalence of depression among the adult population.
2. To study socio demographic profile in relation to depression.
3. To study the psychological factors associated with depression.

### MATERIAL AND METHOD

A descriptive, cross-sectional, community based study was conducted among the urban adult population aged 18 years and above in Karimnagar district during the period from August 2010 to October 2011. The study was conducted in Rampur area, situated at Karimnagar town 10 km away from Prathima Institute of Medical Sciences (PIMS) which is the area covered by the Urban Health Centre attached to the Prathima Medical college. From the

center, 4 wards were selected. In continuation of the above study, sampling was done in Choppadandi mandal of Karimnagar district having 11 villages with 48,659 population. Two villages (Arnakonda, Rukmapur) had been selected for sample collection.

The size of sample was 1350 adult population from the rural and urban settings, who were willing to participate in the study. Sample was selected using systematic random sampling techniques. While selecting the sample the following inclusion and exclusion criteria were observed. Inclusion criteria: Male or female  $\geq 18$  years of age and older and gives informed consent for the study. Exclusion criteria: Severely moribund patients, People not willing to give consent for participation and subjects with any primary sensory deficits.

Patient health questionnaire (PHQ-9): A widely and internationally used instrument, The PHQ-9 is a 9-item self-reported questionnaire designed to evaluate the presence of depressive symptoms during the prior 2 weeks. The nine items of the PHQ-9 are based directly on the nine diagnostic criteria for major depressive disorder in the DSM-IV (Diagnostic and Statistical Manual Fourth Edition). As a severity measure, scores can range from 0 to 27. Brief Patient Health Questionnaire (PHQ) has also been translated in 11 languages including Telugu (local language) and validated for Indian population.

Descriptive variables such as mean and standard deviation were used. Chi-square was used to assess for statistical difference between groups, and significance of association was set at  $P < 0.05$ .

### RESULTS

**Table 1: Prevalence of depression in study population:**

Depression Severity	Number of respondents	Percent
None	1178	87.3
Mild depression	114	8.4
Moderate depression	42	3.1
Moderately severe depression	16	1.2
Total	1350	100.0

Table-1 Indicates that majority of the people in the sample were having mild depression (8.4%), followed by moderate depression (3.1%). Prevalence of depression was 12.74%.

**Table 2: Age wise distribution of Study population:**

Age group	Not depressed	Depressed	Total
Less than 20 years	64(4.7%)	4(0.3%)	68(5.0%)
21- 40 years	377(27.9%)	45(3.3%)	422(31.3%)
41- 60 years	383(28.4%)	77(5.7%)	460(34.1%)
Above 60 years	354(26.2%)	46(3.4%)	400(29.6%)
Total	1178(87.3%)	172(12.7%)	1350(100.0%)

Chi-square = 11.68 p-value = 0.009

Table: 2- shows that most of the study subjects were in the age group of 41-60 years, which constitutes about 34.1% of the respondents. The mean age distribution was 46.57± 16.49. Respondents in the age group 41-60 years were more depressed 77 (5.7%).

**Table 3: Gender-wise distribution of the respondents**

Gender	Not depressed	Depressed	Total
Male	535(39.6%)	59(4.37%)	594(44.0%)
Female	643(47.6%)	113(8.37%)	756(56.0%)
Total	1178(87.3%)	172(12.7%)	1350(100.0%)

Chi-square = 7.523 p-value = 0.006

Table-3: Shows that there were 756 (56%) of female when compared to male 594 (44%) in the sample. Female respondents were at higher risk of depression as compared to male.

**Table 4: Sample distribution on the basis of socioeconomic status**

Socio economic status	Not depressed	depressed	Total
Upper class(I)	8(0.6%)	0(0.0%)	8(0.6%)
Upper middle class(II)	63(4.7%)	10(.7%)	73(5.4%)
Lower middle class(III)	233(17.3%)	33(2.4%)	266(19.7%)
Upper lower class(IV)	777(57.6%)	118(8.7%)	895(66.3%)
Lower class(V)	97(7.2%)	11(0.8%)	108(8.0%)
Total	1178(87.3%)	172(12.7%)	1350(100.0%)

Chi-square= 2.537 Exact p-value=0.628

Table-4: Indicates that majority of the people in the sample belong to Upper Lower class (66.3%), followed by lower middle class (19.7%).

**Table 5: Sample distribution on the basis of living status**

Living status	Not depressed	Depressed	Total
with Family	1109(82.1%)	161(11.9%)	1270(94.1%)
with Relatives/Friends/others	12(0.9%)	2(0.1%)	14(1.0%)
Alone	57(4.2%)	9(0.7%)	66(4.9%)
Total	1178(87.3%)	172(12.7%)	1350(100.0%)

Chi-square=0.82 P-value=0.960

Table 5: Shows that majority of population is living with family (94.1%), followed by loneliness (4.9%).

**Table 6: Sample distribution on the basis of family history of depression**

Family history of depression	Not depressed	Depressed	Total
No	1027(75.9%)	101(7.5%)	1128(83.4%)
Yes	8(0.6%)	54(4.0%)	62(5.4%)
Can't say	143(10.7%)	17(1.3%)	160(12.0%)
Total	1178(87.3%)	172(12.7%)	1350(100.0%)

Chi square=323.4

p=&lt;0.0001

Table-6: Shows that majority of respondents 62(5.4%) are having family history of depression. Family history of depression was associated with an outcome of depression.

**Table 7: Sample distribution on the basis of financial difficulties**

Financial difficulty	Not depressed	Depressed	Total
No	172(12.6%)	72(5.3%)	244(17.9%)
Yes	1006(74.7%)	100(7.4%)	1106(82.1%)
Total	1178(87.3%)	172(12.7%)	1350(100.0%)

Chi square=76.750 p=0.0001

Table-7:Indicates that majority of respondents were having financial difficulties (82.1%).

**Table 8: Sample distribution on the basis of satisfaction with work**

Satisfaction with work	Non depressed	Depression	Total
Yes	832 (61.6%)	116(8.6%)	948(70.2%)
No	330 (24.4%)	49(3.6%)	379(28.1%)
Don't know	16(1.2%)	7(.5%)	23(1.7%)
Total	1178(87.3%)	172(12.7%)	1350(100.0%)

Chi square=6.706 p-value=0.03

Table-8: Indicates that majority of respondents (70.2%) were satisfied with their work.

## DISCUSSION

The present study was carried out with an aim to determine the prevalence of depression and its associated risk factors with depression among adults in rural and urban population of Karimnagar district. The prevalence of depression was 12.7% in the current study. This is consistent with the figures reported for developing countries [10–44%] by Ruiz P, et al (2001)<sup>7</sup>. We only included the studies that were population based and from an urban and rural area. It is seen that the estimates on prevalence of depression vary widely in different populations, which could be attributed to different ethnicity and demography of the study populations and different diagnostic criteria and study instruments employed.

In a community-based study conducted by Nisar N, Billoo et al (2004) among adult women belonging to fisherman community in Karachi, Pakistan, the prevalence of depression was 7.5% using Mini International Neuropsychiatric Interview,

supplemented by ICD-10<sup>17</sup>. Depression was reported in 9.1% of individuals in Bangalore city in South India in the WHO study done by Goldberg DP, et al (1995) in 15 primary care centres<sup>5</sup>.

In a study conducted by Mirowsky J, Ross CE (1992) in Illinois in USA<sup>19</sup>, it was reported that depression reached its lowest level in the middle age at about age 45, with a rise in later life [80 years]. Our study did not show any decline in the middle age, instead there was a steady increasing trend observed with age. The mean age was  $\pm 46.57$ (Standard deviation is 16.49) and chi square was significant with an outcome of depression (p=0.009).

Several large epidemiological studies by Blazer DG, et al (1994) and Bebbington PE, Dunn G, Jenkins R, et al. (1998) have shown that women have higher depression rates than men<sup>20,21</sup>. A meta-analysis of studies conducted by Nolen-Hoeksema S (1990) in various countries has shown that women are roughly twice as likely as men to experience depression. In this

study we have looked into these factors and found that there was an increasing trend in the prevalence of depression with increasing age in female gender (8.37%), while that of men it is 4.37% which is consistent with earlier studies by Husain N, (2000)<sup>22,23</sup>.

Studies by Poongothai S, et al (2009) have shown that economic hardship is a significant cause of depression. It is possible that India being a developing country and there being an association between depression and lower socio-economic status, the prevalence of depression is seen across the lifespan. Significant differences were not noticed among the socio-economic status of the respondents.

### CONCLUSIONS

This study showed the prevalence of depression among adults found to be 12.8% in Karimnagar district. Depression was found to be more in women. The mean age distribution was 46.57± 16.49. Depression might lead to loss of interest and of initiative with consequent isolation from others. Depression grading can be done easily by PHQ-9 scale through medical and paramedical workers.

**Acknowledgement:** My sincere thanks to all the study participants for the successful completion our study.

**Source of Funding:** None

**Conflict of Interest:** None

**Ethical Clearance:** Taken from Institutional ethical committee.

### REFERENCES

1. National Institute of Mental Health (2001) The Numbers Count: Mental Disorders in America, 2001. Bethesda, MD, U.S. Dept. of Health and Human Services, national Institutes of Health, (NIH publ.no.01-4584).
2. Michaud CM, Murray CJ, Bloom BR (2001) Burden of disease: implications for future research. *JAMA* 285: 535–539.
3. Wittchen HU, Pittrow D (2002) Prevalence, recognition and management of depression in primary care in Germany: The Depression 2000 study. *Hum Psychopharmacology* 17: 1–11.
4. Berardi D, Leggieri G, Ceroni GB, Rucci P, Pezzoli A, et al. (2002) Depression in primary care—a nationwide epidemiological survey. *Fam Pract* 19: 397–400.
5. Goldberg DP, Lecrubier Y (1995) Form and frequency of mental disorders across centers. In: Ustun TB, Sartorius N, eds. *Mental Illness in general health care: An international study*. Chichester: John Wiley and Sons on behalf of the World Health Organization. pp 323–34.
6. World Health Report (2001) WHO, Geneva, Switzerland.
7. Ruiz P, ed (2001) *Ethnicity and Psychopharmacology*. Washington, DC: American Psychiatric Press.
8. The WHO World Mental Health Consortium (2004) Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization, World Mental Health Surveys. *JAMA* 291: 2581–90.
9. Muhammad Gadit AA, Mugford G (2007) Prevalence of depression among households in three capital cities of Pakistan: need to revise the mental health policy. *PLoS ONE* 2:e209.
10. Asghar S, Hussain A, Ali SM, Khan AK, Magnusson A (2007) Prevalence of depression and diabetes: a population-based study from rural Bangladesh. *Diabet Med* 24: 872–877.
11. Nakku JE, Nakasi G, Mirembe F (2006) Postpartum major depression at six weeks in primary health care: prevalence and associated factors. *Afr Health Sci* 6: 207–214.
12. Kishore J, Reddaiah VP, Kapoor V, Gill JS (1996) Characteristics of mental morbidity in a rural primary health center of Haryana, *Indian J Psychiatry* 38: 137–42.
13. Amin G, Shah S, Vankar GK (1998) The prevalence and recognition of depression in primary care *Indian J Psychiatry* 40: 364–369.
14. Pothen M, Kuruvilla A, Philip K, Joseph A, Jacob KS (2003) Common mental disorders among primary care attenders in Vellore, South India: Nature, prevalence and risk factors. *Int J Soc Psychiatry* 49: 119–125.
15. Nambi SK, Prasad J, Singh D, Abraham V, Kuruvilla A, et al. (2002) Explanatory models and common mental disorders among patients with unexplained somatic symptoms attending a primary care facility in Tamil Nadu. *Natl Med J India* 15: 331–5.
16. Patel V, Chisholm D, Kirkwood BR, Mabey D (2007) Prioritizing health problems in women in developing countries: comparing the financial burden of reproductive tract infections, anaemia and depressive disorders in a community survey in India. *Trop Med Int Health* 12: 130–139.

17. Nisar N, Billoo N, Gadit A (2004) Prevalence of depression and associated risk factors among adult women in a fishermen community. *J Pak Med Assoc* 54:519–525. ]
18. Rajala U, Uusima`ki A, Keina`nen-Kiukaanniemi S, Kivela` SL (1994) Prevalence of depression in a 55-year-old Finnish population. *Soc Psychiatry Psychiatry Epidemiology* 29: 126 130.
19. Mirowsky J, Ross CE (1992) Age and depression. *J Health Soc Behav* 33: 187–205
20. Blazer DG, Kessler RC, McGonagle KA, Swartz MS (1994) The prevalence and distribution of major depression in a national community sample: the national co morbidity survey. *Am J Psychiatry* 151: 979–986.
21. Bebbington PE, Dunn G, Jenkins R, et al. (1998) The influence of age and sex on the prevalence of depressive conditions: report from the National Survey of Psychiatric Morbidity. *Psychol Med* 28: 9–19.
22. Gadit A, Vahidy A, Shafique F (1998) Mental Health Morbidity: An experience in a community psychiatric clinic. *J Coll Phys Surg Pk* 8: 262–264.
23. Pallson S, Ostling S, Skoog I (2001) The incidence of first onset depression in a population followed from the age of 70 to 85. *Psychol Med* 31: 1159–1168.
24. Mojtabi, R., & Olsson, N. (2004). Major depression in community middle-aged and older adults: prevalence and 2 and 4 year follow-up symptoms. *Psychological Medicine*, 34, 623-634.



# Calculation of NPI Score: Prognosis of Breast Cancer

Ritu Yadav<sup>1</sup>, Rajeev Sen<sup>2</sup>, Preeti Chauhan<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Genetics, M.D. University, Rohtak, <sup>2</sup>Senior Professor, <sup>3</sup>Research Scholar Department of Genetics, M.D. University, Rohtak, Department of Pathology, Pt. B.D. Sharma University of Health Science, Rohtak

## ABSTRACT

The Nottingham Prognostic Index (NPI) is a widely used prognostic tool for stratification of breast cancer patients. Aim of this study was to compare the Nottingham Prognostic Index (NPI) score with prognosis of breast cancer and clinicopathological prognostic parameters. In the present study, One hundred twenty five breast cancer patients ranging in age from <40 to ≥60 years were evaluated. Breast cancer patients were stratified into good, moderate and poor prognosis. 46.4% frequency of patients was found with moderate prognosis, 36.8%, 16.8% frequency of patients was found in poor and good prognosis group respectively. Majority of the young patients were in poor prognosis group. Breast cancer patients with grade III showed the poor prognosis as compared with grade I and II. Poor prognosis was in positive correlation with tumor size and lymph node status. In conclusion, further combined prognostic index validation strategies are required which should be simple, accurate and have independent value as assessed by multivariate analysis.

**Keywords:** NPI Score, Prognosis, Breast Cancer

## INTRODUCTION

Breast cancer is a serious life threatening condition observed in women worldwide. It ranks second (after lung cancer) as a cause of cancer death in women. In the central region of India, 50 to 70% of breast cancer patients present in an advanced stage. Despite of having a number of treatment options, there is still exist a problem regarding decision making difficulty in most appropriate treatment choices.

The Nottingham Prognostic Index (NPI) combines lymph node status, tumor size and histological grade, reflecting metastatic behavior, growth rate and genetic instability of breast cancers<sup>1-3</sup>. Nottingham Prognostic Index (NPI) defines three subsets of patients with different probabilities of dying from breast cancer; good (≤3.4), moderate (3.41 - 5.4), and poor (> 5.4) prognosis groups<sup>4</sup>. Increase in numerical value of NPI is related with poor prognosis<sup>3</sup>. Three factors i.e. tumor

size, lymph node involvement, and histological grade were found to be independently associated with survival<sup>5</sup>. Out of these, lymph node stage has traditionally been regarded as the most powerful prognostic factor related with metastatic behavior in breast cancer. Nottingham Prognostic Index (NPI) index is simple, commonly performed procedure which could be carried out in routine laboratories. The purpose of this study was to compare the Nottingham Prognostic Index (NPI) score with prognosis of breast cancer and with clinicopathological prognostic parameters.

## MATERIALS AND METHOD

### Patients

After the permission from the Institutional human ethical committee, one hundred twenty five breast cancer patients ranging in age from <40 to ≥60 years were selected from Pt. B.D. Sharma University of Health Sciences Rohtak Haryana, for this study.

### Histological analysis

Histological assessment of tumor grade (low, intermediate, and high), tumor size (<2 cm, 2–4.9 cm, ≥5 cm) and node status (positive or negative) were

---

### Corresponding author:

**Ritu Yadav**

Assistant Professor

Department of Genetics, M.D. University, Rohtak, Haryana

E mail: ritugenetics@gmail.com

Ph. No: 91-7404240801

performed. Diagnosis age was categorized as <40, 40–49, 50–59, and ≥60 years. The histological parameters of all cases were reviewed by pathologist and the histological grade will be determined for each case according to Nottingham modification of the Bloom and Richardson Grading System.

**Nottingham Prognostic Index (NPI) scores**

The Nottingham Prognostic Index (NPI) was used to determine the prognosis status in the patients. The value was calculated for prediction of survival using three pathological characteristics: tumor size, lymph node and grade of the tumor. NPI was calculated by using the formula<sup>1</sup>.

$$NPI = [0.2 \times S] + N + G$$

Where, S is the tumor size in centimeters; N is the number of lymph node involved: 0=1, 1-3 =2, >3 = 3; G is the tumor grade: Grade I =1, Grade II = 2, Grade III =3

**RESULTS**

One hundred twenty five breast cancer patients were stratified into good, moderate and poor prognosis groups on the basis of NPI score. 46.4% frequency of patients was found with moderate prognosis. 36.8% patients were found in poor prognosis group and 16.8% frequency of patients was found in good prognosis group.

**Age**

NPI score was analyzed among the different age groups and it was observed that maximum young patients were in poor prognosis group. Poor prognosis was negatively correlated with increasing age whereas good prognosis was positively correlated with age. (Figure 1)

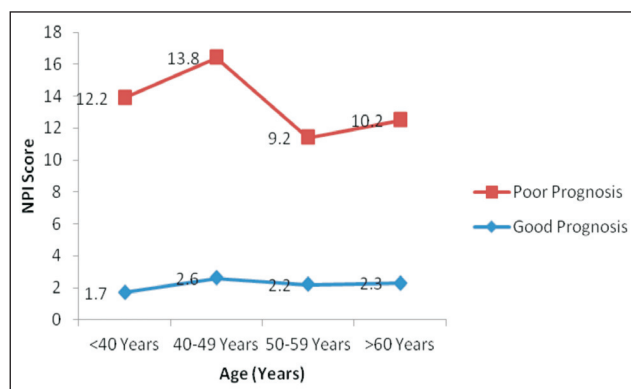


Fig. 1. NPI Score among different age groups.

**Tumor grade**

Three grade types (Grade I, II & III) were selected in the study. NPI score was analyzed among the patients with different grades. Patients with grade I showed minimum score (2.2) and maximum score (9.3). They presented a range of good to poor prognosis. Patients with grade II were with minimum score (1.7) and maximum score (1.2). They also showed good to poor prognosis. Patients having grade III showed moderate to poor prognosis with minimum score (4.8) and maximum (12.8). Breast cancer patients with grade III showed the poor prognosis as compared with grade I and II. (Figure2)

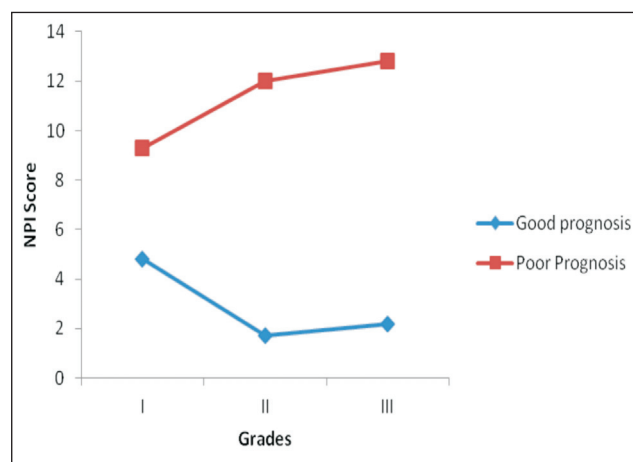


Fig. 2. NPI Score among different tumor grades.

**Tumor size**

Three sizes i.e. <2cm, 2-4.9 cm and >5cm were chosen for the study. It was found that poor prognosis was in positive correlation with tumor size. Increase in poor prognosis had been observed in increased tumor size. (Figure3)

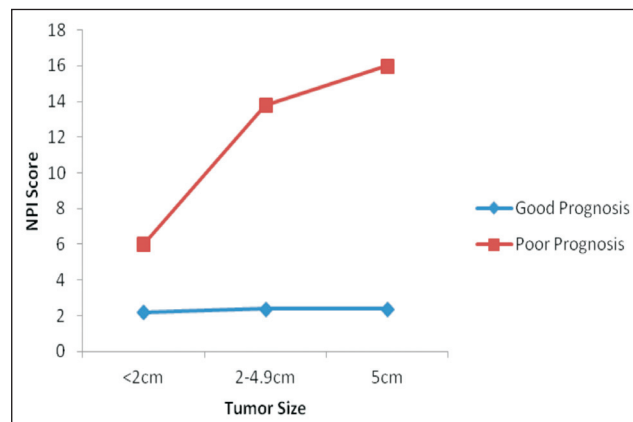


Fig. 3. NPI Score among different tumor sizes.

## Lymph node status

Two parameters (<4 & >4) were taken for lymph node positive metastasis. It has been found that as metastasis increases prognosis became more and more poor.

## DISCUSSION

Improved breast cancer treatments required integration of clinical pathology and cancer biology which could affect the patient's outcome. Our results demonstrated that NPI can provide the prognostic information which is better than the traditional methods.

The influence of age on prognosis of breast cancer is still controversial<sup>6,7</sup>. The present data have found poor prognosis in young patients. Recent studies have also shown that young age might be an adverse prognostic factor<sup>8,9</sup>. Occurrence in young age patients might be due to socioeconomic factors. Many other studies have documented the characteristics of breast cancer in young age patients could be different to older patients<sup>10,11</sup>. So there is a need to improve the treatment strategies for breast cancer in young women. For that awareness programmes as a tool for improving the current knowledge of breast cancer may be helpful.

The relationship between histopathological factors and NPI score showed the poor prognosis in breast cancer patients with grade III as compared to patients having grade I and II. Increase in size of tumor was found to be related with the poor prognosis group. These results are accordance with previous studies<sup>12-15</sup>. Prognosis was found to be significantly related with tumor size <2cm. Tumor size between 2 to 5 cm was shown moderate influence whereas no association was found in tumors size >5cm<sup>16</sup>. Relationship was found in lymph node involvement with increasing tumor size. Our results also showed association between tumor size and lymph node status. There are some controversial results in relation between tumor size and lymph node status.

## CONCLUSION

Our study provides reliable prognostic information. In addition to this there is a need of simple, accurate and combined prognostic index which should have independent value as assessed by multivariate analysis. The clinical utility and impact on health economic required to be assessed in clinical

trials. Furthermore different therapy based validation strategies are required to improve the overall survival. It has been reported that different characteristics of breast cancer are important for clinical management and their incorporation into the NPI score could significantly improve in decision making difficulty in medicine in breast cancer patients.

**Acknowledgment:** Authors are grateful to University grants commission (F-40-287/2011 (SR), New Delhi for financial support in research work. The authors acknowledge the M.D. University Rohtak and Health University, Rohtak for providing the help and support.

Source of Funding: University grants commission, New Delhi

**Conflict of Interest:** Nil

**Ethical Clearance:** Permission was obtained from the institutional ethical committee of M.D. University, Rohtak and written permission from the Health University, Rohtak.

## REFERENCES

1. Galea MH, Blamey RW, Elston CE, Ellis IO. The Nottingham Prognostic Index in primary breast cancer. *Breast Cancer Res Treat* 1992; 22(3): 207-19.
2. Miller DV, Leontovich AA, Lingle WL, Suman VJ, Mertens ML, Lillie J. Utilizing Nottingham Prognostic Index in microarray gene expression profiling of breast carcinomas. *Mod Pathol* 2004; 17(7): 756-764.
3. Lee AH, Ellis IO. The Nottingham prognostic index for invasive carcinoma of the breast. *Pathol Oncol Res* 2008; 14(2):113-115.
4. Kollias J, Murphy CA, Elston CW, Ellis IO, Robertson JF, Blamey RW. The prognosis of small primary breast cancers. *Eur J Cancer* 1999; 35(6): 908-912.
5. Okugawa H, Yamamoto D, Uemura Y, Sakaida N, Yamada M, Tanaka K. Prognostic factors in breast cancer: the value of the Nottingham Prognostic Index for patients treated in a single institution. *Surg Today* 2005; 35(11): 907-11.
6. Holli K, Isola J. Effect of age on the survival of breast cancer patients. *Eur J Cancer* 1997; 33: 425-8.
7. Kollias J, Elston CW, Ellis IO. Early-onset breast cancer histopathological and prognostic considerations. *Br J Cancer* 1997; 75: 1318-23.

8. Dubsy PC, Gnant MF, Taucher S. Young age as an independent adverse prognostic factor in premenopausal patients with breast cancer. *Clin Breast Cancer* 2002; 3: 65–72.
9. Love RR, Duc NB, Dinh NV. Young age as an adverse prognostic factor in premenopausal women with operable breast cancer. *Clin Breast Cancer* 2002; 2: 294–8.
10. Bertheau P, Seinberg SM. Breast cancer in young women: clinicopathologic correlation. *Semin Diagn Pathol* 1999; 16: 248–56.
11. Colleoni M, Rotmensz N, Robertson C. Very young women (35 years) with operable breast cancer: features of disease at presentation. *Ann Oncol* 2002; 13: 273–9.
12. Ciampi A, Lawless JF, McKinney SM, Singhal K. Regression and recursive partition strategies in the analysis of medical survival data. *J Clin Epidemiol* 1988; 41(8): 737-48.
13. Callagy GM, Pharoah PD, Pinder SE, Hsu FD, Nielsen TO, Ragaz J. Bcl-2 is a prognostic marker in breast cancer independently of the Nottingham Prognostic Index. *Clin Cancer Res* 2006; 12(8): 2468-75.
14. Cannings E, Kirkegaard T, Tovey SM, Dunne B, Cooke TG, Bartlett JM. Bad expression predicts outcome in patients treated with tamoxifen. *Breast Cancer Res Treat* 2007; 102(2):173-9.
15. Ture M, Tokatli F, Kurt I. Using Kaplan-Meier analysis together with decision tree methods (C&RT, CHAID, QUEST, C4.5 AND ID3) in determining recurrence free survival of breast cancer patients. *Expert Systems with Applications* 2009; 36: 2017-26.
16. Guerra I, Algorta J, Diaz de Otazu R, Pelayo A, Farina J. Immunohistochemical prognostic index for breast cancer in young women. *J Clin Pathol: Mol Pathol* 2003; 6: 323-327.

# A Study on Awareness and Preparedness about Global Warming among Medical Interns

Pai Divya Venkatesh<sup>1</sup>, A H Suryakantha<sup>2</sup>

<sup>1</sup>Post graduate student, <sup>2</sup>Professor, Dept. of Community medicine, SSIMS & RC, Davangere

## ABSTRACT

**Introduction:** Global warming is an emerging international public health challenge and to meet this challenge the health system requires knowledgeable and qualified staff.

**Objectives:** To study the awareness about global warming among medical interns and to study their preparedness to meet the challenge of protecting health from global warming.

**Methodology:**

**Study design:** cross- sectional study

**Materials and method:** An observational study was carried out among the interns of S.S. Institute of Medical Sciences and Research Centre, Davangere using a predesigned and pretested questionnaire. The level of awareness was used to judge their preparedness also.

**Data analysis:** Microsoft excel

**Statistical analysis:** Percentage and proportion

**Results:** Almost all the interns had heard of global warming but only 68% of them knew correctly what it is and how it is happening by human activities. 68% were aware of greenhouse gases and their effects in global warming. 49% knew correctly the health effects of global warming. Friends, media and books were the source of information for them. Only 48% knew about the preparedness against global warming.

**Conclusion:** Even though majority of interns are aware of the causes and effects of global warming, their knowledge about preparedness against that was limited

**Keywords:** Global Warming, Greenhouse Gases

## INTRODUCTION

Normally gases like carbon dioxide, methane, nitrous oxide, Chlorofluorocarbons trap sufficient heat coming from the sun to sustain life, like the green glass of a plant nursery. Therefore, they called greenhouse gases. Human activities like industrialization,

urbanization, deforestation, burning of fossil fuels, etc. have caused increase in these gases. Accumulation of these gases causes trapping of more heat from the sun thereby causing rise in the surface temperature of the earth. This phenomenon is called global warming.<sup>(1)</sup>

From the last 100 years the surface temperature of earth has raised by ½ degree Celsius. At the present rate of human activities, the earth's temperature is estimated to rise by 2.5 degree Celsius within another 50 years. This would trigger irregular and catastrophic state of global warming.<sup>(1)</sup>

Thus, Global warming is an emerging international public health challenge and to meet this challenge the

---

**Corresponding author:**

**Pai Divya Venkatesh**

Post graduate Student,

Dept. of Community Medicine,

SSIMS & RC, Davangere



health system requires knowledgeable and qualified staff.

**OBJECTIVES**

1. To study the awareness about global warming among medical interns
2. To study their preparedness to meet the challenge of protecting health from global warming

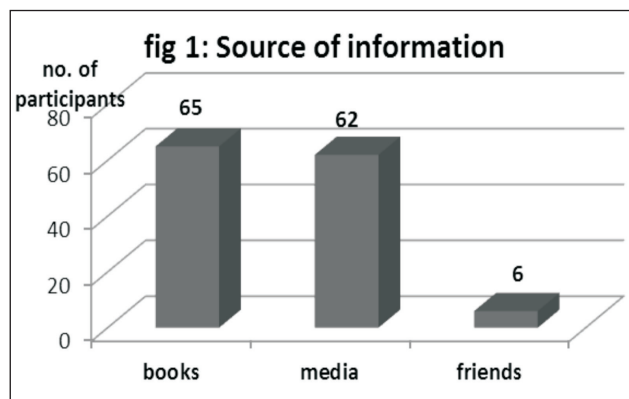
**MATERIALS AND METHOD**

The study was conducted in a private medical college in Davangere. The institutional based observational study was conducted after obtaining ethical clearance from the institutional ethical committee. All the medical interns (100) present during the survey were included in the study. They were assured that their identity would be kept confidential. A predesigned and pretested questionnaire was used to test their awareness about global warming.

The level of awareness was used to judge their preparedness. Data was analyzed using Microsoft Excel and statistical analysis was done using percentages and proportions.

**RESULTS**

The study was conducted among 100 medical interns. All of them had heard about global warming. Majority of them (65%) used books as a source of information. (Fig .1)



N= 100

Though all of them had heard about global warming only 68 % understood correctly about global warming ie., is rise in the temperature of the surface atmosphere of the earth and human activities like

industrialization, deforestation and vehicular traffic leads to it.

68% of them knew that greenhouse gases like carbon dioxide, hydrofluorocarbons and methane cause global warming by trapping of heat coming from the sun. Only 65 % of them knew correctly that global warming had an harmful effect on the ecosystem, ie. it caused acid rain, climatic change, melting of polar ice,etc.

Even though majority (68%) of the students knew about global warming only 49 % of them knew correctly that global warming had a harmful impact on health by causing vector borne diseases, respiratory diseases, waterborne diseases, etc. (Table no.1)

**Table no.1: Showing awareness about the effect of global warming on health**

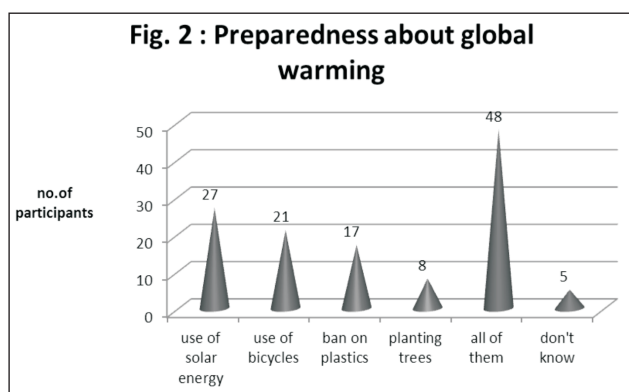
Adverse effects of global warming	Correct Response (in percentage)
Vector borne diseases	2
Waterborne diseases	6
Respiratory diseases	12
Vector borne diseases, waterborne diseases, respiratory diseases	49
None	18
Don't know	13

50 % of them knew that all forms of life ie, aquatic animals, plants and human beings are in danger. Hardly 48% of them knew correctly that global warming could be prevented by measures such as reducing industries, vehicles and by reforestation. (Table no. 2)

**Table no.2: Showing awareness about measures to be taken to prevent global warming**

Preventive measures	Correct Response (in percentage)
Reducing industries	12
Reducing vehicles	18
Reforestation	27
Reducing industries, reducing vehicles and reforestation	48
None	1
Don't know	1

Inspite of being aware about global warming very few (48%) of them knew correctly about their role in the prevention of global warming by encouraging planting of trees, use of bicycles, use of solar energy and ban on plastics.(fig.2)



N=100

## DISCUSSION

Normally the greenhouse gases trap sufficient heat on the surface of the earth to sustain life on earth. The earth's overall surface temperature is 15 degree Celsius and is being maintained by carbon cycle and polar ice caps.

It took nearly 800 years to raise the surface temperature of earth by 1 degree Celsius. From the last 100 years, the surface temperature has risen by ½ degree Celsius and it is estimated that within another 50 years, the surface temperature would rise by 2 degree Celsius. At this rate, all forms of life on earth will be in danger and ultimately it could trigger irreversible and catastrophic state of global warming. The earth which was like an ice box has started burning.

This is evidenced by the fact that there has been increasing incidence of respiratory, alimentary and vector borne disease. Climatic change due to global warming in middle income countries have caused over 1, 50,000 deaths and 5 million DALYs during year 2000.<sup>(2)</sup>

There was unusual high level of dengue fever and Dengue Hemorrhagic Fever in 1998. In 1995, a heat wave in Chicago, US, caused 514 heat related deaths (12/ lakh population) and 3300 excess emergency admissions. The very young, the very old and the frail are most susceptible.

The climatic changes due to global warming have been increasing the disasters like droughts, floods, storms, bushfires, etc. Infectious diseases have been increasing, as evidenced by El Nino phenomenon, (ie, abnormal warming of surface ocean waters)<sup>(3)</sup> Global warming also causes depletion of ozone resulting in

increasing incidence of skin cancer and progression of various autoimmune diseases.<sup>(4)</sup>

Global warming is a significant and emerging threat to public health. Health professionals are on the front line in dealing with the impacts of global warming. The present study showed that 68 % of medical interns are aware of greenhouse gases and the causes of global warming, books being their source of information. Only 49 % of them are aware of the health impacts of global warming. But their knowledge about adaptation plans (health protection) against global warming is limited. This may be due to lack of the chapter in the medical curriculum.

Whereas, a study conducted by Majra JP showed that 90 % of the medical interns were aware of the cause of climatic changes, 78 % of them were aware of the health impacts of climatic changes but their knowledge regarding health protection measures ( adaptation plans ) against global warming was limited .<sup>(4)</sup>

Whereas, a study conducted by Pandve HT, et al on the medical students showed that 246 (98.40%) students were aware about global warming, while 245 (98%) students opined that human activities are contributing to climate change. The commonest source of information about climate change was newspaper and magazines (78.20%), followed by television (75.70%), Internet (45.10%), radio (24.4%), and scientific journal (21.1%). According to 88.5% of the students, education and awareness regarding climate change are the most effective strategies in tackling climate change issues, followed by lifestyle changes (63.20%), international partnership (22.2%), and more research in climate change (18.4%).<sup>(5)</sup>

In the study by Pandve et al., about 54.5% of the respondents believed that youth could play a major role in combating climate change.<sup>(6)</sup>

## CONCLUSION AND RECOMMENDATIONS

The present study reveals that even though a majority of interns are aware of the causes and effects of global warming, their knowledge about health protection was limited. This may be due to lack of the topic in the curriculum. So, chapter on global warming and adaptation plans must be include in the medical curriculum. Since global warming affects health of all the people, population strategy should be implemented before it is too late.

**Acknowledgement:** None

**Conflict of Interest:** None declared

**Source of Funding:** Nil

#### REFERENCES

1. Suryakantha AH . Community Medicine with Recent Advances. Jaypee brothers Medical Publishers(P) Ltd. 2<sup>nd</sup> ed.850-2.
2. World Health Organization. World Health Report 2002. Geneva;WHO: 2002.
3. Bouna MJ, Van Der Kaay HJ . Epidemic Malaria in India's Thar Desert. *Lancet* 1995; 373:132-3.
4. Majra JP, Acharya D. Protecting health from climate change: Preparedness of medical interns. *Indian J Community Med* 2009; 34:317-20.
5. Pandve HT, Raut A. Assessment of awareness regarding climate change and its health hazards among the medical students. *Indian J Occup Environ Med* 2011; 15(1):42-5.
6. Pandve HT, Deshmukh PR, Pandve RT, Patil NR. Role of youth in combating climate change. *Indian J Occup Environ Med* 2009;13:105

# A Study on Detection of Protein Energy Malnutrition in 1-5 Years of Age Group and Nutritional Intervention to the Same Age Children in Rural and Urban Field Practice Areas of Rajiv Gandhi Institute of Medical Sciences, Kadapa

K Chandra Sekhar<sup>1</sup>, C Bala Krishna<sup>2</sup>, K J Kishore Kumar<sup>3</sup>, Suresh Kumbhar<sup>4</sup>, Devidas<sup>5</sup>

<sup>1</sup>Associate Professor, Alluri Sita Rama Raju Academy of Medical Sciences, Eluru, <sup>2</sup>Prof & HOD, Rajiv Gandhi Institute of Medical Sciences, Kadapa, <sup>3</sup>Asso.Professor, Kakatiya Medical College, Warangal, <sup>4</sup>Associate Professor, ESIC Medical College, PGIMSR, Bangalore, <sup>5</sup>Asst.Professor, Rajiv Gandhi Institute of Medical Sciences, Kadapa

## ABSTRACT

**Introduction:** Protein energy malnutrition (PEM) has been identified as a major public health problem in India and developing countries. It occurs particularly in weaklings and less than five years of children and growing children particularly. During 2000-07, more than 25% of the world's children under the age of 5 years were underweight.

**Objectives:** 1. To know the prevalence of protein energy malnutrition in rural and urban areas of Kadapa district. 2. To check the nutritional status improvement following anganwadi center food supplementation.

**Materials & Method:** This present community based cohort study was carried out in Rural Health Centre, chennuru and Urban Health Centre area, Akkayapalli area during the year April 2009 to March 2010. Sample size in this study was 503 in rural and urban areas using cluster sampling method and house to house survey conducted. Importance of the study was explained to all the patients and informed consent was taken and diagnostic criteria for protein energy malnutrition was based on mid arm circumference. Results were analyzed with Microsoft Excel 2007 version and necessary statistical tests were applied.

**Results:** Out of 503 children in urban and rural areas, Prevalence of PEM in the urban population was 24.2% and prevalence of PEM in rural area was 47.3%. PEM was more in rural female children and statistically significant association was found between female sex and PEM ( $P < 0.05$ ). In the urban study population, before supplementation of food, the prevalence of PEM in urban area was 24.2% with following supplementation of food for 6 months the PEM was 16.3%. In the rural area, before supplementation of food, the prevalence of PEM in rural area was 47.3%, with following supplementation of food the PEM was 40.3%.

**Conclusions:** The prevalence of Protein energy malnutrition was found to be higher in both urban and rural areas. Nutritional supplementation has impact in the reduction of PEM and this association was statistically significant. So that simple life style modifications and nutritional advice to the mothers can be initiated as early as possible and periodical growth monitoring by anganwadi workers and active participation by mothers also required.

**Keywords:** Age, Sex, Education, SES, Breast Feeding, Weaning, Nutritional Supplementation

---

## Corresponding author:

K Chandra Sekhar

Associate Professor

Department of Community Medicine, Alluri Sita Rama Raju Academy of Medical Sciences, Eluru

E-mail: cskalevaru@yahoo.com

Mobile No: 09849360226

## INTRODUCTION

Protein energy malnutrition (PEM) has been identified as a major public health problem in India and developing countries. The proportion of PEM ranged from 1% of children in developed countries to 26% of children in developing countries and it exhibits

tip of Iceberg phenomenon of the disease. It occurs particularly in weaklings and less than five years of children and growing children. Cases with mild-to-moderate malnutrition are likely to remain unrecognized because clinical criteria for their diagnosis are imprecise and are difficult to interpret accurately.

Maternal education is significantly related to early childhood morbidity and mortality. In Bangladesh, most mothers do not have a correct knowledge on exclusive breastfeeding and the appropriate time for introduction of weaning foods in rural area<sup>1</sup>. Another study conducted in the rural population reported that according to Gomez classification, 96% of children had varying degrees of protein energy malnutrition (PEM) (28.4% mild, 58.2% moderate and 9.2% severe)<sup>2</sup>. Timely weaning, education and promotion of essential vaccination may reduce childhood malnutrition, especially severe PEM. It has been reported that the prevalence of breastfeeding in Bangladesh is highest in the world where diarrheal diseases are hyper-endemic and issues of breastfeeding in several diarrheal diseases have been well documented<sup>3</sup>.

The questionnaire included information about breast feeding like exclusive breastfeeding, weaning and feeding. As regards weaning practices, about 38% were found not giving their babies supplementary food and almost one-third did not know the beneficial effects of fruits and vegetables for their babies. The low income and high illiteracy among rural mothers were found to affect the rearing practices and also nutrition during pregnancy and lactation. More studies are needed to confirm our findings and it is important to initiate programs for educating mothers with special emphasis on energy dense food during pregnancy, lactation and under five years of children and control of infections, importance of supplementary foods.

Keeping the above facts in mind, the study was planned to know the prevalence of Protein energy malnutrition in rural and urban areas of Kadapa district among the under five years of children.

## OBJECTIVES

1. To know the prevalence of protein energy malnutrition in rural and urban areas of Kadapa district.
2. To check the nutritional status improvement following anganwadi center food supplementation.

## MATERIALS AND METHOD

This present community based cohort study was carried out in Rural Health Centre, chennuru and Urban Health Centre area, Akkayapalli area during the year April 2009 to March 2010 using the Cluster sampling method. The population coverage of Urban Health Centre is about 38,246. Initially, a pilot study was conducted to pretest the proforma and to have a rough estimate of the prevalence of Protein energy malnutrition, the prevalence was found to be 50%. In this pilot study, prevalence was shown to be 50%, and allowable error taken as 10% and formulae used here is  $4PQ / L^2$ .

Finally sample size in this study was 503 and the actual study was started after making necessary corrections and advises. The prevalence in the urban area was shown to be 26%. Sample size was calculated based on the above formulae and sample arrived was 503. The study was approved by the ethical committee of the Rajiv Gandhi Institute of Medical Sciences, Kadapa.

A house-to house survey was carried out. After obtaining written informed consent from the head of the household, information about the socio-demographic characteristics were recorded in the predesigned, pretested proforma. For PEM detection, mid arm circumference was taken and graded into normal, mild to moderate and severe malnutrition of the individuals was considered. The statistical analyses were done using Chi-square test, mean, Proportions etc.

**Table 1. Sex wise distribution of Protein Energy Malnutrition (PEM)**

Sex	PEM Urban		PEM Rural	
	Present	Absent	Present	Absent
Male	63(22.4%)	218(77.6%)	113(42.2%)	155(57.8%)
Female	59 (20.9%)	163(79.1%)	125(46.7%)	110(53.3%)
Total	122(24.2 %)	381(75.8%)	238(47.3%)	265(52.3%)

$\chi^2=4.11, 1df, P<0.05,$

Of these, Prevalence of PEM in the urban population was 24.2% and prevalence of PEM in rural area was 47.3%. PEM was more among females in rural

area. Statistically significant association was found between the protein energy malnutrition and female sex in rural area.



**Table 2. Literacy status of the mother in study population:**

Level of Education of Mother	PEM Urban		PEM Rural	
	Present	Absent	Present	Absent
Illiterate	40(27.2%)	107(72.8%)	98(47.8%)	107(52.2%)
Primary school	34(25.5%)	99(74.5%)	56(46.6%)	64(53.4%)
Middle school	24(25.5%)	70(74.5%)	29(46%)	34(54%)
High school	13(22.4%)	45(77.6%)	23(46.9%)	26(53.1%)
Intermediate	08(15.3%)	44(84.7%)	20(50%)	20(50%)
Degree	03(15.7%)	16(84.3%)	12(46.1%)	14(53.9%)
Total	122(24.2%)	381(75.8%)	238(47.3%)	265(52.7%)

This table reveals that among urban area residents, prevalence of PEM in illiterate mothers was 27.2% and degree completed individuals was 15.7%. But,

in rural area, the prevalence of PEM in illiterate mothers was about 47.8% and in degree completed people was 46.1%.

**Table 3. PEM according to per capita income (B.G.Prasad classification)**

Per capita income per month	PEM Urban		PEM Rural	
	Present	Absent	Present	Absent
>2245	22(17.6%)	103(82.7%)	32(33%)	65(67%)
1223-2444	13(19.1%)	55(80.9%)	39(60%)	26(40%)
734-1222	30(24%)	95(76%)	61(48.4%)	65(51.6%)
367-733	34(25.1%)	101(74.9%)	78(49.6%)	79(50.4%)
<366	23 (46%)	27 (54%)	28(48.2%)	30(51.8%)
Total	122(24.2%)	381(75.8%)	238(47.3%)	265(52.7%)

$\chi^2=16.92$  and  $\chi^2=12.62$ , 4df,  $P<0.01$ .

In the present study, about 17.6% of PEM cases belonging to upper class in urban area. About 33% of PEM cases were belongs to upper class in rural areas.

**Table 4. Continuation of breast feeding in the study population**

Continuation of breast feeding	PEM Urban		PEM Rural	
	Present	Absent	Present	Absent
6 months	105(25.8%)	301(74.2%)	165(47.8%)	180(52.2%)
6-12 months	8(19%)	34(81%)	63(48.8%)	66(51.2%)
1-2 yrs	9(16.3%)	46(83.7%)	10(34.4%)	19(65.6%)
Total	122(24.2%)	381(75.8%)	238(47.3%)	265(52.7%)

In the study population the prevalence of PEM in less than 6 months of breast feeding was about 25.8% in urban areas. The prevalence of PEM in less than 6 months of breast feeding was 47.8% in rural areas.

**Table 5. Weaning in relation to PEM**

Weaning	PEM Urban		PEM Rural	
	Present	Absent	Present	Absent
4 <sup>th</sup> month	16(30.7%)	36(69.3%)	23(47.9%)	25(52.1%)
5 <sup>th</sup> month	19(31.1%)	42(68.9%)	44(44.4%)	55(55.6%)
6 <sup>th</sup> month	39(27.2%)	94(72.8%)	59(45.3%)	71(54.7%)
7 <sup>th</sup> month & above	48(18.6%)	209(81.4%)	102(45.1%)	124(54.9%)
Total	122(24.2%)	381(75.8%)	238(47.3%)	265(52.3%)

$\chi^2=8.90$ , 1df,  $P<0.02$ ;  $\chi^2=3.70$ , 1df,  $P>0.05$

In the study population of urban areas, the prevalence of PEM in relation to weaning those started at 4 months PEM was 30.7% and in rural area, the prevalence of PEM among weaning those started at 4 months PEM was 47.9%.

**Table 6. Type of weaning food in relation to PEM.**

Type of weaning food	PEM Urban		PEM Rural	
	Present	Absent	Present	Absent
Domestic food	64(24.6%)	196(75.4%)	121(45.8%)	143(54.2%)
Cerelac/artificial	58(23.8%)	185(76.2%)	117(48.9%)	122(51.1%)
Total	122(24.2%)	381(75.8%)	238(47.3%)	265(52.3%)

$\chi^2=0.51$ , 1df,  $p>0.05$ ;  $\chi^2=0.4$ , 1df,  $P>0.05$

In the study population, there was no significant association was found between domestic food weaning and artificial food weaning in relation to PEM in both rural and urban areas.

**Table 7. Mid arm circumference in relation to gradient of PEM.**

MAC	Urban	Rural
<12.5cm(Severe PEM)	36(7.1%)	94(18.6%)
12.5 to 13.5cm(Mild to Moderate)	86(17.1%)	144(28.6%)
> 13.5cm(Normal)	381(75.8%)	265(52.8%)
Total	503(100%)	503(100%)

$\chi^2=61.33$ , 2df,  $P<0.0001$

In the urban study population, about 7.1% of PEM individuals were belongs to severe PEM and 17.1% individuals were mild to moderate PEM. In the rural areas, about 18.6% of PEM individuals were belongs to severe PEM and 28.6% individuals were mild to moderate PEM.

**Table 8. Nutritional intervention versus Urban PEM cases:**

Nut. Supplementation	PEM Present	PEM Absent	Total
Before Supplementation	122(24.2%)	381(75.6%)	503(100%)
After supplementation	82(16.3%)	421(83.7%)	503(100%)

$\chi^2=9.84$ , 1df,  $P<0.05$

In the urban study population, before supplementation of food, the prevalence of PEM in urban area was 24.2%, following supplementation of food for 6 months then the PEM was 16.3%.

**Table 9. Nutritional supplementation versus Rural PEM cases:**

Nut. Supplementation	PEM Present	PEM Absent	Total
Before Supplementation	238(47.3%)	265(52.7%)	503(100%)
After supplementation	203(40.3%)	300(59.7%)	503(100%)

$\chi^2=3.95$ , 1df,  $P<0.05$

In the rural study population, before supplementation of food, the prevalence of PEM in rural area was 47.3%, following supplementation of food for 6 months then the PEM was 40.3%.

## DISCUSSION

Protein Energy Malnutrition (PEM) has been identified as a major health and nutritional problem in India. It is an important cause of childhood morbidity and mortality, but leads also to permanent impairment of physical and possibly of mental growth of these who survive<sup>10</sup>.

Prevalence of malnutrition in the urban study population was found to 24.2% and rural area the prevalence of PEM was 47.3%. In the present study in Urban area, severe malnutrition was 7.1%, mild to moderate malnutrition was 17.1% and in rural area severe malnutrition was 18.6%, mild to moderate malnutrition was 28.6%.<sup>3</sup> Iqbal Hossain M et al conducted a study in Bangladesh revealed that another study conducted in the rural population reported that according to Gomez classification, 96% of children had varying degrees of protein energy malnutrition (28.4% mild, 58.2% moderate and 9.2% severe)<sup>2</sup>.

In the present study there was a gradual increase in Protein energy malnutrition among females was 52.6% and 47.4% in males in rural areas. The observed difference between the protein energy malnutrition and female sex was statistically significant ( $p < 0.05$ ). Similar finding was observed with Keller W, Fillmore CN Prevalence of protein-energy malnutrition. World Health Statistics report in the year 1993<sup>9</sup>.

In the present study, among urban area, prevalence of PEM in illiterate mothers was 27.2% and degree completed individuals was 15.7%. But, in rural area, the prevalence of PEM in illiterate mothers was about 47.8% and in degree completed families the prevalence of PEM was 46.1%. Maternal literacy has been influencing the nutritional status of children. Food consumption pattern was found to be better in children with literate mothers as compared to illiterate mothers<sup>10,11</sup>.

In the present study, about 17.6% of PEM cases belonging to upper class in urban area, about 33% of PEM cases were belongs to upper class in rural area. Low socio economic status and Protein energy malnutrition was statistically significant ( $P < 0.01$ ). In the study population the prevalence of PEM in less than 6 months of breast feeding was about 25.8% in urban areas. In the study population the prevalence of PEM in less than 6 months of breast feeding was about 47.8% in rural areas.

In the urban study population, before supplementation of food, the prevalence of PEM in urban area was 24.2%, following supplementation of food for 6 months then the PEM was 16.3%. In the rural area, before supplementation of food, the prevalence of PEM in rural area was 47.3%, following supplementation of food for 6 months then the PEM was 40.3%. Nutritional supplementation has impact in the reduction of PEM and this association was statistically significant.

Dc Onis M, Monteiro C, Ankre et al conducted a study in the year 1993 revealed that role of developmental stimulation and nutritional supplementation in rehabilitation of malnourished children in the hospital and community settings, showed both the interventions to produce a significant positive impact on growth and development reduced significantly after the interventions in the rural and urban areas<sup>12</sup>. A study conducted in Gaza in the year 1988 by Gayle HD, Binkin NJ, Staehling NW observed

that growth monitoring significantly reduces the PEM<sup>13</sup>.

Peripheral MCH functionaries should be supported by electronic and mass media to play an important role in dissemination of correct messages on breastfeeding and weaning of young children. Every endeavour should be made to combat this problem through multi pronged approach like growth monitoring, nutritional supplementation, and nutritional rehabilitation and nutrition education.

## CONCLUSIONS

Prevalence of malnutrition in the urban study population was found to 24.2% and rural area the prevalence of PEM was 47.3%. Appropriate time of weaning significantly reduces the PEM in urban and rural areas. No significant impact on artificial feeds in the reduction of PEM. Nutritional supplementation has impact in the reduction of PEM in urban and rural area and this association was statistically significant. Based on the above results, there is a need of developing nutritional and health education messages through existing infrastructure of MCH functionaries like Auxillary Nurse Midwife, Anganwadi Workers and voluntary health workers for prevention of under nutrition.

**Acknowledgement:** My sincere thanks to Department for international development (DFID) agency for providing the funds and encouragement of the research.

**Source of Funding:** Thanks to Department for international development (DFID) agency for providing the funds and encouragement of the research.

**Conflict of Interest:** None

## REFERENCES

1. Das DK, Ahmed S. Knowledge and attitude of the Bangladeshi rural mothers regarding breastfeeding and weaning. *Indian J Pediatr* 1995; 62(2): 213-7.
2. Iqbal Hossain M, Yasmin R, Kabir I. Nutritional and immunization status, weaning practices and socio-economic conditions of under five children in three villages of Bangladesh. *Indian J Public Health* 1999; 43(1): 37-41.

3. Mitra AK, Rabbani F. The importance of breastfeeding in minimizing mortality and morbidity from diarrhoeal diseases: the Bangladesh perspective. *J Diarrhoeal Dis Res* 1995; 13(1): 1-2. *Ibrahim Med. Coll. J.* 2008; 2(1): 35-36
4. Behrman RE, Kliegman RM, Jenson HB, editors. *Nelson's Textbook of pediatrics*. 16th ed. Philadelphia: Saunders, 2000:32-50.
5. Gorstein J. Assessment of nutritional status: effects of different methods to determine age on the classification of undernutrition. *Bull World Health Organ* 1989;67:143-50.
6. World Health Organization. *Measuring change in nutritional status: guidelines for assessing the nutritional impact of supplementary feeding programmes vulnerable groups*. Geneva: World Health Organization, 1983. 101 p.
7. Waterlow JC. Classification and definition of protein-calorie malnutrition. *Br Med J* 1972;3: 566-9.
8. World Health Organization. *Use and interpretation of anthropometric indicators of nutritional status*. *Bull World Health Organ* 1986;64:929-41.
9. Keller W, Fillmore CN. Prevalence of protein-energy malnutrition. *World Health Stat Q* 1993;36:129-67.
10. Park K. *Park's Textbook of preventive and social medicine*. 21<sup>st</sup> ed. Jabalpur: Banarsidas Bhanot, 2011:590-93.
11. National family health survey, Karnataka, 1992-93. Bangalore: Population Research Centre, Institute for Social and Economic Change, 1995. 302 p.
12. De Onis M, Monteiro C, Akre J, Glugston G. The worldwide magnitude of protein-energy malnutrition: an overview from the WHO global database on child growth. *Bull World Health Organ* 1993;71:703-12.
13. Gayle HD, Binkin NJ, Staehling NW, Trowbridge FL. Arm circumference versus weight-for-height in nutritional assessment: are findings comparable? *J Trop Paediatr* 1988;34:213-7.
14. UNICEF (2009), *State of world children 2009*.

# Lowered Platelet Count as a Prognostic Factor in Pregnancy Induced Hypertension - a Prospective Study

Saroja C Kamatar<sup>1</sup>, Rajesh B P<sup>2</sup>, V S Raju<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Obstetrics and Gynaecology, <sup>2</sup>Assistant Professor, Department of Pulmonary Medicine, <sup>3</sup>Professor, Department of Obstetrics and Gynaecology, J J M Medical College, Davangere

## ABSTRACT

Hypertensive disorders of pregnancy are a common complication affecting 5 to 10% of all pregnancies. Maternal complications range from abruption of placenta, DIC, eclampsia, renal failure, pulmonary edema to death. Neonatal complications can range from IUGR, preterm delivery and death. In pregnancy induced hypertension (PIH), due to a slow process of consumption coagulopathy, reduced platelet count becomes an early feature of the disease. Hence lowered platelet count may have a prognostic value in PIH.

An institutional based prospective study was conducted during the period of Aug-2005 to Aug-2007. Platelet counts were compared between women having normal pregnancy and Pregnancy induced hypertension (PIH) during the third trimester.

In the present study we observed 54% of mild PE, 40% severe PE and 6% eclampsia cases. All cases showed decreasing trend in platelet count as pregnancy advanced. Mild PE and normotensive women had similar counts of safe threshold (> 1.5 lakhs) with no complications and managed conservatively. Mild PE cases with lowered count (1-1.5 lakhs) progressed to severe PE. Severe PE cases with platelet count < 1 lakh progressed to eclampsia and developed partial HELLP syndrome. Hence platelet count need to be done in all PIH patients and serially monitored. Decreasing platelet count may be seen prior to the onset of clinical severity and serve as a prognostic factor in PIH.

**Keywords:** PIH, Platelet Count, Eclampsia, HELLP Syndrome

## INTRODUCTION

Pregnancy induced hypertension (PIH) still remains a nightmare for every obstetrician in spite of advances in medical science. It is a common complication affecting 5 to 10% of all pregnancies<sup>1</sup>. 30% are due to chronic hypertension and 70% are due to gestational hypertension-preeclampsia<sup>2</sup>. The incidence is high in developing countries as compared to developed. The spectrum of disease ranges from mildly elevated blood pressures with minimal clinical

significance to severe hypertension and multi-organ dysfunction. Understanding the disease process and the impact of hypertensive disorders on pregnancy is of utmost importance, as these disorders account to 15% of maternal morbidity and mortality worldwide<sup>3</sup>.

To date various methods have been quoted and practiced to identify women at risk of developing PIH. But once identified, there have been few methods or tests to determine the prognosis and severity of PIH. In normal pregnancy, average platelet count remained static or decreased to 213,000/mm<sup>3</sup>. Fall in platelet count by 15% called gestational thrombocytopenia (116,000 /mm<sup>3</sup>) was due to platelet consumption.

PIH causes thrombocytopenia which is life threatening and results from platelet activation, aggregation and consumption that is accompanied by decreased platelet count and decreased life span<sup>4</sup>. Levels of platelet activating factors are also increased<sup>5</sup>.

---

### Corresponding author:

**Saroja C Kamatar**

Assistant Professor

Department of Obstetrics and Gynaecology

J M Medical College, Davangere -577004

Karnataka

Mob: 09886710853, Fax: 08192-231388

E-mail: saroja.kamatar7@gmail.com



In PIH, due to a slow process of consumption coagulopathy, reduced platelet count becomes an early feature of the disease<sup>6</sup>. Thus, the present study was carried out with an objective to know variation in platelet count of normal and PIH women, to know the relation of platelet count and severity of PIH and to correlate the prognosis in antenatal period.

## METHODOLOGY

### Source of data

A prospective study was conducted in the Dept. of OBG, JJM Medical College, Davangere, Karnataka, from August 2005 to August 2007.

### Procedure

### Inclusion criteria

The study group included 50 women with PIH according to ACOG classification.<sup>7</sup> the control group included 50 randomly selected women with normal pregnancy (normotensive and non proteinuria).

### Exclusion criteria

Women with hemorrhagic disorders, thromboembolic episodes, epilepsy, hepatic or renal disorders and drug intake (myelosuppressives) were excluded.

They were briefed about the study and consent taken. History was taken regarding age, parity, duration of pregnancy, symptoms and signs of PIH. Examination and investigations were done according to proforma that was predesigned and pretested. Women in study group were divided into mild PE, severe PE and eclampsia group based on the ACOG criteria.

Patients were evaluated during the antenatal visits with history, symptoms or signs of severity of disease, clinically examined and necessary specific investigations like LFT, RFT, serum uric acid, and complete haemogram were done to assess the complications. Platelet count was done manually<sup>8,9</sup> from blood samples taken every four weeks during the 3<sup>rd</sup> trimester till delivery.

**Statistical Analysis:** Chi-square test was used for testing the relationship between platelet counts and PIH. Prognostic validity tests were performed to assess

the role of platelet count and PIH. A value of 0.05 or less was considered significant.

## RESULTS

Platelet counts were done at 4 weekly intervals in study and control group. The mean platelet counts were compared. There was a decreasing trend in platelet count in both the study and control group. In the control group, the mean platelet count of the first sample was 2.52 lakhs / mm<sup>3</sup> which decreased to 2.30 lakhs / mm<sup>3</sup> in the 4<sup>th</sup> sample during delivery. In the study group, the mean platelet count of the first sample was 2.27 lakhs / mm<sup>3</sup> which decreased to 1.77 lakhs / mm<sup>3</sup>. When compared to the control, the study group had lower counts in all the 4 samples (Table 1).

Study group was divided into mild and severe PE. The mean platelet counts of all the four counts were calculated among the mild PE, severe PE and control group. The mean platelet count of mild PE cases was 2.35 in the 1<sup>st</sup> sample which decreased to 2.01 lakhs / mm<sup>3</sup> in 4<sup>th</sup> sample. The mean platelet count for severe PE in 1<sup>st</sup> sample was 2.18 which decreased to 1.52 lakhs / mm<sup>3</sup> in 4<sup>th</sup> sample. The mean platelet count for control group was 2.52 which decreased to 2.10 lakhs / mm<sup>3</sup> in 4<sup>th</sup> sample. Mild PE and control group almost had similar counts in all the 4 samples. Severe PE patients had lower platelet count when compared to both control and mild PE patients (Table 2).

The study group of 50 women with PIH was distributed into mild PE, severe PE and eclampsia. Mean platelet counts were compared using the chi-square test. There was a significant difference between the platelet count of severe PE (0.001), eclampsia (0.021) and mild PE (0.004) when compared to the control group. There was a significant difference between the platelet count of mild and severe PE ( $p = 0.001$ ), mild PE and eclampsia ( $p=0.05$ ). Between severe PE and eclampsia, there was no significant statistical difference ( $p > 0.05$ ) (Table 3).

Platelet counts were divided into three groups as < 1 lakh (Thrombocytopenia), 1- 1.5 lakh and more than 1.5 lakhs / mm<sup>3</sup>. Patients from the control and study group were categorized according to the level of platelet counts. In the control group ( $n = 50$ ), 88% of patient had platelet count of >1.5 lakhs and 6% had counts between 1 – 1.5 lakh / mm<sup>3</sup>. None of the patients had counts < 1 lakh / mm<sup>3</sup>. In the study

group, 88.9% of mild PE (n = 27) had platelet counts of > 1.5 lakhs / mm<sup>3</sup>, 11% had counts between 1 – 1.5 lakhs/mm<sup>3</sup> and none had counts < 1 lakh / mm<sup>3</sup>. Among the severe PE cases (n = 20), 45% had counts of >1.5 lakhs / mm<sup>3</sup>, 50% had counts between 1 – 1.5 and 5% had counts < 1 lakh / mm<sup>3</sup>. Among the eclampsia cases (n = 3), 33% had platelet counts of > 1.5 lakhs / mm<sup>3</sup> and 66.7% between 1 – 1.5 lakhs / mm<sup>3</sup>. Minimum counts were seen in severe PE and eclampsia (Table 4).

Among 27 mild PE cases, 12 progressed to severe PE. The mean platelet count of the 1<sup>st</sup> sample when diagnosed as mild PE was 2.2 lakhs. The count declined to 1.5 lakhs / mm<sup>3</sup> as mild PE progressed to severe PE. Further decline in platelet count was found as pregnancy progressed. 3 cases had partial HELLP syndrome, and 6 had elevated liver enzymes only. Among 20 cases of severe PE, 3 had partial HELLP, 10

had elevated liver enzymes, and 1 case had both elevated liver enzymes and LP. 1 case developed eclampsia, with a platelet count of 80,000 / mm<sup>3</sup> which was clinically significant. (Table 5)

Among the 3 eclampsia cases, 2 had EL enzymes only with mean platelet count of 1.1 lakhs / mm<sup>3</sup>. Only 1 case of eclampsia with thrombocytopenia underwent emergency caesarean delivery.

Patients in the study group were categorized into 3 class of HELLP syndrome according to the platelet count. No cases were seen in class I. 3 (6%) cases belonged to class II (2 cases were of severe PE and 1 of eclampsia) and all these cases had emergency caesarean delivery. 14 cases (28%) belonged to class III and were managed conservatively. In the study group, 6 cases had partial HELLP (low platelet counts of 1.5 lakhs / mm<sup>3</sup> with EL enzymes) but were not in the significant thrombocytopenic range.

**Table 1: Comparison of platelet counts between study and control group (Platelet counts at 4 weekly intervals and mean platelet count)**

Group (n)	Platelet count (lakhs / mm <sup>3</sup> )				
	I	II	III	IV	Av.
Study (50)	2.27 ± 0.16	2.16 ± 0.20	1.96 ± 0.29	1.77 ± 0.38	2.04 ± 0.23
Control(50)	2.52 ± 0.23	2.38 ± 0.20	2.26 ± 0.22	2.10 ± 0.27	2.32 ± 0.21
P value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

\* Unpaired' test

**Table 2: Comparison of platelet count among the study group (mild PE, severe PE) and control group**

Group (n=50)	Platelet count (lakhs / mm <sup>3</sup> )			
	I	II	III	IV
Mild PE(27)	2.35 ± 0.14	2.28 ± 0.13	2.13 ± 0.17	2.01 ± 0.23
Severe PE(20)	2.18 ± 0.11	2.04 ± 18	1.78 ± 0.25	1.52 ± 0.29
Control	2.52 ± 0.23	2.38 ± 0.20	2.26 ± 0.22	2.10 ± 0.27

**Table 3: Comparison of platelet count in study and control group**

Group	No. of case	Mean ± SD platelet count	t* value	P value
Mild PE	27	2.19 ± 0.14	3.02	0.004 (p < 0.001)
Severe PE	20	1.88 ± 0.17	9.07	< 0.001
Eclampsia	3	1.68 ± 0.15	6.87	0.021 (p < 0.05)
Control	50	2.32 ± 0.21	-	-

**Table 4: Comparison of level of platelet counts between the study and control group.**

Platelet count (lakhs / mm <sup>3</sup> )	Mild (27)	Severe (20)	Eclampsia (3)	Control (50)
> 1.5	24 (88.9)	9 (45)	1 (33.3)	44 (88)
1 – 1.5	3 (11)	10 (50)	2 (66.7)	6 (12)
<1	-	1 (5)	-	-

**Table 5: Complications in study group**

	Mild PE	Severe PE	Eclampsia	Control
Partial HELLP	3	3	-	6
EL	6	10	2	-
EL + LP	-	1	-	-
Mild to severe PE	12	-	-	-
Severe PE to eclampsia	-	1	1	-

**Table 6: Comparison of mean platelet count in lakhs / mm<sup>3</sup> in different series**

Group	Present study	Joshi et al <sup>6</sup>	Kulkarni <sup>10</sup>	Giles <sup>11</sup>	Agarwal <sup>12</sup>	Dube et al <sup>13</sup>
Control	2.3	2.2	2.5	2.8	2.4	2.3
Mild PE	2.1	2.0	1.8	2.4	2.1	1.9
Severe PE	1.8	1.4	1.19	2.1	2.1	1.9
Eclampsia	1.6	1.3	1.18	1.5	1.6	1.8

## DISCUSSION

Platelet count is reduced in cases of pre-eclampsia. Low platelet counts in patients with mild and severe PE, and very low counts in eclampsia were comparable to those reported by other authors. (Table 6) The present study found 50% of severe PE and 66% of eclampsia patients with platelet count of 1 lakh/mm<sup>3</sup> comparable with Joshi et al<sup>6</sup> who found 21.8% of severe PE patients and 39.3% of eclampsia patients. The study results are also comparable to the study of Sibai et al<sup>14</sup> and Pritchard<sup>15</sup> who have reported platelet count of less than 1 lakh per cc in 30% of PIH patients.

The mean value of platelet count in the control group declined gradually in the third trimester when all the 4 counts were compared but were not in significant thrombocytopenic range. Platelet count among the study group showed a marked decrease and there was a significant difference between platelet counts of mild PE (p = 0.004), severe PE (p = 0.001) and eclampsia (p = 0.021) when compared to control group.

The results of mild PE and control group were similar and comparable to the study by Boehlen et al<sup>16</sup>. The platelet count (>1.5 lakhs) in these cases can be considered clinically safe and managed expectantly. When mild PE cases had platelet count between 1-1.5 lakhs/mm<sup>3</sup> they progressed to severe PE. Severe PE cases showed remarkable and clinically significant decline in the platelet count. The count decreased to 1.52 lakhs from 2.18 lakhs. When the platelet counts were < 1 lakhs these cases progressed to eclampsia. Severe PE and eclampsia patients developed partial HELLP syndrome at the time of delivery when the platelet count were between 1-1.5 lakhs/mm<sup>3</sup>. These

patients also showed elevated liver enzymes with platelet count between 80,000-1.2 lakhs. Severe PE and eclampsia cases developed class II HELLP<sup>17, 18</sup> syndrome with count between 1-1.5 lakhs. Platelet counts of <1 lakh per ml indicated increased risk of DIC and HELLP Syndrome. These results were similar to Rousillon et al<sup>19</sup>. So it was crucial to classify the patients according to the severity of thrombocytopenia. Termination of pregnancy should be considered for Class I patients. Class II and III can be managed conservatively.

In this study minimum counts were seen in patients with severe PE and eclampsia. If patients are followed serially with each woman acting as her own control, a relative reduction in the platelet count may be seen many weeks prior to the onset of clinical disease. The present study concludes that reduced platelet count was directly proportional to the severity of PIH similar to study by Rodrigue et al<sup>20</sup>. It serves as a parameter to assess the severity of PIH. PE once diagnosed and if the prognosis is known, fetal and maternal mortality and morbidity can be reduced with appropriate treatment.

**Acknowledgement:** The authors are thankful to Principal JJM Medical College, Medical Director Bapuji Hospital and Superintendent Chigateri Hospital, Davangere for providing facilities to carry out this work and also to all the participated patients.

**Conflict of Interest:** None

**Source of Support:** Self-funding.

**Ethical Clearance:** Taken from Institution Ethics Committee

## REFERENCES

1. Gary CF, Levena KJ, Bloom SL, Hauth JC, Gilstrap L, Wenstrom KD. (name of chapter)Williams Obstetrics, 22<sup>nd</sup> edition, New York, McGraw Hill 2005; 761-808.
2. Baha M, Sibai. Hypertension in pregnancy. Clinical Obstetrics and Gynaecology 1999; 42(3):421.
3. Norwitz ER, Robinson JN, John TR. Prevention of preeclampsia: Is it possible. Clinical Obstetrics and Gynaecology 1999; 42(3):436-454.
4. Harlow FH, Brown MA. Platelet activation in hypertensive disorder of pregnancy. Am J Obstetrics and Gynecology 2002; 187-188.
5. Baker PN, Cunningham FG. Platelet and coagulation abnormalities. Chesley's hypertensive disease in pregnancy, 2<sup>nd</sup> edition, Stamford, Lange; 1999; 349.
6. Joshi Kale, Vrunda, Shaila S. Lowered platelet count: A prognostic index in pregnancy induced hypertension. J Obstetrics and Gynaecology India 2004; 54(3):235-36.
7. Fernando A. (name of chapter) Practical guide to high risk pregnancy and delivery. 2<sup>nd</sup> edition, Philadelphia, Mosby 1994. 183-207.
8. Lewis D. Hematology in under resourced laboratories. Chapter 26 In: Lewis SM, Bain BJ, Bates I edition. Practical hematology 9<sup>th</sup> edition. P.596-598.
9. Brown B. Routine hematology procedures. Chapter 3. In: Hematology principles and procedures, 6<sup>th</sup> edition. 1993;p.116-117.
10. Kulkarni RD, Sutaria UD. Platelet counts in toxemia of pregnancy. J obstetrics and Gynaecology India. 1983; 33:321-325.
11. Giles.C, Inglis.TC. Thrombocytopenia and Macro thrombocytosis in gestational hypertension. Int J obstetrics and Gynecology 1981; 88:1115-1117.
12. Agarwal S, Buradkar A. Coagulation studies in toxemia of pregnancy. J obstetrics and Gynecology India 1978; 992-6.
13. Dube B, Bhattacharya S, Dube RK .Blood coagulation profile in Indian patients with pre-eclampsia and eclampsia.Br J obstetrics and Gynecology 1975;82:35-9
14. Sibai BM, Anderson, GZD, McCubbin IH. Eclampsia II: Clinical significance of laboratory finding. Obstetrics and Gynecology 1982; 59:153-157.
15. Pritchard JA, Cunningham FG, Mason RA. Coagulation changes in preeclampsia their frequency and pathogenesis. Am J Obstetrics and Gynecology 1976; 124:855-864.
16. Boehlen F, Hohlfeld P, Extermann Perneger T V, Demoerlose P. Platelet count at term pregnancy: a reappraisal of the threshold. Obstetrics and Gynecology 2000; 95(1):29-33.
17. John RB, Sibai BM. HELLP syndrome .Postgraduate obstetrics and Gynecology. 2003; 23(12).
18. Everett F, Martin J. Twelve steps to optimal management of HELLP syndrome. Clinical obstetrics and Gynecology 1999; 42(3):532-550.
19. Rousillon E, Estrade JP, Guyton F et al. Importance of thrombocytopenia for management of HELLP syndrome. J Gynecology obstetrics Biol Reprod 2003; 32(6):541-48.
20. Rodrigue BA, Perez PC, Rocha LR, Perez JMM, Martinez MA, Valencia HM. Maternal and perinatal surgical complications in low platelet count for HELLP syndrome in severe preeclampsia-eclampsia in intensive care. Ginecol Obstet Mex 2003; 71:379-86.

# Assessment of Stunting among Children of Government & Private Primary Schools of Davangere City of Karnataka State

Dayalaxmi T Shedole<sup>1</sup>, B Vijayakumar<sup>2</sup>, Vidya G S<sup>3</sup>

<sup>1</sup>Post graduate Student, <sup>2</sup>Professor & Head, <sup>3</sup>Associate Professor, Department of Community Medicine, J J M Medical College, Davangere, Karnataka, India

## ABSTRACT

**Background:** The best global indicator of a child's well being is growth. Height has been shown to be related to productivity & a 1% loss in adult's height as a result of childhood stunting is associated with 1.4% loss in productivity. Stunting is associated with impaired mental development & poor school performance later on. As today's children are the citizens of tomorrow's world, their survival, protection & development are the pre requisite for the future development of humanity.

**Objectives:** To assess stunting among primary school children & to compare stunting among government & private primary school children.

**Methodology:** A cross sectional study was conducted for a period of two months in government & private primary schools of Davangere city, Karnataka. A total of 362 children of 1st to 4th STD were included in the study. Selection of schools & students was done by simple random & systematic random sampling. Height in centimeters was measured for all children by using wall mounted stadiometer. The data was entered into Microsoft Excel sheet & analyzed by using software SPSS version 17.

**Results:** The overall prevalence of stunting in this study is 14.36% of which 13% were stunted & 1.4% were severely stunted. The prevalence of stunting was more among government school children 13.8% & severe stunting was more among private school children 1.5%.

**Conclusion:** It is seen from this study that nutritional status of children studying in government schools & belonging to Muslim religion is more severe. Girls are affected more than the boys, may be because of gender discrimination.

**Keywords:** Stunting, Nutrition Education, Primary School Children

## INTRODUCTION

The best global indicator of a child's well being is growth: Infections & poor nutrition or combination of both are major factors affecting physical growth & mental development<sup>1</sup>. Worldwide, 178 million children aged less than five years (under-five children)

are stunted with the vast majority in South-central Asia and sub-Saharan Africa<sup>3</sup>, Over 1/5th of our population comprises of children aged 5-14 years i.e. the group covering primary and secondary education. As today's children are the citizens of tomorrow's world, their survival, protection & developments are the pre requisite for the future development of humanity<sup>2</sup>. Stunting is a major public-health problem in low and middle-income countries because of its association with increased risk of mortality during childhood. Apart from causing significant childhood mortality, stunting also leads to significant physical and functional deficits among survivors<sup>3</sup>.

---

### Corresponding author:

Dayalaxmi T Shedole

Post graduate Student

Department of Community Medicine, J J M Medical College, Davangere-577004, Karnataka, India.

E-mail- daya\_laxmi@yahoo.co.in

Mob: +919916246435



Height has been shown to be related to productivity & a 1% loss in adult's height as a result of childhood stunting is associated with 1.4% loss in productivity<sup>1</sup>

In developing countries, most deaths in children are among the under-five children. As a result, there is extensive literature on under-five children compared to that of information on the health of school children.

The present study was carried out among primary school children of 6-9 years age group from private & government primary schools of Davangere city, Karnataka, in order to describe the nutritional status of primary school children through focusing on stunting to provide baseline information about the prevalence & distribution of this problem.

### OBJECTIVES

1. To assess stunting among primary school children.
2. To compare stunting among government & private primary school children.

### MATERIALS & METHOD

**Study population:** Primary School Children of 1<sup>st</sup> to 4<sup>th</sup> Standard, both of Private & Government Primary Schools of Davangere city.

**Sample size:** 362 children in the age group of 6 to 9 years

**Method of collection of data**

**Sampling procedure**

The sample consisted of 10% of schools in the city, i.e. 2 private & 2 government schools selected by simple random technique, proportion to the no of schools in the city (22 government & 24 private primary schools) & the sample comprised of students aged 6-9 years from 1<sup>st</sup> to 4<sup>th</sup> Standard i.e. 50% of the students were selected by systematic random sampling method from each standard. Thus a total of 362 children were included in the study i.e. 202 children from private & 160 children from government school were studied.

Prior permission was taken from the head of the institute for conducting the study. Schools were visited during the month of July & August. The data was collected by using a predesigned proforma which comprised of basic information of children like age, sex, standard, religion & fathers occupation. The information was obtained from school records with the help of class teacher.

The recorded parameter is height. Height in centimeters was measured for all children in the school with the help of a wall mounted stadiometer. The children were asked to remove the foot wear, and stand with heels together and head positioned so that the line of vision was perpendicular to the body. A glass scale was brought down to the topmost point on the head. Height was recorded to the nearest 1 cm.

The Z- score table values of World Health Organization (WHO) growth standard for height for age were used to estimate the age specific prevalence of stunting & severe stunting<sup>4</sup>

Stunting was defined as HAZ (height for age Z score) below minus two standard deviation (<-2 SD) from the median of reference population, Severe stunting was also defined as HAZ below minus three standard deviation (<-3 SD) from the median of reference population. Normal was defined as HAZ lying between minus two standard deviation (-2SD) & plus two standard deviation (+2SD)<sup>5</sup>.

**Study design:** It is a cross sectional, school based study.

**Study period:** 2 months (July 1, 2012 to august 31, 2012).

**Statistical analysis:** The data was entered into Microsoft Excel sheet & was analyzed by using software SPSS version 17.

**Inclusion criteria**

- a. All children of 1<sup>st</sup> to 4<sup>th</sup> standard of government & private schools of Davangere city.
- b. Those children present on the day of study.
- c. Those children, who are cooperative, were included in the study.

**Exclusion criteria**

- a. Children below 6 years & above 9 years
- b. Those children who are absent on the day of study
- c. Those who are not cooperative were excluded from the study.

**Ethical Clearance**

The study was approved by institutional ethical committee of JJM Medical College Davangere, Karnataka.

## RESULTS

Table 1: Assessment of Stunting among primary school children

Stunting					
Parameters	Normal n=310(%)	Stunted n=47(%)	Severely stunted n=5(%)	Total no n=362 (%)	$\chi^2$ ,df, p-value
<b>Age(years)</b>					
6	66 (79.5%)	14 (16.9%)	3 (3.6%)	83(22.9%)	$\chi^2=6.635$ df=6 p-value=0.356
7	80 (87.0%)	11 (11.9%)	1 (1.1%)	92(25.4%)	
8	81 (90%)	9 (10%)	0 (0%)	90(24.9%)	
9	83 (85.6%)	13 (13.4%)	1 (1.0%)	97(26.8%)	
<b>Sex</b>					
Male	167 (86.1%)	23 (11.9%)	4 (2.0%)	194(53.6%)	$\chi^2=1.821$ df=2 p-value=0.402
Female	143 (85.1%)	24 (14.3%)	1 (0.6%)	168(46.4%)	
<b>Religion</b>					
Hindu	243 (86.8%)	34 (12.1%)	3 (1.1%)	280(77.3%)	$\chi^2=2.288$ df=4 p-value=0.683
Muslim	65 (81.3%)	13 (16.2%)	2 (2.5%)	80(22.1%)	
Christian	2 (100%)	0 (0%)	0 (0%)	2(0.6%)	
<b>Occupation of father</b>					
Professional	91 (91.9%)	8 (8.1%)	0 (0%)	99(27.3%)	$\chi^2=12.873$ df=8 p-value=0.116
Semi-professional	85 (88.5%)	11 (11.5%)	0 (0%)	96(26.5%)	
Skilled	75 (79.8%)	16 (17.0%)	3 (3.1%)	94(25.96%)	
Semi-skilled	47 (82.5%)	9 (15.8%)	1 (1.7%)	57(15.7%)	
Unskilled	12 (75%)	3 (18.7%)	1 (6.3%)	16(4.4%)	
<b>Type of school</b>					
Private	174 (86.1%)	25 (12.4%)	3 (1.5%)	202(55.8%)	$\chi^2=0.179$ df=2 p-value=0.914
Government	136 (85%)	22 (13.8%)	2 (1.2%)	160(44.2%)	

Out of 362 children involved in the study, overall prevalence of stunting & severe stunting was 13% & 1.4% & about 85.6% children were of normal height. The prevalence of stunting was found comparatively more among government school children (13.8%), where as severe stunting was found more among private school children(1.5%). Stunting & severe stunting was more among children who are in the age group of 6years (16.9% , 3.6%). Stunting was highest

among females (14.3%) compared to males (11.9%), where as severe stunting was highest among males (2.0%) compared to females (0.6%). The prevalence of stunting & severe stunting was highest among children belonging to muslim religion 16.2% & 2.5% & among children whose father is occupationally a unskilled worker 18.7% & 6.3%. The results are summarised in table 1.

Table 2: Comparison of stunting among government &amp; private primary school

Parameters	Children															
	Stunting(height for age)															
	Total		Normal		Stunted		Severely stunted									
	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt						
no	(%)	no	(%)	no	(%)	no	(%)	no	(%)	no	(%)					
<b>1.Age(years)</b>																
6	40	(25.0)	43	(21.3)	31	(77.5)	35	(81.4)	7	(17.5)	7	(16.3)	2	(5.0)	1	(2.3)
7	40	(25.0)	52	(25.7)	35	(87.5)	45	(86.5)	5	(12.5)	6	(11.5)	0	(0)	1	(1.9)
8	43	(27.0)	47	(23.3)	38	(88.4)	43	(91.5)	5	(11.6)	4	(8.5)	0	(0)	0	(0)
9	37	(23.0)	60	(29.7)	32	(86.5)	51	(85)	5	(13.5)	8	(13.3)	0	(0)	1	(1.7)

**Table 2: Comparison of stunting among government & private primary school (Contd.)**

Parameters	Children															
	Stunting(height for age)															
	Total		Normal		Stunted		Severely stunted									
	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt								
no	(%)	no	(%)	no	(%)	no	(%)	no	(%)							
<b>2.Sex</b>																
Male	79	(49.4)	115	(56.9)	68	(86.1)	99	(86.09)	10	(12.7)	13	(11.3)	1	(1.3)	3	(2.6)
Female	81	(50.6)	87	(43.1)	68	(84.0)	75	(86.21)	12	(14.8)	12	(13.8)	1	(1.2)	0	(0)
<b>3.Religion</b>																
Hindu	147	(91.1)	133	(65.8)	125	(85.0)	118	(88.7)	20	(13.6)	14	(10.5)	2	(1.4)	1	(0.8)
Muslim	13	(8.1)	67	(33.2)	11	(84.6)	54	(80.6)	2	(15.4)	11	(16.4)	0	(0)	2	(3.0)
Christian	0	(0)	2	(1.0)	0	(0)	2	(100)	0	(0)	0	(0)	0	(0)	0	(0)
<b>4.Occupation of father</b>																
Professional	56	(35.0)	43	(21.3)	50	(89.3)	41	(95.3)	6	(10.7)	2	(4.7)	0	(0)	0	(0)
Semi-professional	61	(38.1)	35	(17.3)	53	(86.9)	32	(91.4)	8	(13.1)	3	(8.6)	0	(0)	0	(0)
Skilled	23	(14.4)	71	(35.1)	18	(78.3)	57	(80.3)	4	(17.4)	12	(16.9)	1	(4.3)	2	(2.8)
Semi-skilled	10	(6.3)	47	(23.3)	7	(70.0)	40	(85.1)	3	(30.0)	6	(12.8)	0	(0)	1	(2.1)
Unskilled	10	(6.3)	6	(3.0)	8	(80.0)	4	(66.7)	1	(10.0)	2	(33.3)	1	(10.0)	0	(0)

1. The prevalence of stunting & severe stunting was more among government school children in the age group of 6 years (17.5%, 5.0%) compared to private school children (16.3%, 2.3%)
2. Stunting was more among government school females (14.8%) compared to private school females(13.8%), where as severe stunting was more among private school males(2.6%) compared to government school males(1.3%)
3. Stunting & severe stunting was more among private school children belonging to Muslim religion (16.4%, 3.0%) compared to government school children belonging to Muslim religion(15.4%,0%)
4. The prevalence of stunting was more among private school children (33.3%) whose father is an unskilled worker, where as severe stunting was more among children of government school children (10.0%) whose father is an unskilled worker.

The results are summarized in table 2

### DISCUSSION

The overall prevalence of stunting in this study is 14.36% (52), among them 13% (47) were stunted where as 1.4% (5) were severely stunted. A study conducted by Panda et.al in school children of Ludhiana city reported prevalence of stunting as 26.28%<sup>6</sup>. A study

conducted by Joseph et.al in rural Karnataka reported prevalence of stunting as 38.6%<sup>7</sup>. In the present study the prevalence of stunting among boys was 11.9%(23) while in girls it was 14.3%(24). The prevalence of stunting was more in girls as compared to boys (14.3% vs 11.9%). This may be due to improper dietary habits, lack of knowledge of balanced diet among their parents, more over first preference will be given to male children in all aspects including food & sometimes stunting may be due to genetically inheritance. In the present study the prevalence of stunting was more among children attending government schools 13.8% (22) compared to children attending private school 12.4% (25). This may be due poor quality of Mid day meal provided in the schools .A study conducted by Idowu O. Senbanjo et.al in Nigeria reported prevalence of stunting as 17.4%. prevalence of stunting was more among boys 18.2%(54) compared to girls 16.4(45), also the prevalence of stunting was more among children attending government school 21.1%(84) compared to children attending private school 8.8%(15)<sup>3</sup>. a study conducted by A.J.AL-Saffar in Baghdad reported the overall prevalence of stunting as 18.7%, also reported females (19.1%) were slightly more stunted compared to males (18.3%)<sup>2</sup>

### LIMITATIONS

1. School based study constituting only a small sample size

2. The study could have included other socio-demographic factors like economic status, literacy status of parents
3. Apart from stunting other parameters like wasting & underweight would have been assessed so that the nutritional status could have been assessed in a better way.

### CONCLUSION

It may be stated that the nutritional status of children belonging to Muslim religion & those studying in government school is more severe which may be due to certain customs, beliefs, food taboos, poor knowledge about nutritious food & poor knowledge about birth spacing among Muslims. In government schools because Mid day meal is provided the children won't be getting their lunch box & more over they will be skipping their breakfast as a result the Children are not growing to the required percentage of height they should attain. Girls are affected more than the boys, may be because of first preference given to male children.

### RECOMMENDATIONS

- Knowledge of parents about the nutritive values of locally available foods so that the children can get sufficient amount of nutritious foods
- Children have to be supplied with the foods having proper balance of proteins, carbohydrate, fat & minerals.
- Health education, personal hygiene education, nutrition education may be made as part of the school curriculum apart from the regular educational activities in the community.
- Better school health services may be planned periodically for the school children.
- Mid -day meal quality should be monitored periodically by the concerned authorities, so that the goal of mid-day meal scheme is achieved efficiently.

department of Community Medicine, Head masters of the primary-Schools and school children for their cooperation in carrying out the study. I also thank teaching staff and postgraduates for their valuable guidance.

**Conflict of Interest:** Nil

**Source of Support:** None

### REFERENCES

1. A.J.AL-Saffar. Stunting among Primary-School Children. A sample from Baghdad, Iraq. *Eastern Mediterranean Health journal*. 2009; 15 (2): 322-329.
2. Izharul Hasan, Mohd Zulkifile and Abdul Haseeb Ansari. Prevalence of stunting among school children of Government Urdu Higher Primary Schools in Azad Nagar and its surrounding area, Bangalore. *International Journal of Medicine & Medical Sciences*. October 2011;3(10):304-309
3. Idowu O. Senbanjo, Kazeem A. Oshikoya, Olumuyiwa O. Odusanya and Olisamedua F. Njokanma. Prevalence of and Risk factors for Stunting among School Children and Adolescents in Abeokuta, Southwest Nigeria. *J Health Popul Nutr*. Aug 2011; 29 (4):364-370.
4. The WHO. Child Growth Standards, Growth Reference. 5-19 years. [http://www.who.int/growthref/who2007\\_height\\_for\\_age/en/index.html](http://www.who.int/growthref/who2007_height_for_age/en/index.html), accessed 16 October 2012.
5. National Family Health Survey (NFHS)-3. Report 2005-2006. India. Chapter 10. Nutrition and Anemia, September 2007; Vol.1:268
6. Panda P, Benjamin AI, Shavinder, Zachariah P. Health status of school children in Ludhiana city. *Indian J. Community Med*. 2000; 25:10-17.
7. Josheph B, Rebello A, Kullu P, Raj VD. Prevalence of malnutrition in Rural Karnataka, South India. A comparison of anthropometric indicators. *Indian J. Health Popul. Nutr* 2002; 3:239-244.

**Acknowledgment:** I sincerely thank the Institution, The principal and The Prof and Head of the

# Burn Injuries in Geriatric Patients Admitted in Tertiary Care Hospitals in India

Gowri Shankar<sup>1</sup>, Vijaya A Naik<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Community Medicine, S. N. Medical College, Navanagar, Bagalkot, Karnataka, India, <sup>2</sup>Professor and Head, Department of Public Health, KLE University Nehru Nagar, Belgaum, Karnataka, India

## ABSTRACT

**Introduction:** The geriatric population is continuously increasing due to improved living standards and better medical care. This study was done to know the epidemiology and outcome of burn injuries in geriatric patients.

**Material and method:** A one-year prospective study during 2009 of burn injury patients of age 60 years or over admitted in two tertiary care hospitals in India were selected. Ethical clearance was obtained from Institutional Review Board. Data regarding socio demographic profile, total burn surface area, mode of burn, co morbid conditions and outcome was recorded on a pre designed and pre tested questionnaire after informed consent and analyzed using percentages and Fisher Exact test.

**Results:** Out of 235 adult burn patients, 16(6.80%) were more than 60 years of age. Majority (75%) were women. All were accidental and occurred at home. Flames contributed to 87.5% whereas scalds were seen in 12.5%. Co-morbidity was observed in 68.75% with cataract being the most common (45.45%). Mortality was 50% and all who died were women which is statistically significant. (p=0.038)

**Conclusion:** Geriatric population is at high risk for burns in their own homes and necessary precautionary measures should be taken by all concerned to prevent future incidents thereby decreasing the pain and misery and economic cost of treatment.

**Keywords:** Burn Injuries, Geriatric Patients

## INTRODUCTION

The geriatric population in India is continuously increasing due to improved living standards and better medical care. Age is recognized as a major determining factor in burn mortality and geriatric burn patients are a vulnerable subgroup that brings about enormous therapeutic challenge. They often have pre existing medical problems. <sup>[1]</sup> Many burn injuries are linked to social, environmental, cultural and biological issues

in causation. They are recognized as man made and behavior linked disorders and attributed to socio demographic transition. Prevention, acute and long term care and rehabilitation are the major challenges faced today <sup>(2)</sup> This study was done to know the epidemiology and outcome of burn injuries in geriatric patients.

## MATERIALS AND METHOD

A one-year prospective study during 2009 of all burn injury patients of age 60 years old or over admitted in two tertiary care hospitals of Belgaum city were selected. Ethical clearance was obtained from Institutional review Board, data regarding socio demographic profile, total burn surface area, mode of burn, co morbid conditions and outcome was recorded on a pre designed and pre tested questionnaire after

---

### Corresponding author:

**Gowri Shankar**

Associate Professor

Department of Community Medicine, S. N. Medical College, Bagalkot - 587 103, Karnataka India

Email: drgowrijnmc@gmail.com

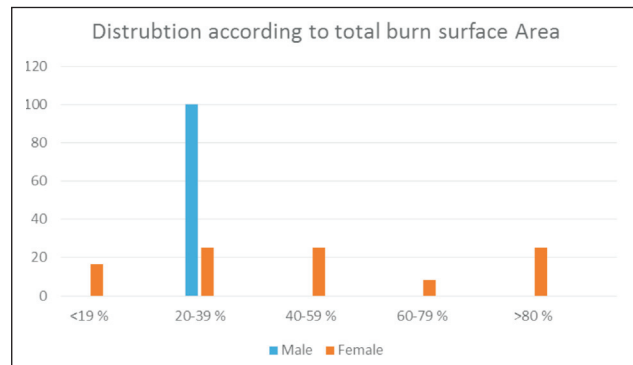
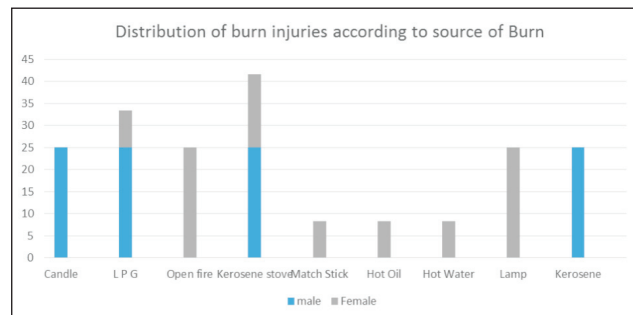
Mobile No.: +91-99866-13442



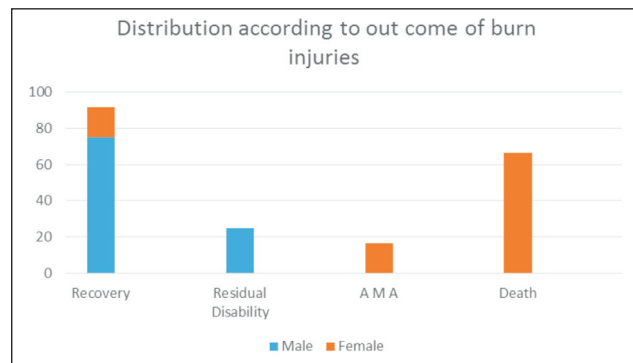
informed consent and analysed using percentages and Fisher Exact test.

### RESULTS

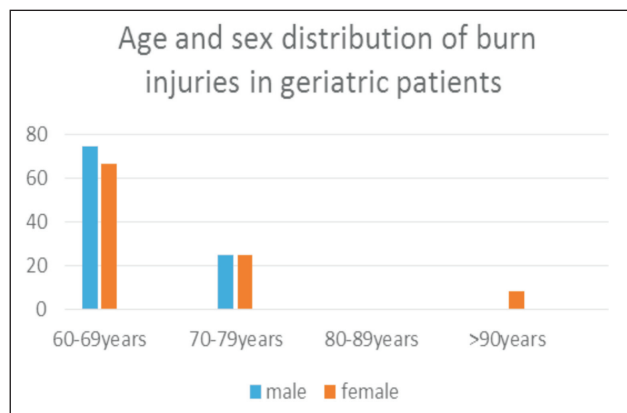
Out of 235 adult burn patients admitted during the study period, 16(6.80%) were more than 60 years of age. Majority (75%) of the injured were females. It was observed that maximum numbers (68.75%) were between 60-69 years of age [Graph 1] and were from rural areas (56.25%). Maximum number (50%) were married followed by 43.75% widows. Geriatric patients from extended joint families contributed to 62.5% and 18.75% were from broken families. Majority (43.75%) were from lower socio economic status. All the injuries were accidental and occurred at home. Flame injury contributed to 87.5% of the cases whereas scalds were seen in 12.5%. Co-morbid conditions were observed in 68.75% of the patients with cataract being the most common (45.45%). The source of burn was Open fire/ floor level kerosene stove or lamp in 18.75% cases each [Graph 2]. The cause of burn was ignition of the victim's clothes in 50% of the cases followed by 18.75% getting injured while rescuing other family members. The material of clothing worn by 43.75% of the victims was mixed and 31.25% were wearing synthetic clothes at the time of injury. It was observed that there were two peaks of the time of burn injury i.e. between 6 am to 12 noon and 6 pm to 12 midnight (37.5% each). First aid was dousing with water in 37.5% of the cases. Total burn surface area was 20-39% in 43.75% of the patients and it was observed that all the cases with > 40% TBSA were females [Graph 3]. The overall mortality was 50% and all who died were females (p=0.038) [Graph 4]



Fisher Exact test P=0.089



Fisher Exact test P=0.038 Significant



Fisher Exact test P=0.635

### DISCUSSION

The aging Indian society is facing many social, economic, medical and other problems. Aging is a risk factor for many diseases and for trauma<sup>[3,4]</sup>. In this study, geriatric patients more than 60 years of age contributed to 6.80% of the total adult cases. The discrepancy between the relatively low percentage of old people in the present study and the higher percentage (25%) reported in Tokyo<sup>5</sup> might be due to the social structure in India, where older members usually live within the family and are served by younger family members, thus decreasing their exposure to hazardous situations and hence their

liability to injury. Majority of the geriatric patients were females as they are in contact with heat producing equipment and this finding is similar to another study.<sup>(1)</sup> Many were from rural areas and a low socio economic background indicating a high risk group<sup>(6)</sup>. All the injuries were accidental and occurred at home which has also been reported by others.<sup>(1,7)</sup> Education regarding home safety measures and modification of home environments to avoid domestic accidents should be carried out. The burn injury in majority was due to flames by a cheap inflammable source kept on the floor where the victims long loose flowing clothes caught fire and is similar to most other studies<sup>(7,10)</sup>

Awareness about first aid after burn injuries and while rescuing others from a fire accident should be brought about. The co morbid condition was cataract in 45.45% of the cases and this finding is similar to another study.<sup>(1)</sup> Primary health care activities in rural areas need to be aggravated to identify for the most needed for cataract surgery. Awareness is to be created among the public to safeguard their geriatric family members against flame injuries at home as they need longer hospitalization leading to increasing economic problems by the related treatment.<sup>(3)</sup> The two peak times of burn injury coincided with high risk activities such as meal preparation, lighting and heating.<sup>(6)</sup> The most important and alarming characteristic was the high mortality rate particularly in old women due to flame injuries with more than 40% total burn surface area and this finding correlates to another study.<sup>(3)</sup> It is concluded that the geriatric age group is at high risk for burn injuries in their own homes and necessary precautionary measures should be taken by all concerned to prevent future incidents there by decreasing the pain and the misery and the economic costs of treatment.

**Acknowledgement:** The authors would like to acknowledge Dr.Rajesh Powar, Consultant, Department of Plastic Surgery, KLE's Sri Prabhakar Kore Charitable Hospital, Belgaum for his guidance in the study and Mr.M.D.Mallapur, Statistician, Department of Community medicine, J.N.Medical College, Belgaum for the statistical analysis.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

## REFERENCES

1. Ho WS, Ying SY, Chan HH. A study of burn injuries in the elderly in a regional burn centre. *Burns* 2001; 27:382-85.
2. Gururaj G .Injuries in India- A national perspective burn of disease in India, National Commission on macroeconomics and health. New Delhi: MOHFW, Government of India; 2005
3. Morita S, Higami S, Yamagiva T, Iizuka S, Nakagawa Yamamoto I et al. Characteristics of elderly Japanese patients with severe burns. *Burns* 2010; 36:1116-21.
4. Peel NM, Bartlett HP, McClure RJ. Healthy aging as an intervention to minimize injury from falls among older people. *Ann N Y Acad Sci* 2007; 1114: 162-9.
5. Kobayashi K, Ikeda H, Higuchi R, Nozaki M, Urabe M, Hamabe Y et al. Epidemiological and outcome characteristics of major burns in Tokyo. *Burns* 2005; 31S; S3-S11.
6. Mc Loughlin E. A simple guide to burn epidemiology. *Burns* 1995; 21(3):217-20.
7. Head BM, Head AN, Tanner NSB. Burns to the elderly in reappraisal. *Br J Plast Surg* 1987; 40: 278-82.
8. Seill JM, Law EJ, Belcher K, Thiruvaiyaru D. A regional medical center's experience with burns of the elderly. *J Burn Care Rehabil* 199; 20: 218-23.
9. Cutillas M, Sesay M, Perro G, Bourdarias B, Castede JC, Sanchez R. Epidemiology of elderly patients' burns in the south west of France. *Burns* 1998; 24:134-8.
10. Tejerina C, Reig A, Codina J, Mirabet V. Burns in patients over sixty years old: epidemiology and mortality. *Burns* 1992; 18:149-52.

# Study of Urinary Tract Infection in Infants and Young Children with Acute Diarrhea

D Narayanappa<sup>1</sup>, HS Rajani<sup>2</sup>, A Sangameshwaran<sup>3</sup>

<sup>1</sup>Professor and Head, <sup>2</sup>Assistant Professor, <sup>3</sup>Junior Resident, Department of Pediatrics JSS Medical College

## ABSTRACT

**Objective:** To identify urinary tract infection(UTI) in infants and young children presenting with acute diarrhoea .

**Settings:** Department of Paediatrics , JSS Hospital, Mysore

**Participants:** 239 children aged between 1 month to 5 years admitted with acute diarrhoea.

**Main Outcome:** Incidence of UTI in infants and young children presenting with acute diarrhoea .

**Results:** 12 (5%) cases of the study population had UTI. 50% of the cases were in the age group of 6-12 months. None of them had symptoms suggestive of UTI. 83.4% of the cases had E.coli in their urine culture.

**Conclusion:** Routine screening for UTI must be done in infants and young children with acute diarrhoea.

**Keywords:** Children, Diarrhoea, Urinary Tract Infection

## INTRODUCTION

Urinary tract infections (UTI ) are a common bacterial infection in infants and young children resulting in morbidity and mortality<sup>1</sup>. Urinary tract infections are common in children with an estimated incidence of 1-3% in boys and 3-10% in girls<sup>1</sup> The long term consequences of UTI are renal parenchymal damage and renal scarring that can cause hypertension and progressive renal damage <sup>1,2</sup>. The signs and symptoms of UTI are nonspecific in infants and young children and also they do not usually pertain to the genitourinary tract<sup>3</sup>. Gastrointestinal symptoms of poor feeding, vomiting, abdominal pain and diarrhoea are reported in many infants with UTI<sup>1</sup> and also diarrhoea can predispose infants and young children to develop UTI<sup>4,5</sup>. Under diagnosis of UTI results in inadequate treatment of UTI putting them at risk for renal scarring and the long term sequelae of hypertension and renal failure<sup>1</sup>

In developing countries, diarrhoea is one of the commonest diseases in infancy but data regarding association between UTI and diarrhoea are limited. This study was done to evaluate the incidence of UTI in infants and young children with diarrhoea.

## METHODOLOGY

All children aged between 1 month to 5 years admitted in the Paediatric ward, JSS Hospital were included in the study. Children who had received antibiotics prior to admission, those who had congenital anomalies of genitourinary tract/ spine, those with clinical features of septicaemia and history of instrumentation of urinary tract were excluded from the study.

A detailed history with importance to stool frequency, duration, colour, urinary symptoms, fever were collected and detailed clinical examination findings were recorded in a predesigned proforma.

Acute diarrhoea was defined as passage of 3 or more liquid stools for more than 2 days but for less than 14 days<sup>6</sup>

UTI was diagnosed by positive urine culture with more than 10<sup>5</sup> colonies/ml on urine specimen collected by suprapubic aspiration as recommended<sup>1</sup>.

Significant pyuria was defined as more than 10 leukocytes per cubic millimetre in fresh uncentrifuged sample<sup>1</sup>.

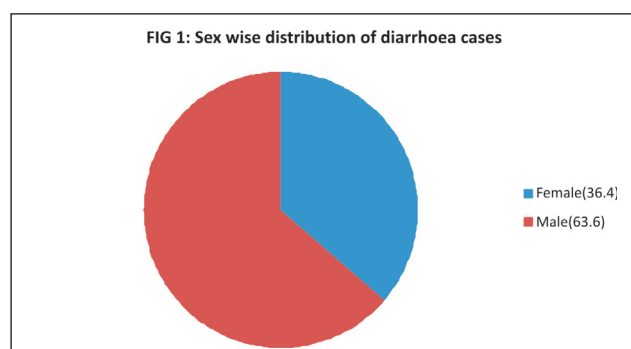
Urine and stool microscopy and culture sensitivity, rotavirus IgM Elisa on stool were done on the day of admission with an average timing of 42 hours after the onset of diarrhoea.. Abdominal USG was done in all urine culture positive cases ..

Ethical committee clearance was obtained from institutional ethical committee and informed written consent was obtained from parents.

All the statistical analysis were done using SPSS Windows Version 14(SPSS 2005 Inc,Newyork)

### RESULTS

Among 239 children included in this study, 152(63.6%) were males and 87(36.4%) were females(Fig 1). 159(66.5%) were infants less than 1 year and 80(33.5%) were between 1 to 5 years of age. 94(39.3%) cases had E coli on stool culture, in 81( 33.8%) rotavirus IgM was positive, in 8% no intestinal pathogen was isolated and in the remaining Klebsiella, Acinetobacter, Shigella, Vibrio Cholera, Candida, Proteus, Pseudomonas were isolated.



Twelve (5%) cases of them had UTI (Fig 2). 7(58.3%) were females and 5(41.7%) were males.

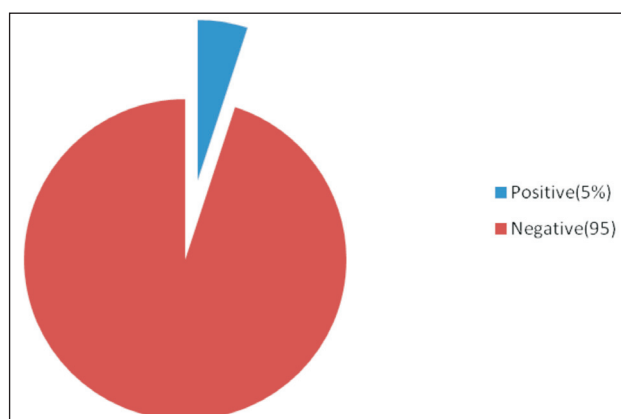


Fig 2: Occurrence of UTI in children with diarrhoea.

Among UTI cases, 50% were in the age group of 6-12 months and 33.4% were between 12 to 24 months.(Table I). Seven(83.4% )of UTI cases were infants. Nine(75%) of these children with UTI had fever and vomiting, Seven(58.3%) of them had poor weight gain but none of them had urinary symptoms. In 10(83.4%), E coli was the most common causative agent followed by Klebsiella and Citrobacter(8.3% each). Ultrasound abdomen done in all these children with UTI was normal.

Table 1 : Association of age with uti in children with diarrhea

Age in Months	Diarrhea Casesn=239	Diarrhea with Utin=12
3-6	26(10.9)	1(8.3)
6-12	133(55.6)	6(50)
12-24	65(27.2)	4(33.4)
24-60	15(6.3)	1(8.3)
Total	239(100)	12(5)

Figures in parenthesis indicate percentages.

Nine out of twelve UTI cases had the same organism in both urine and stool culture.

Among UTI cases 58.4% had normal nutritional status, 25% had Grade I protein energy malnutrition,16.6% had Grade II and Grade III malnutrition according to Indian Academy of Pediatrics classification. 91.6% of UTI cases had less than 5 pus cells per high power field. All 12 cases of UTI did not have significant pus cells(>10/hpf) in stool microscopy.

Statistical analysis showed no significant association between UTI and age, sex, nutritional status, urine pus cells and stool pus cells.

## DISCUSSION

The spectrum of illness extends from minor symptoms to life threatening systemic illness<sup>7</sup>. The younger the child, the more diverse are the manifestations of UTI<sup>7</sup>.

Children with UTI can present with diarrhoea but the definite cause for association is not known. Diarrhoea could be the result of infection of urinary tract similar to parenteral diarrhoea seen with other infections or could be the cause of infection of urinary tract by ascending infection.

The overall prevalence of UTI in diarrhoea cases was 5% in this study while in studies done by Thakhar R etal<sup>3</sup>, balat A etal<sup>8</sup>, Srivaths PR etal<sup>9</sup>, Bagga A etal<sup>10</sup>, Jeena etal<sup>11</sup>, Dharindharka etal<sup>12</sup>, it ranged from 8% to 24%.

The most common age group was less than one year similar to observations done by Thakar etal<sup>3</sup> study. This may be because 66.5% of study population were less than 1 year of age. Ecoli UTI was the most common in our study in concordance with Uppal etal<sup>13</sup> and Srivaths etal<sup>9</sup> study.

No statistically significant difference in the incidence of UTI was noted between male and females in contrast to other studies done by Thakhar etal<sup>3</sup>, Dharindharka etal<sup>12</sup>. This may be because 66.5% of study population were less than 1 year of age, where there is no female predilection for UTI.

75% of the UTI cases had same organism isolated from both urine and stool cultures similar to Srivaths etal<sup>9</sup> study but in Uppal etal<sup>13</sup> study and Thakar etal<sup>3</sup> study, it was 40% and 37.5% respectively. The high percentage of same organism being isolated in urine and stool in this study may be because cases with parenteral diarrhea and septicemia were excluded.

Following birth, heavy periurethral colonization with aerobic bacteria normally becomes established in both sexes. Colonization with *E. coli* and enterococci diminishes during the first year and normally becomes light after five years of age. Studies done by Stamey etal<sup>4</sup> suggest that ascending route of infection of the urinary tract is preceded by and associated with heavy colonisation of the periurethral area and the lower

urethra with *E. coli*. Gastroenteritis may contribute to the colonisation of periurethral flora and increase the risk of developing UTI<sup>5</sup>.

Isolation of different organisms from stool and urine culture indicates that UTI is not due to diarrhoea but In the absence of serotyping, it is difficult to comment on the causal relationship of the organism in children with same organisms isolated in both stool and urine<sup>3</sup>.

There was no significant association between malnutrition and UTI in the present study in contrast to Bagga A etal<sup>10</sup> and Thacker R etal<sup>3</sup> study. As previously reported<sup>3,8,14</sup> the absence of pyuria does not rule out UTI. In this study, there was no significant association between urine pus cells and UTI.

The present study shows that signs and symptoms of UTI in children are nonspecific and usually do not pertain to the genitourinary tract. Since diarrhoea could be one of the manifestations of UTI in young children or gastroenteritis may contribute to colonisation of periurethral region and cause ascending infection, high index of suspicion is necessary and all children presenting with acute diarrhea must be screened for UTI.

**Contributors Credits:** DN, HSR, AS participated in study design, acquisition of data, analysis, interpretation of data. HSR, DN participated in manuscript preparation and critical review. DN will be the guarantor of this study. The final manuscript was approved by all authors.

**Funding:** Nil

**Conflict of Interest:** None

**Acknowledgement:** We acknowledge the support provided by Microbiology department, JSS Medical college and Hospital, Mysore.

## REFERENCES

1. Indian Society Of Pediatric Nephrology. Revised statement on management of urinary tract infections. Indian Pediatr. 2011;48:70916.
2. Smellie JM, Prescod NP, Shaw PJ, Risdon RA, Bryant TN. Childhood reflux and urinary infection: a follow-up of 10–41 years in 226 adults. Pediatr Nephrol. 1998; 12:727-36.
3. Thakar R, Rath B, Prakash KS, Mittal SK, Talukdar B. Urinary tract infection in infants and



- young children with diarrhoea. *Indian Pediatr.*2000;37:886-89.
4. Stamey TA, Timothy M, Millar M et al. Recurrent urinary infection in adult women: The role of introital enterobacteria. *Calif Med.* 1971;1: 155-59.
  5. Bollgren I, Winberg J. The periurethral aerobic bacterial flora in healthy boys and girls. *Acta Paediatr Scand.*1976; 65:74-80.
  6. World Health Organisation. Treatment and prevention of acute diarrhoea; practical guidelines. Geneva WHO 1989.
  7. Deshpande PV, Verrier JK. An audit of RCP guidelines on DMSA scanning after urinary tract infection. *Arch Dis Child.*2001;84(4): 324-27.
  8. Balat A , Hill L. Infectious Diseases concomitant with Urinary tract Infections In Children. *Turkish J. of Medical Sciences.*1999;9;65-68.
  9. Srivaths PR, Rath B, Prakash SK, Talukdar B. Usefulness of screening febrile infants for urinary tract infection. *Indian Pediatr.*1996;33:218-20.
  10. Bagga A, Tripathi P, Jatana V, Hari P, Kapil A , Srivastava RN et al. Bacteriuria and urinary tract infections in malnourished children. *Pediatric nephrology.* 2003;18( 4): 366-70.
  11. Jeena P, Coovadia H, Adhikari M. Probable association between urinary tract infections (UTI) and common disease of infancy and childhood: a hospital-based study of UTI in Durban, South Africa. *Journal of Tropical Pediatrics.*1996;42: 112-15.
  12. Dharnidharka VR, Kandoth PW. Prevalence of bacteriuria in febrile infants. *Indian Pediatr.*1993;30:987-90.
  13. Uppal SK, Srivastava VK, Mullick P, Vaishnav S. Association of gastroenteritis with urinary tract infection in infancy. *Indian Pediatr.*1975;12: 159-60.
  14. Ginsburg CM, McCracken GH. Urinary tract infections in young infants. *Pediatrics.*1982;69:409-12.

# Reproductive Health of Married Young Women in the Context of HIV/AIDS in India

Hazra Avishek<sup>1</sup>, Chakraborty Sandip<sup>2</sup>

<sup>1</sup>Senior Program Officer, Population Council, New Delhi, <sup>2</sup>Assistant Professor, Department of Statistics, Iswar Chandra Vidyasagar College, Tripura

## ABSTRACT

**Objectives:** The focus of the paper is to examine how utilization of reproductive health care services varies with the change in knowledge level regarding RTI/STI and HIV/AIDS.

**Materials & Method:** The data of District Level Household Survey (DLHS) conducted during 2002-04 under the Reproductive and Child Health (RCH) project has been used for the present study. Constructing knowledge index, bi-variate and multivariate techniques have been applied in order to fulfil the specific objectives of the paper.

**Findings:** Analysis suggests that with increase in the score of knowledge index, propensity to utilize reproductive healthcare services increases and reproductive health problems decreases among the young women.

**Conclusion:** The paper notes that special emphasis should be given to the young married women as well as their husbands to make them more conscious about problems and prevention measures of reproductive and sexual health.

**Keywords:** Knowledge Index, Reproductive Health

## INTRODUCTION

The increasing penetration of HIV into the general population, as evident from the transmission pattern, suggests that women, particularly young married women, are at a higher risk and more vulnerable to infection than any other age groups (NACO, 2004)<sup>1</sup>. It is essential that young women's reproductive and sexual health needs to be addressed pragmatically so as to empower them with means that can reduce their vulnerability in terms of reproductive and sexual health through specific health programs.

Proper knowledge about the modes of transmission is considered to be one and the only means of prevention against this disease. Unfortunately in India only half of the young married women heard about HIV/AIDS (IIPS, 2006)<sup>2</sup>. They often lack even

basic knowledge about HIV transmission and prevention.

Although, over the years reproductive health care utilization is expected to increase, it has been found that a substantial proportion of women do not practice proper reproductive care, even in cases where accessibility do not become a matter of concern. As the maternal morbidity as well as maternal deaths is higher among the young mothers, it becomes imperative for them to have proper care before delivery, during delivery and also after delivery. In absence of the information whether the couple have proper knowledge about reproductive health care, in this study it has been hypothesized that proper knowledge regarding Reproductive Tract Infections (RTIs), Sexually Transmitted Diseases (STDs) and

HIV/AIDS not only lead to better utilization of reproductive health care services but also prevent them from the reproductive health problems.

In its first part, the present paper investigates reproductive health status among young married women, extent of knowledge regarding RTI/STI, awareness about HIV/AIDS, prevalence of safe motherhood. In the next part, the paper examines how level of knowledge regarding RTI/STI and HIV/AIDS influences reproductive health care and thus reproductive health status. Since husband play the role of so-called "decision-maker" in a patriarchal society like India, it is reasonable to capture them in the study.

## DATA AND METHOD

### Data

The data of District Level Household Survey conducted during 2002-04 has been used for the present study. The analysis has been carried out among the women in the age group 15-24 years. The analysis for the present study is based on 72,463 couples.

### Measurement of Variables

In the present study, any reproductive health problem is defined as any problems relating to menstruation and reported symptom(s) of RTI/STIs.

#### Knowledge index about HIV/AIDS and RTI/STI

All the respondents, who reported to know about HIV/AIDS, have been considered to develop the knowledge index. Computation of knowledge index consisted of information relating to different modes of HIV transmission, various means of HIV prevention and opinion regarding whether HIV/AIDS curable or not. The cumulative scores (ranging from 0 to 10) are divided into three categories - no knowledge (score=0), inadequate knowledge (score=1 to 5) and adequate knowledge (score=6 to 10).

The knowledge index of RTI/STIs has been constructed on the basis modes of transmission and whether RTI/STIs are curable or not. The cumulative scores (ranging from 0 to 4) are divided into three categories- no knowledge (score=0), inadequate

knowledge (score=1 to 2) and adequate knowledge (score=3 to 4).

## METHOD

Bi-variate and multivariate techniques viz logistic regression analysis have been applied in order to fulfil the specific objectives of the paper.

## RESULTS

### Characteristics of the young women

The distribution of young married women according to individual and household level characteristics shows that substantially higher proportion of the women are Hindu, belongs to other backward caste, reside in rural areas and are from households with low standard of living in India. About 19 percent of the couples are illiterate, 14 percent of the women are having more than three children. Around half of the young women faced pregnancy complications, 15 percent had post delivery complications and nine percent of the young married women in India have an experience of abortion.

### Level of knowledge about HIV/AIDS and RTI/STIs

The level of knowledge about HIV/AIDS and RTI/STI among the young married women and their husbands demonstrates that only 16 percent of the married young women in India have adequate knowledge about HIV/AIDS. The situation is more pitiful regarding the knowledge about RTI/STIs among them. Four percent of the married young women in India have sufficient knowledge about RTI/STIs. The husbands are in better position to some extent. The level of adequate knowledge about HIV/AIDS and RTI/STIs among the couples is substantially low. Only 9 percent and one percent couples have adequate knowledge about HIV/AIDS and RTI/STIs in India.

### Utilization of maternal health services

Only about 15 percent and 20 percent of the young married women have received full antenatal care. In India 45 percent births by the young mothers neither institutional nor assisted by any trained health personal.

## Reproductive health problems among married young women and their husbands

Results about the intensity of reproductive health problems among the married women and their husbands indicate that in India, around 30 percent of the married young women suffers from any sort of reproductive health problem, while, about eight percent of their husbands suffers from any problem related to their RTI/STIs

### Problems related to RTI/STI

One-fourth of the young married women have reported to have at least one symptom of RTI/STIs. *Table 1* shows the problems reported by women related to RTI/STIs in India.

**Table 1: Percentage of young married women reporting any symptoms of RTI/STIs, India**

Symptoms	%
Itching over vulva	6.9
Boils/Ulcers/warts around vulva	2.8
Pain in lower abdomen not related to menses	10.0
Pain during sexual intercourse	6.1
Bleeding after sexual intercourse	1.3
Swelling in the groin	2.4
Frequent/ painful passage of urine	6.6
Some mass coming out of vagina	4.4
Any involuntary escape of urine while coughing/sneezing	3.4
Swelling/limp in breast	1.0

Specific problems of reproductive health experienced by the husbands of young women are presented in *table 2*.

**Table 2: Percentage of husband of young married women reporting different symptoms of RTI/STIs, India**

Symptoms	%
Any discharge from penis	2.4
Any sore/rash/redness on genital or anal area	1.4
Difficulty/pain while urinating or very frequent urination	3.6
Swelling of testis or in groin area (penis)	1.3
Itching/irritation around genital	3.0

### Menstruation related problems

It can be observed from *table 3* that 16 percent of the young married women reported menstruation related problems.

**Table 3: Percentage of young married women reporting any menstruation related problems and symptoms, India**

Symptoms	%
No period	4.6
Painful period	50.0
Frequent or short period	12.3
Delayed period	24.9
Prolonged bleeding	7.3
Excessive bleeding	13.4
Continuous bleeding	3.2
Scanty bleeding	21.2
Inter-menstrual bleeding	5.2
Any menstruation related problems	16.4

Prevalence of reproductive health problems among the married young women by different background characteristics

*Table 4* illustrates the prevalence of reproductive health problems are more prevalent among the young married women who reside in rural area, belonging to household with low standard of living, belonging to schedule caste category and of Muslim religion. Couple's education plays a crucial role in reporting of any symptoms of their reproductive health problems. The reporting of reproductive health problem is more among the literate couples than the illiterate. Woman with higher level of education than her husband has more opening to report her reproductive health problems than those who have not. Women in higher parity and whose husbands have any reproductive health problem have higher reproductive health problems than their counterpart. The bi-variate analysis shows that young women of those couples who have adequate knowledge about HIV/AIDS have less reproductive health problems than those who have insufficient knowledge about HIV/AIDS. Again, young women of those couples who have adequate knowledge about RTI/STIs have also lesser proportion of reproductive health problems than those who have inadequate knowledge about RTI/STIs. The relation between utilization of the components of maternal health care service (full antenatal care and safe delivery) and reproductive health problems are not explicable from the bi-variate analysis. Reproductive health problems are more among women who faced any pregnancy complication or post delivery complications or experienced any episode of abortion compared to their counterparts.

**Table 4: Percent distribution of reproductive health problems of the young wives according to selected background characteristics for India**

Variables	%	Variables	%
<b>Place of residence</b>		<b>Couples Knowledge about HIV/AIDS</b>	
Rural	30.3	Both have no or inadequate knowledge	30.5
Urban	28.2	At least one have adequate knowledge	29.1
		Both have adequate knowledge	25.6
<b>Standard of living</b>		<b>Couples Knowledge about RTI/STI</b>	
Low	30.5	Both have no or inadequate knowledge	29.8
Medium	29.6	At least one have adequate knowledge	29.5
High	27.9	Both have adequate knowledge	24.8
<b>Children ever born</b>		<b>RH problems of the husband</b>	
1	27.3	No	28.8
2	28.7	Yes	39.9
3+	29.6		
<b>Religion</b>		<b>Pregnancy complication</b>	
Hindu	29.8	No	22.7
Muslim	30.7	Yes	38.7
Others	28.1		
<b>Caste</b>		<b>Post Delivery complication</b>	
Schedule Caste	31.3	No	24.0
Schedule Tribes	29.3	Yes	49.6
		<b>Safe delivery</b>	
Other backward caste	29.0	No	27.6
Others	30.0	Yes	27.0
<b>Couples Education</b>		<b>Full antenatal care</b>	
Both are illiterate	28.2	No	27.9
Wife literate but husband illiterate	31.9	Yes	23.6
Husband literate but wife illiterate	31.1		
		<b>Experience of Abortion</b>	
Both are literate	29.5	No	28.8
		Yes	39.4

**Determinants of any reproductive health problems among young married women**

It is clear from table 5 that place of residence, couples education, children ever born, reproductive health problems of the husband, couples knowledge about HIV/AIDS, utilization of full ANC and delivery services and experience of abortion are found to be important predictors in determining any reproductive health problems among the young married women. In India, women from urban area are less likely to have any reproductive health problems than the women in rural area. Reporting of any reproductive health problems are more prevalent among the literate couples. Higher parity increases the chance of reproductive health problems by 10 percent. Women whose husbands had reproductive health problems are

more prone (1.5 times) to have any reproductive health problems than those women whose husbands had not. Couple’s level of knowledge about HIV/AIDS has significant impact on women’s reproductive health. Young married women of the couple with adequate knowledge about HIV/AIDS were less likely to suffer from reproductive health problems.

Level of knowledge about RTI/STI and HIV/AIDS among the young married women and their husbands, utilization of maternal health services and reproductive health problems

It is apparent from table 6 that as the level of knowledge about RTI/STI and HIV/AIDS increases among the young women and their husbands, utilization of maternal health services also increases.



The level of knowledge about HIV/AIDS increases, the practice of any ANC increases from 71 percent to 96 percent, extent of full ANC increases by three times and safe delivery increases from 46 percent to 86 percent. Similarly, as the level of knowledge about RTI/STI increases the practice of full antenatal care

increases from 14 percent to 35 percent and safe delivery increases from 53 percent to 81 percent. The proportion of any antenatal care varies from 76 percent to 96 percent with different levels of knowledge about RTI/STI.

**Table 5: Results of logistic regression analysis for any reproductive health problem (1=yes, 0=no) of the young wives in India**

Variables	exp( $\beta$ )
<b>Place of residence (Rural)</b>	
Urban	0.908*
<b>Standard of living (Low)</b>	
Medium	1.017
High	1.003
<b>Children ever born (One)</b>	
2	1.109*
3+	1.103*
<b>Religion (Hindu)</b>	
Muslim	1.099
Others	1.020
<b>Caste (Schedule Caste)</b>	
Schedule Tribes	0.921*
Other backward caste	0.964
Others	0.979
<b>Couples Education (Both are illiterate)</b>	
Wife is literate but husband is illiterate	1.269*
Wife is illiterate but husband is literate	1.159*
Both are literate	1.190*
<b>Couple's Knowledge about HIV/AIDS (Both have no or inadequate knowledge)</b>	
Any one have adequate knowledge	1.020
Both have adequate knowledge	0.876*
<b>Couple's Knowledge about RTI/STI (Both have no or inadequate knowledge)</b>	
Any one have adequate knowledge	1.031
Both have adequate knowledge	0.955
<b>Reproductive health problem of the husband (No)</b>	
Yes	1.462*
<b>Pregnancy complication (No)</b>	
Yes	1.853*
<b>Post Delivery complication (No)</b>	
Yes	2.609*
<b>Safe delivery (No)</b>	
Yes	0.986*
<b>Full antenatal care (No)</b>	
Yes	0.817*
<b>Ever had an abortion (No)</b>	
Yes	1.450*

Text in parentheses indicates Reference category; \*p<0.05

**Table 6: Maternal health care utilization by different levels of couples' knowledge about HIV/AIDS and RTI/STI, India**

Couples' knowledge about RTI/STI	Utilization of Maternal Health Services		
	Any ANC	Full ANC	Safe Delivery
Both have no/inadequate knowledge	75.6	13.6	52.9
Any one have adequate knowledge	90.9	23.1	75.6
Both have adequate knowledge	95.7	34.7	80.6
Couples' knowledge about HIV/AIDS	Utilization of Maternal Health Services		
	Any ANC	Full ANC	Safe Delivery
Both have no/inadequate knowledge	71.0	10.5	46.1
Any one have adequate knowledge	90.0	21.6	73.0
Both have adequate knowledge	95.7	32.1	85.8

Having noted that when couples have adequate knowledge about HIV/AIDS and RTI/STI, the tendency to utilize maternal health care services is more as compared to those of having inadequate knowledge, intension was to proceed one step ahead to examine the linkage between utilization of maternal health services and reproductive health problem for different level of knowledge of RTI/STIs and HIV/AIDS. The findings suggest that the level of reproductive health problem decreases when

utilization of maternal health care services is more and level of knowledge about HIV/AIDS and RTI/STI among the young married women and their husbands rise (table 7). It is also noticed that when anyone or both of the couples have adequate knowledge about HIV/AIDS or RTI/STIs and simultaneously gone for full ANC or practiced safe delivery, reproductive health problem is less among them compared to those with similar level of knowledge but not converted the knowledge into practice.

**Table 7: Percentage of young married women who have any reproductive health problems with different levels of knowledge about RTI/STI and HIV/AIDS and utilization of maternal health services, India**

Knowledge about RTI/STI	Have any RH Problem			
	Full ANC		Safe Delivery	
	Yes	No	Yes	No
Both have no or inadequate knowledge	23.4	27.9	27.1	27.4
Any one have adequate knowledge	24.6	28.5	26.6	30.7
Both have adequate knowledge	24.8	23.9	23.3	27.8
Knowledge about HIV/AIDS	Have any RH Problem			
	Full ANC		Safe Delivery	
	Yes	No	Yes	No
Both have no or inadequate knowledge	23.8	28.1	28.1	27.3
Any one have adequate knowledge	24.0	28.2	26.5	29.5
Both have adequate knowledge	22.3	24.1	23.2	28.5

**DISCUSSION**

In this paper an effort has been made first to investigate the reproductive health status of the young married women and to find a linkage between awareness about RTI/STI and HIV/AIDS with utilization of maternal health services and finally with reproductive health problems.

Findings suggest that despite different policies and programmes still one third of young married women reported to have any reproductive health problem. The

availability of services and differences in social and cultural values guides rural-urban differentials in terms of prevalence of reproductive health problem. Couples education also plays a significant role in reporting of reproductive health problem. Since proper education enhances the level of knowledge and awareness about morbidity and mortality, educated couples are much aware about their reproductive health matters and they may able to identify the health problems and report it without any hesitation. The study indicates that husband's reproductive health

problems increase the risk of reproductive health problem of the young women. Since most of RTI/STI is communicable, therefore it may happen that some of health problems pass to women through sexual contact with her husband. Adequate knowledge about HIV/AIDS among the couples and utilization of maternal health services reduce the chance of reproductive health problems among the young married women. Both the factors improve the reproductive health situation in two ways. First, they can effect individually. Those couples who have adequate knowledge about HIV/AIDS, they are more likely to practice safe sexual behaviour and that may reduce the risk of suffering from any reproductive health problem. On the other hand, utilization of maternal health services decreases the chance of pregnancy complication and post delivery complications. Secondly, these two factors affect reproductive health of the young married women jointly. Findings reveal that adequate knowledge about RTI/STIs and HIV/AIDS among the couples improves the utilization of maternal health services. Again, it is found that the prevalence of reproductive health problem is less among those women who have adequate level of knowledge about RTI/STIs and HIV/AIDS and utilize the maternal health services.

Therefore, appropriate programme oriented intervention model should be adopted which can enhance the awareness and knowledge level of the young women.

**Conflict of Interest:** There is no conflict of interest.

**Source of Funding:** No financial support.

**Ethical Clearance:** Research ethics are maintained.

**Acknowledgement:** The authors are thankful to Prof. F.Ram, Senior Professor & Director, IIPS, Mumbai, for his valuable suggestions and comments at the time of preparation of the paper.

## REFERENCES

1. National AIDS Control Organization (NACO). (2004). NACO Annual Report, 2004. NACO, New Delhi
2. International Institute for Population Sciences. (2006). India Summary Report, Reproductive and Child Health, District Level Household Survey (2002-04) and Facility Survey (2003), International Institute for Population Sciences, Mumbai.

# A Study of Oral Cancers and Some Epidemiological Factors in Patients Attending Tertiary Care Hospital

Nirmala C J<sup>1</sup>, Hemanth T<sup>2</sup>, Henjarappa K S<sup>3</sup>

<sup>1</sup>Assistant Professor, Dept of Community Medicine, Dr, B.R.A.M.C, Bangalore, <sup>2</sup>Associate Professor, Dept of Community Medicine, M.S.R.M.C, Bangalore, <sup>3</sup>Assistant Professor, Dept of Anaesthesiology, KMIO, Bangalore

## ABSTRACT

Cancer is one of the major threats to public health in the developed world and increasingly in the developing world. Oral cancer is the 8th most common cancer in the world and India has one of the highest incidences. In India, Oral cancer is the leading cancer in males and ranking third in females.

**Study objective:** To study some of the epidemiological factors associated with oral cancer.

**Study Design:** Cross sectional study.

**Study Area:** Kidwai Memorial Institute of Oncology (KMIO), Bangalore.

**Study Population:** Histologically confirmed new cases of oral cancer of all age groups and all stages of the disease attending the hospital during the study period.

**Results:** The study population consisted of 74.0% males and 26.0% females out of total 200 subjects. Majority of the study population belonged to the 50-59 years, 48.5% were illiterates, 81.5% were unskilled workers and 34% belonged to class III. Sixty percent were smokers, 47% were paan chewers, 43% were alcoholics and 42.5% had poor hygienic practices.

**Keywords:** Oral Cancer, Epidemiological Factors

## INTRODUCTION

Non communicable diseases also known as Modern epidemics are assuming importance among the adult population in both developed and developing countries. Cardiovascular diseases and cancers are the leading causes of death in developed countries. In the developing countries, cancer is one among the ten commonest causes of mortality.<sup>1</sup> This cancer epidemic is due to the combined effect of increased life expectancy and the high or increasing levels of prevalence of cancer risk factors.<sup>2</sup> Approximately 10 million people are diagnosed with cancer and more than 7 million die of this disease every year.<sup>3</sup>

Oral cancer is the 8th most common cancer in the world<sup>4</sup>. In SEAR, the great majority of cancers include oral cancers in men and cancer cervix in women. Oral cancers are seen predominantly in both the sexes accounting for about one third of all cancers.<sup>1</sup> India has one of the highest incidence of oral cancer in the world.<sup>5</sup> Oral cancer constitutes 12% of all cancers in

men and 8% of all cancers among women.<sup>6</sup> The vast majority of the cases present with regionally advanced disease with only 25-30% presenting in early stages which is amenable for cure. Advanced cancer carries a poor prognosis and patients usually die of uncontrolled regional disease. The five year survival even with aggressive treatment at this stage is less than 20% with a median survival of around 12 months.<sup>7</sup>

According to ICD-10, Oral cancers include cancer lips, mouth, gums, floor of the mouth, palate, tongue, salivary glands, tonsils, oropharynx, nasopharynx and hypopharynx.<sup>8</sup> The risk factors for the development of Oral cancers include tobacco smoking, tobacco chewing, oral snuff, chewing betel quid, consumption of alcohol, the presence of potentially malignant oral lesions and poor oral hygiene.<sup>9</sup> Most of the risk factors like use of tobacco in any form, chewing betel quid, consumption of alcohol, poor oral hygiene are amenable for prevention. The fact that these risk factors

are modifiable emphasizes the need for increasing awareness among the general public and policy makers as a first step in the prevention and control of oral cancers.

## MATERIALS AND METHOD

**Study Design:** Cross sectional study.

**Study Area:** Kidwai Memorial Institute of Oncology (KMIO), Bangalore.

**Study Population:** New cases of oral cancer of all age groups and all stages of the disease confirmed by biopsy and histopathological report at KMIO during the study period.

**Study Period:** One year, from 2008 – 2009

**Method Of Data Collection:** Before the collection of data from the subjects, a close rapport was established by explaining the objectives and the importance of the study. Verbal consent was obtained from all the study subjects. Information regarding the socio demographic details, the exposure to risk factors such as tobacco smoking, tobacco chewing, paan chewing, and alcohol drinking in terms of age at start of habits, type used, dose and duration of exposure were obtained with the help of pretested semi structured questionnaire by interviewing the study subjects.

**Statistical Analysis:** Descriptive statistical methods, calculation of Mean and Standard deviation

## RESULTS

**Table 1. Distribution of study population according to Age, Gender, and Religion**

Age Groups (years)	Cases No. (%)
20-29	3 (1.5)
30-39	10 (5.0)
40-49	37 (18.5)
50-59	78 (39.0)
60-69	55 (27.5)
>=70	17 (8.5)
<b>Gender</b>	
Male	148 (74.0)
Female	52 (26.0)
<b>Religion</b>	
Hindu	188 (94.0)
Muslim	6 (3.0)
Christian	6 (3.0)
Total	200 (100)

(Mean= 54.8 years, standard deviation= 10.70 years)

Table 1 depicts that majority of the study population 39% belonged to 50-59 years followed by 27.5% in 60-69 years. Males constituted 74% and females 26% with ratio of 2.8:1 Hindus constituted 94%, followed by Muslims 3% and Christians 3% .

**Table 2: Distribution of Study Population according to Education, Occupation and Socioeconomic status**

Education Status	Cases No. (%)
Not literate	97 (48.5)
Primary school	30 (15.0)
Middle School	50 (25.0)
High School	16 (8.0)
College and above	7 (3.5)
<b>Occupation</b>	
Unskilled worker	163(81.5)
Semi Skilled worker	16(8.0)
Skilled worker	17(8.5)
Professional	4(2.0)
<b>Socio economic status</b>	
Class I	4 (2.0)
Class II	64 (32.0)
Class III	68 (34.0)
Class IV	57 (28.5)
Class V	7 (3.5)
Total	200 (100)

Table 2 depicts that nearly 50% of the cases were illiterates and only 3.5% had studied up to college and above, 81.5% were unskilled workers, 34%, belonged to class III followed by 32% belonging to class II according to B.G.Prasad's classification.

**Table 3: Distribution of study population according to Tobacco smoking habits**

Smoking habit	Cases No. (%)
Smokers	120( 60.0)
Non Smokers	80 (40.0)
Total	200 (100)
<b>Type of smoking</b>	
Cigarettes	8(6.6)
Bidis	105 (87.5)
Both	7 (5.8)
<b>Age at start of the Smoking habit (years)</b>	
< =25	87 (72.5)
>25	33 (27.5)
<b>Frequency of smoking ( number per day)</b>	
< =20	63 (52.5)
> 20	57 (47.5)
<b>Duration of smoking habit (years)</b>	
<=20	15 (12.5)
21-29	51 (42.5)
>30	54 (45.0)
Total	120 (100)



Table 3 depicts that 60% of the cases were smokers and 40% were non smokers. Bidi smokers constituted maximum number, 72.5% of the smokers started the habit before the age of 25. Smoking more than 20 bidi/cigarette was found in 47.5 % and 45% had more than 30 years of the habit.

**Table 4: Distribution of study population according to Chewing habits**

Chewing Habit	Cases No. ( %)
Yes	94 (47.0)
No	106 (53.0)
Total	200 (100)
<b>Type of paan chewing</b>	
Tobacco only	11(11.7)
Tobacco + betel leaf + areca nut +lime	51(54.2)
Betel leaf + areca nut + lime	29(30.8)
Betel leaf + areca nut	3(3.2)
<b>Age at start of the chewing habit (years)</b>	
<=25	63 (67.0)
>25	31 (33.0)
<b>Frequency of paan chewing (times per day)</b>	
<= 5	50 (53.1)
6 - 10	30 (32.0)
> 10	14 (14.9)
<b>Total duration of Chewing habit (years)</b>	
<= 20	23 (24.5)
21- 30	33 (35.1)
> 30	38 (40.4)
Total	94 (100)

Table 4 depicts that 47% of the cases were chewers and 53.0% of the cases were nonchewers. Tobacco + betel leaf + areca nut +lime users were around 54.2%, 67 % of the chewers started the habit before the age of 25. Chewing for 6-10 times was found in 32 % & 40.4% had more than 30 years of chewing habit.

**Table 5: Distribution of study population according to Alcohol drinking habits**

Alcohol consumption	Cases No. ( %)
Yes	86 (43.0)
No	114 (57.0)
Total	200 (100)
<b>Type of alcohol beverage</b>	
Arrack	61(71.0)
Beer	11 (12.8)
Whisky	7 (8.1)
Others	7 (8.1)

**Table 5: Distribution of study population according to Alcohol drinking habits (Contd.)**

Alcohol consumption	Cases No. ( %)
<b>Frequency of alcohol drinking</b>	
Daily	27(31.4)
Three times weekly	16(18.6)
Weekly	17(19.8)
Monthly	11(12.8)
Occasionally	15(17.4)
<b>Total duration of habit (years)</b>	
<=20	22 (25.6)
21-30	36 (41.9)
>30	28 (32.5)
Total	86 (100)

Table 5 shows a higher proportion of alcohol consumers 43.0% among cases. Arrack drinkers were 26%, 31.5 % of the alcoholics were daily drinkers, 32.5 % had more than 30 years of the habit.

**Table 6: Distribution of study population according to Oral hygienic practices**

Brushing teeth regularly	Cases No. ( %)
No	85(42.5)
Yes	115 (57.5)
<b>Materials used for brushing teeth</b>	
Finger + Tooth paste/powder	54(27.0)
Tobacco	8(4.0)
Charcoal	88 (44.0)
Others	22(11.0)
Tooth brush + Tooth paste	28 (14.0)
<b>Frequency of brushing teeth</b>	
Twice daily	13 (6.5)
Once daily	187 (93.5)
Total	200 (100)

Table 6 depicts that 42.5% of the cases were not brushing teeth regularly. Charcoal users were 44% and tooth paste/powder users were only 27% and 93.5% brushed teeth only once in a day.

## DISCUSSION

Oral cancer is any cancerous tissue growth located in the mouth. It may arise as a primary lesion originating in any of the oral tissues, by metastasis from a distant site of origin, or by extension from a neighboring anatomic structure. Oral cancer is predominantly seen in the older age group. Studies have reported maximum prevalence in the 5<sup>th</sup> and 6<sup>th</sup>

decade of life. The incidence in older age group could be due to the prolonged duration of exposure to the initiators and promoters of cancer, cellular ageing and the decreased immunological surveillance.<sup>10</sup> The present study findings were similar to a study done in Trivandrum, India.<sup>11</sup>

Men are affected almost twice as often as women, probably due to their higher indulgence in risk factors. The ratio of males to females diagnosed with oral cancer is 2:1 over life time.<sup>9</sup> In a study males constituted 61.2% and females 38.75% with ratio of 2:1.<sup>12</sup> The present study findings were similar to a study where Hindus were 79.55%, followed by Muslims 11.22% & Christians (9.22%). Also farmers and industrial workers constituted majority of the cases, low educational attainment was associated with significantly increased risk of oral cancer. Cases reported significantly fewer years of education.<sup>13</sup> A study in Trivandrum, India showed that 41.1% were illiterates, 17.7% had completed high school and above.<sup>11</sup> In a study 26.8% belonged to class II followed by 23.4% belonging to class V.<sup>14</sup>

Tobacco is by far the most important risk factor for Oral cancer. Prevalence of tobacco use has declined in some high income countries, but continues to increase in low and middle income countries, especially among young people and women. Smoking Tobacco is in the form of Cigarettes, Bidis, Cigars, Pipes, and Sticks. Smokeless Tobacco is chewing tobacco and snuff.<sup>10</sup> A study concluded that, tobacco consumption was the most important factor for the prediction of the risk of oral cancer.<sup>14</sup> A study with 200 cases showed that, heavy smoking was very common among cases. Long-duration smoking and early age of starting smoking were associated with especially increased risks.<sup>15</sup> A study in Spain showed that all measures of tobacco smoking status, amount, duration, and type of smoking were strongly associated with cancer risk.<sup>16</sup>

An increased risk of about 2 fold was observed among chewers without tobacco, whereas among chewers with tobacco, the increase in risk was 5 fold for oral cancers.<sup>17</sup> Increased risk was seen in individuals who had chewed more than 5 times a day and more than 20 years or more.<sup>11</sup> Paan tobacco chewing had significant predisposing effect in females.<sup>18</sup> A study, showed that, 60 % were smokers, 20 % were chewers and 20% were mixed users (smoking and chewing).<sup>19</sup>

Alcohol is an independent risk factor for oral cancer. A synergistic effect of tobacco and alcohol has been observed. The risk in consumers of alcohol depends on the type and the amount consumed. A study in Mainpuri district of UP showed higher prevalence rate of oral cancer in those who consumed alcohol as compared to non users of alcohol. Alcohol may promote carcinogenesis by various mechanisms which may include dehydrating effects of alcohol on the mucosa increasing mucosal permeability and effects of carcinogen in tobacco, nutritional deficiency and solubilizing tobacco.<sup>9</sup> The alcoholic beverage used commonly in South India is arrack which is locally brewed liquor with 40-50% ethanol. Another locally fermented and distilled sap from palm trees is called toddy. A study in Spain concluded that all measures of alcohol drinking status, amount, duration, and cessation were strongly associated with cancer risk. The association with cancer risk was much stronger for drinking of spirits. The risk increased with increasing ethanol content of each type of drink.<sup>16</sup>

A study in Beijing, showed poor dentition as a strong risk factor. Those who reported that they did not brush their teeth had an elevated risk indicating that oral hygiene and several oral conditions are risk factors for oral cancer.<sup>20</sup> In a study, various indicators of oral hygiene and dentition were used to assess the general oral condition. Cases reported that they cleaned their teeth less often. Majority of the study participants, mostly women reported using fingers and other instruments instead of a tooth brush. Regular tooth paste was used by 25% of oral cancer cases.<sup>13</sup>

Cancer control consists of a series of measures based on present knowledge in the fields of prevention, detection, diagnosis, treatment, aftercare and rehabilitation, aimed at reducing the number of new cases. The basic approach to the control of cancer is through primary and secondary prevention. An important area of primary prevention is cancer education which should be directed at high risk groups. Oral cancer is amenable for primary prevention. If the risk factors are eliminated from the community, a great deal of reduction in the incidence of Oral cancer can be achieved. This requires intensive public education and motivation for changing life styles supported by legislative measures like banning or restricting the sale of carcinogens like tobacco.

## CONCLUSION AND RECOMMENDATIONS

- The risk factors such as smoking tobacco in the form of bidis, cigarettes, smokeless tobacco in the form of chewing, alcohol drinking and irregular habit of brushing teeth were associated with the risk of development of oral cancer .
- The risk of developing oral cancer increases as the dose and the duration of the risk factors increased.
- Regular brushing of teeth was found to be protective against development of oral cancer.
- The risk factors are highly amenable for primary and secondary prevention. Tobacco habits showed highest risk for oral cancer among the various risk factors. Thus there is a great need to augment tobacco control measures and educate the public about harmful effects of tobacco consumption.

**Acknowledgement:** Department of community medicine, M.S.Ramaiah Medical College, Bangalore

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** Obtained

## REFERENCES

1. Park.K, Park's text book of Preventive and Social Medicine, Jabalpur; M/S Banarsidas Bhanot publishers, 2009. 20th edition. pp 332-340
2. Peterson PE, The WHO perspective: Strengthening the Prevention of Oral Cancer, Community Dentistry Oral Epidemiology, Blackwell Munksguard, 2005, 33, pp 397-9
3. WHO Media centre, Global burden of cancer, available at [http://www.who.int/mediacentre/factsheets/fs\\_297/en/](http://www.who.int/mediacentre/factsheets/fs_297/en/) accessed on 15/10/07
4. Stewart BW, Kleives.P, World Cancer Report Lyon, WHO International Agency for Research on Cancer, 2003.
5. Ferlay J, Bray F, Pisani P, Parkin DM, GLOBACON 2002: Cancer incidence, mortality and prevalence worldwide. IARC Cancer Base. No. 5 version 2.0 Lyon: IARC Press, 2004
6. Sankarnarayan R, Oral cancer in India, An epidemiological and clinical review, Oral surgery, Oral med, Oral path 1990, 69, pp 325- 330
7. Vikram B, Cancers of the head and neck region in developing countries, Radiotheroncol 2003, 67(1), 1-2
8. National Cancer Registry Programme, Consolidated Report of the Hospital Based Cancer Registries, 2001- 2003, Indian Council of Medical Research, New Delhi, India, April 2007
9. Hiremath SS, Text book of Preventive and Community Dentistry, Published by Elsevier, a division of Reed Elsevier India pvt. Ltd. New Delhi, 2007 pp 138- 142
10. Soben Peter, Essentials of preventive and community dentistry, Arya( Medi) Publishing House, New Delhi, 3<sup>rd</sup> edition, June 2007 pp 452-487
11. Muwonge R, Ramdas K, Sankila R, Thara S, Thomas G, Vinoda J, et al, Role of tobacco smoking, chewing and alcohol drinking in the risk of oral cancer in Trivandrum, India: A nested case control design using incident cancer cases, Oral oncology 2008, 44, 446-454
12. Khandekar SP, Bagdey PS, Tiwari RR, Oral cancer and some epidemiological factors: A hospital based study, Indian Journal of Community Medicine july- September, 2006 vol. 31 no.3 pp 157- 159
14. Franco EL, Kowalski LP, Oliveira BV, Curado MP, Pereira RN, Silva ME, et al, "Risk factors for oral cancer in Brazil, a case control study", International journal of Cancer, 1989. vol 43,issue 6 pp 992-1000.
15. Garrote LF, Herrero R, Reyes RO, Vaccarella S, Anta LJ, Ferbeye L, Munoz N, et al, Risk factors for cancer of the oral cavity and oro- pharynx in Cuba, British Journal of cancer, 2001, 85(1), 46-54
16. Castellsague X, Quintana MJ, Martinez MC, Nieto A, Sanchez MJ, Juan A, et al, The role of type of tobacco and type of alcoholic beverage in oral carcinogenesis, International journal of Cancer, 2003. vol 108, 741-749
17. Znaor A, Brennan P, Gajalakshmi V, Mathew A, Shantha V, Varghese C, et al, Independent and

- combined effects of tobacco smoking, chewing and drinking on the risk of oral, pharyngeal and esophageal cancers in Indian men, *International journal of Cancer*, 2003. vol 105, 681-686
18. Sankarnarayanan R, Duffy SW, Day NE, Nair M.K, Padmakumary G, A case control investigation of cancer of the oral tongue and the floor of the mouth in Southern India, *International journal of Cancer*, 1989. vol 44, 617-621.
  19. Varshney PK, Agrawal N, Bariar LM , Tobacco and alcohol consumption in relation to oral cancer, *Indian journal of Otolaryngology and Head and Neck Surgery* Vol 55 No 1 January-March 2003
  20. Zheng T, Boyle P, Hu H, Duan J, Jiang P, Daquan M, et al, Dentition, oral hygiene, and risk of oral cancer: a case-control study in Beijing, *People's Republic of China Cancer Causes and Control* vol 1 no.3 november 1990, pp 234- 241

# A Study of Oral Health Awareness among Undergraduate Medical Students in Davangere City - a Cross Sectional Survey

Sujatha B K<sup>1</sup>, Puja C Yavagal<sup>2</sup>, Nagesh L<sup>3</sup>, Mary Shimy S Gomez<sup>4</sup>

<sup>1</sup>Senior Lecturer, Department of Public Health Dentistry, Vaidehi Institute of Dental Science and Research Centre, Bangalore, Karnataka, India, <sup>2</sup>Reader, <sup>3</sup>Professor and Head, <sup>4</sup>Postgraduate Student, Department of Public Health Dentistry, Bapuji Dental College and Hospital, Davanger

## ABSTRACT

**Background:** Oral health is an integral part of general health. It is an essential component of health throughout the life of an individual. Certain systemic diseases can manifest in the oral cavity. Majority of the population approaches medical practitioners for their oral health problems at primary health centre level. Hence, general practitioners should have an adequate knowledge about oral health and also they should play an active role in oral health promotion.

**AIM:** To assess the oral health awareness among undergraduate medical students in Davangere city.

**Methods and Material:** A self structured, pre-tested, closed ended questionnaire consisting of 25 questions with options on Likert scale was used for the survey. Questions were related to oral health problems and their relation with general health. The data was collected, compiled and analyzed using Chi-square test.

**Results:** The oral health awareness was assessed based on the inter-quartile range, in that only 25% of the undergraduate students were found to have good oral health awareness, 38% were found to have average and 37% were found to have poor oral health awareness. Final year undergraduate medical students were found to have better oral health awareness (40%), when compared to second (13%) and third year students (23%) at  $p < 0.001$ .

**Conclusion:** Oral health awareness among undergraduate medical students was found to be poor. Final year undergraduate students were found to have better oral health awareness.

**Keywords:** Oral Health, Medical Students, General Practitioner, Primary Health Centre

## INTRODUCTION

Oral health is an essential component of health throughout life. Poor oral health and untreated oral diseases and conditions can have a significant impact

on quality of life. They can affect the most basic human needs, including the ability to eat and drink, swallow, maintain proper nutrition, smile, and communicate. But Oral problems are affecting human race since time immemorial and they are considered as one of the "public health problems".

India is a country of diverse ethnic groups, geographic characters, culture and religion with population of 1.22 billion<sup>1</sup>. Among them 68.84% of population is residing in rural area where only 10% of manpower resources are available and vice versa in urban areas<sup>2</sup>. The dentist population ratio is 1:10,000

---

### Corresponding author:

**Sujatha B K**

Senior Lecturer

Department of Public Health Dentistry, Vaidehi Institute of Dental Science and Research Centre, Bangalore, Karnataka, India

Email: sujibk2005@yahoo.com

Contact number: 9019956236



in urban areas and 1:250,000 in rural areas<sup>3</sup> For such a major part of the population, health care is delivered through primary health centres mainly, where majority of health providers are medical practitioners. The demands of faculty and facilitation are tremendous challenges, and as such, the supply most often cannot cater to the needs of the same<sup>4</sup>.

Medical practitioners should play an active role in oral health promotion<sup>5</sup>. Proper knowledge of oral diseases is crucial in medical practice due to the following reasons a) Periodontal diseases are associated with multiple systemic conditions of medical interest b) A large number of systemic diseases have oral manifestations c) Many drugs are associated with oral adverse drug reactions<sup>6</sup> and d) Majority of the population approach medical practitioners for their oral health problems. So, early screening and proper referrals by these professionals may benefit to improve the access to oral health problems and to reduce the associated morbidity and mortality. The need of the hour is for general practitioners to have an adequate knowledge about oral health as they are the one to whom majority of the population approach.

**Need for the study:** Today's students are tomorrows doctors, the knowledge they are going acquire at present will be reflected in the future during their practice.

Exploration of literature revealed that there are no studies in the available literature to assess the oral health awareness among undergraduate medical students. So, a present study was chose with an aim to assess the oral health awareness among undergraduate medical students in Davangere city.

## METHODOLOGY

### Study type and design

The study is an observational, cross sectional survey. A self structured, pre-tested questionnaire was used for the survey. All the questions are closed ended and the options were on Likert scale. Administering the questionnaire was done by an investigator during students' leisure hours.

### Sampling size and sampling method

All the undergraduate students studying in second, third and final year of JJM Medical College and SS Medical College and Hospital were included in the study constituting a total population of 1092 students.

### Ethical consideration and consent

The study protocol was approved by Institutional review board of Bapuji Dental College and Hospital. The required permission was obtained from the concerned authorities of both the medical institutions. Written informed consent was taken from the students participating in the study after explaining the objectives, pros and cons of the study.

### Duration of the study

The study was completed in a period of 4 months.

## COLLECTION OF DATA

The data was collected using a self structured pre-tested questionnaire. The questionnaire included the demographic details and the information related to oral health maintenance, relationship of dental diseases with systemic diseases and oral health problems and the methods for their treatment.

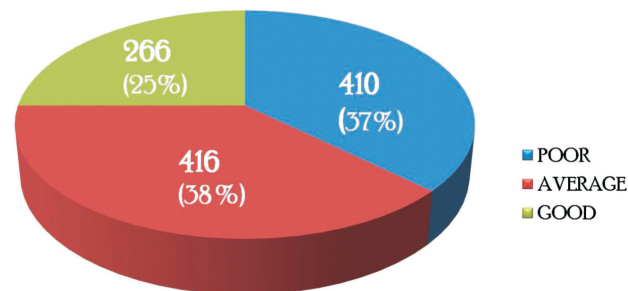
### Analysis of data

As the data was qualitative, Chi-square test was used to check the significant difference.

## RESULTS

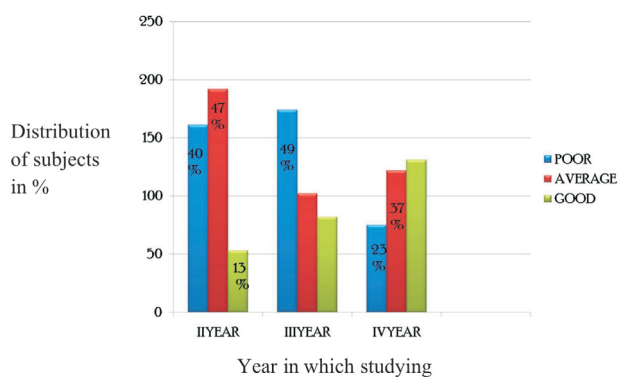
Based on the inter-quartile range , all the students were divided according to their oral health awareness as follows, d''11 = Poor oral health awareness, 12-16 = Average oral health awareness, ≥17 = Good oral health awareness.

**Graph 1:** Oral health awareness among undergraduate medical students.



Out of 1092 students, only 266 (25%) were found to have good oral health awareness, 416 (38%) students were found to have adequate oral health awareness and 410 students (37%) were found to have poor oral health awareness.

**Graph 2:** Oral health awareness of second, third and final year undergraduate medical students.



Final year undergraduate medical students were found to have better oral health awareness (40%) when compared to second (13%) and third year (23%) undergraduate medical students.

## DISCUSSION

In the present study the awareness about oral health was found to be poor among undergraduate medical students in Davangere city. Since it is the first study no comparison has been done. The probable reasons could be less clinical exposure of the medical students to oral health problems as they are Pre-occupied with their own curricular activities, and also the attitude of the students toward oral health – considering it as least important.

Final year undergraduate medical students were found to have better oral health awareness compared to second and third year undergraduate medical students. Probable reasons could be more clinical exposure, more experience and knowledge of final year undergraduate medical students when compared second and third year students.

Majority of the second year students were found to have average oral health awareness when compared to third year students in which most of them had poor oral health awareness. The Probable reason could be medical students are exposed to dental subjects in their second year academic curriculum. First year undergraduate medical students were not included in the study as they do not have clinical exposure. It is recommended that Oral health awareness of the undergraduate medical students can be improved by

Incorporating basic information about oral health in their academic curriculum, conducting various interdisciplinary workshops, CDE programs and conferences, increasing the clinical exposure of the students to oral findings as most of the systemic diseases manifests in the oral cavity, special study modules or electives in oral health and disease should be created by involving the dental faculty, emphasizing the importance of oral health.

As prospective doctors- they should have sufficient awareness about oral health as oral health problems are cumulative by nature, more amenable to prevention and difficult to treat. Early identification of the oral diseases and referral to a specialist not only prevents a patient from pain, agony, functional, esthetic problems but also death in some conditions.

The present survey shows poor oral health awareness among undergraduate medical students, further studies have to be conducted to explore the reasons.

**Acknowledgement:** We thank all the medical undergraduate students and concerned authorities for their participation and support.

**Conflict of Interest:** No conflict of interest

**Source of funding:** Nil

## REFERENCES

1. <http://www.indiaonlinepages.com/population/india-current-population.html>. Accessed on 14/1/2012.
2. <http://censusindia.gov.in/2011-Documents/Houselisting%20English.pdf>. Accessed on 14/01/2012.
3. Nanda Kishor KM. Public health implications of oral health –inequity in India. J. Adv Dental Research. 2010 ;( I): 1-0.
4. <http://www.dentistryindia.net/article.php?id=1010>. Accessed on 14/1/2012.
5. Patel A et al. Awareness of Oral health among medical practitioners in Sangamner City- A cross-sectional survey. IJCDS .2010; 1(1):26-9.
6. Jorge Hernn Ramirez; Roger Arce; Adolfo Contreras, Why Must Physicians Know about Oral Diseases? Teaching and Learning in Medicine. 2010; 22(2):148 – 55.

# Assessment of Grip Strength and Sensations in Computer users Versus Individuals Doing Writing Task

Thakur A M<sup>1</sup>, Pandey S P<sup>2</sup>, Yardi S S<sup>3</sup>

<sup>1</sup>Assoc. Professor, Department of Physiotherapy, <sup>2</sup>Bachelors of Physiotherapy, <sup>3</sup>Professor & Director, Department of Physiotherapy, Pad Dr D. Y. Patil University, Navi Mumbai

## ABSTRACT

**Objective:** To assess the grip strength and sensations between computer users versus individuals doing writing task

**Materials and Method:** This study compared the grip strength using a grip dynamometer and sensations using Semmes Weinstein monofilaments in individuals doing writing work and computer users

**Result:** The results of the study showed that grip strength was maximum in dominant hand of individuals doing writing task and least in both the hands of computer users as compared to the control group. Also the sensations were more affected in dominant hand of individuals doing writing task and in both the hands of computer use.

**Conclusion:** The grip strength was found to be more in dominant hand of individuals doing writing task and least in both the hands of computer users while the sensations were affected in the dominant hand of individuals doing writing task and in both the hands of computer users as compared to control group individuals.

**Keywords:** Grip Strength, Sensations, Computer users, Individuals Doing Writing Work

## INTRODUCTION

In our everyday life, both hands are used for various purposes and they form an integral part of all functional activities. Hand is a very complex structure capable of not only a multitude of motor tasks but also of relaying sensory information about the temperature, the shape and texture of objects to the brain<sup>1</sup>. To achieve our daily goals, our hand movements have to be finely co-ordinated and need to have good strength, sensations & coordination of the muscle and dexterity.<sup>2</sup>

Recent years have seen drastic changes in technology. Technology has changed from hand held manual instruments to wireless and computerized gadgets bringing in the change in the use of hands to perform activities.

Earlier, individuals used to do a lot of writing task in order to keep records of all information. But with

advance in technology there is increase in use of computers for collecting, creating & transmitting information.<sup>3</sup>

Whereas, writing is a single handed task involving individual's dominant hand only. It requires constant maintenance of tip to tip prehension grip involving index finger and thumb<sup>4</sup>. The intrinsic muscles of the hand are in constant forceful contracted position for maintaining prehension grip in order to hold pen and to do writing task for longer duration.

Computer typing is a bimanual task where both hands are used for typing purposes.<sup>5</sup> Computer operators are involved in activities such as sitting for prolonged time and constant placement of hand on mouse. They have to do typing work for prolonged period of time which involves repetitive task of flexing and extending of wrist and finger movements on

keyboard. Many of them do not use proper support for wrist and some times their hand position is not in proper alignment to that of keyboard.<sup>3</sup>

In both types of work, there is a constant hand activity with stereotype movements, fixed posture and static load during typing<sup>3</sup> or writing that can affect hand musculatures affecting its strength, coordination and sensation.

This study was thus undertaken to evaluate if prolonged use of hands either to work on computer or do writing work can affect the grip strength and sensation of hand, and if yes, then which kind of work affected it the most.

### MATERIALS AND METHOD

Ethical approval was obtained from the Ethics Committee of Pad Dr. D. Y. Patil University, Navi Mumbai. Written consent was taken from all the subjects participating in the study.

The outcome measures used in this study were grip strength and sensations. 90 subjects within the age group of 25 to 50 years were randomly selected for the study. 30 individuals worked on computers, 30 individuals did writing task and the remaining 30 served as the control group. Individuals doing the respective work for more than 3 years and more than 5 hours per day were only included in this study. Any individual suffering from musculoskeletal/neurological problem or had undergone any surgery of the cervical spine or upper limb was excluded from the study.

#### Procedure to assess grip strength using Baseline hydraulic grip dynamometer

The subjects were made to sit on a chair, holding dynamometer in the hand with back straight, shoulder adducted, arms unsupported, elbow flexed to 90 degree, forearm in neutral position, wrist extended to 30° & in 15° ulnar deviation. The subjects were then instructed to press the dynamometer with maximum force. This was performed three times with the rest time of five minutes in between. Both hands were tested alternately, and each force was recorded. Average of three readings for each hand was recorded.

#### Procedure to assess sensations using Semmes Weinstein monofilaments

The subjects were asked to rest the hand on a stable & padded surface. Testing was done in a quiet area to

help the subject fully concentrate on the testing procedure. Subject's vision was occluded. Subject was explained the procedure and was instructed to respond whenever the stimulus was felt by saying "YES". Monofilaments were pressed at 90 degree against the skin until it bowed. It was held for 1.5secs and then removed. Stimulus was applied three times and subject's response was noted using the coloured pencil that responded to the colour on the handle of Touch-test. When the subject did not respond to the stimulus, the next largest monofilament was used and the procedure was repeated.

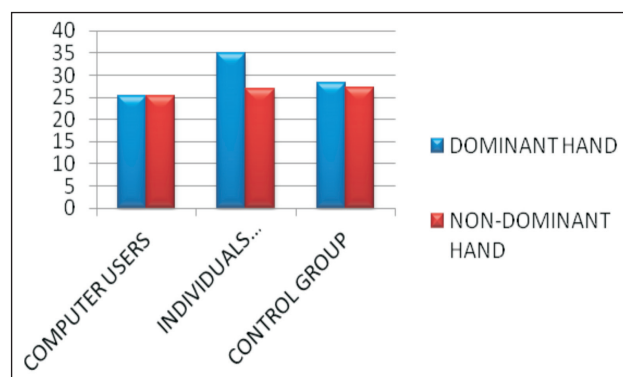
Following touch test sensory evaluator chart was used for evaluation of hand sensation

EVALUATOR SIZE	HAND THRESHOLD
2.83	Normal
3.61	Diminished light touch.
4.31	Diminished protective sensation.
4.56	Loss of protective sensation.
5.07	Loss of protective sensation.
6.65	Deep pressure sensation only

### OBSERVATION & RESULTS

The data was analyzed using Graph pad Instat 3.

**Graph 1:** Comparison of grip strength between dominant and non dominant hands in control group, individuals doing writing task and computer users.



The comparison of grip strength between dominant and non-dominant hands within the same groups was statistically analyzed using paired t test and the level of significance was set to  $p < 0.05$

The statistical analysis showed significant difference in grip strength between the dominant and non-dominant hands in the control group (dominant -  $28.219 \pm 10$ , non-dominant -  $27.14 \pm 9.16$ ,  $p = 0.0287$ ) and



individuals doing writing work (dominant -34.815 ±8.9, non-dominant - 26.94±8.10, p - 0.0001). However in the computer users, no significant difference was seen between the two hands (dominant -25.410 ±8.8, non-dominant - 25.31±9.60, p - 0.8726).

The comparison of grip strength of dominant and non-dominant hands between the three different groups was statistically analyzed using one way analysis variance (ANOVA).

In the dominant hand, grip strength was found to be maximum in individuals doing writing task followed by control group and then the computer users. (p<0.05, P<0.001 respectively)

In the non dominant hand, grip strength was found to be maximum in control group followed by individuals doing writing task and computer users; however the difference between the three groups was not statistically significant.

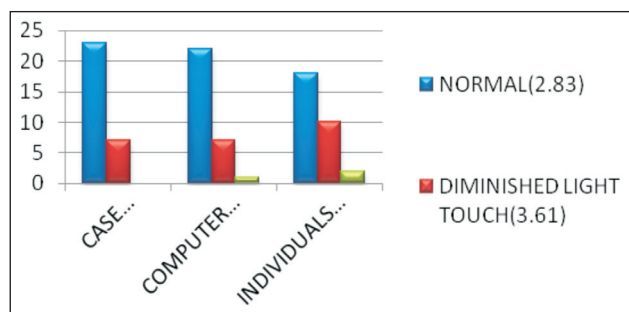
The analysis of graphs 2 and 3 was on percentage basis.

Of the 30 control group subjects, 23 (77%) had normal sensation and 7 (23%) had diminished touch sensation and the sensations was found to be same in both the hands of control group.

Of the 30 computer users, 22(73%) had normal sensation, 6 (23%), had diminished touch sensation, 1 (4%) had diminished protective sensation, and these were same in both the hands of computer users.

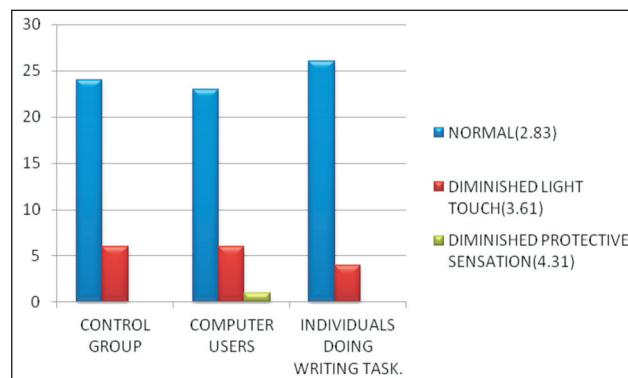
Of the 30 individuals doing writing task, 18 (60%) had normal sensation, 10(33%) had diminished touch sensation, 2(7%) had diminished protective sensation, in dominant hand and 26 (87%) had normal sensation, and 7(13%) had diminished touch sensation in non-dominant hand of.

**Graph 2:** Comparison of sensations between dominant hand of control group, computer users and individuals doing writing task.



Sensation was found to be more affected in the dominant hand of individuals doing writing task followed by computer users and control group

**Graph 3:** Comparison of sensations between non-dominant hand of control group, computer users and individuals doing writing task.



Sensation was found to be more affected in the non dominant hand of computer users followed by control group and individuals doing writing task

### DISCUSSION

The results of the study show that grip strength is maximum in dominant hand of individuals doing writing task and least in both the hands of computer users as compared to the control group.

Writing involves use of dominant hand only where the intrinsic muscles of the hand are in constant forceful contracted position in order to hold pen and perform the act of writing. While writing, the intrinsic muscles are in forceful contracted position and are doing the act of both gripping the pen and writing, which requires effort<sup>9</sup>. Also gripping of pen involves isometric contraction of the intrinsic muscles of hand. These activities performed on daily basis for longer period of time increase the strength and endurance of the muscles leading to an increase in the grip strength. As writing is single handed task, grip strength was seen to be more in dominant hand than non-dominant hand.

Computer typing is a bimanual task involving both the hands. While typing, finger flexors and wrist flexors work eccentrically and extensors work concentrically. Because of poor ergonomic posture, long period of uninterrupted working hours and unsupported extremities of operators and performing repetitive movement of fingers flexors for longer



period of time, muscle undergoes fatigue leading to weakness of intrinsic muscles and wrist muscles and this may eventually decrease the grip strength in computer users. As computer typing involves use of both the hands, the grip strength is decreased in both hands which is also evident from the study.

The study also assessed sensation of hands in computer users and individuals doing writing task.

The result of the study shows that sensation was more affected in dominant hand of individuals doing writing task and in both the hands of computer use. Earlier studies have shown that one of the most common causes of finger numbness is excessive use of the hands.<sup>10</sup>

The numbness caused by mild, temporary nerve compression is not due to the compression of the nerve per se, but is rather due to cutting off the blood supply to the nerve. A nerve is made up of the axons of neurons and connective tissue. The blood vessels which supply the nerve run in the connective tissue that surrounds the axons. The blood vessels supplying a nerve end in a capillary plexus that pierces the perineurium, so, these blood vessels are actually in the nerve. Thus, if the nerve is compressed, the blood vessels are also compressed, and blood supply to the axons is cut off and that part receives no new blood & hence no oxygen, ATP and no washing away of waste metabolites affecting nerve transmission. Finally it leads to numbness resulting in diminished sensation.<sup>11</sup>

Individuals who do prolong period of writing work need to hold pen for longer period in order to do the task of writing. The pressure exerted to hold pen and then finish the work of writing is firm, constant<sup>12</sup>, more forceful and of larger intensity as compared to that when typing on a computer. This results in pressure over the nerve of finger tips and diminished blood supply leading to numbness and eventually affecting sensation<sup>11</sup>. As writing involves use of dominant hand only, the sensation was more affected in the dominant hand of the writers than non-dominant hand.

Whereas, computer users intermittently do tapping movement over long periods of time with less rest pauses in between. This puts intermittent pressure over the finger tips resulting in pressure over the nerve of finger tips and diminished blood supply leading to numbness and eventually affecting sensation<sup>11</sup>. However as this pressure is intermittent and less than in writing, the sensation was comparatively less affected in computer users. Also because both the

hands are used in typing, therefore, in computer users it was seen that in both the hands sensation were equal.

## CONCLUSION

The grip strength was more in dominant hand of individuals doing writing task and least in both the hands of computer users as compared to control group individuals.

Also the sensation was found to be more affected in individuals doing writing task in the dominant hand and in both the hands of computer users as compared to control group individuals.

**Conflict of Interest:** None

**Acknowledgement:** We are grateful to the subjects from Bombay High Court and relatives of patients from Pad Dr D. Y. Patil Hospital and Research Centre, Navi Mumbai, who participated in this study.

**Source of Funding:** None

## REFERENCES

1. Blair V A et.al. Functional Human Movement. Physiotherapy Research International, 2000; Vol-5(4):261-262.
2. Johansson RS et.al. Eye-hand coordination in object manipulation. Journal of Neuroscience, 2001; 21(17):6917-32.
3. V. Dandannavar, et.al. Motor Performance in Upper Limbs among Regular Computer Users. Life Sciences and Medicine Research, 2010 July 31; Vol 14.
4. Cynthia Norikin, Pamela Levangie. Joint structure & function. 4<sup>th</sup> ed, New Delhi: Jaypee Brothers(JP); 2009
5. Bernstein NA. The co-ordination and regulation of movements. Oxford; New York: Pergamon Press, 1967.
6. Rantanen T, Guralnik JM, Foley D, et al Midlife hand grip strength as a predictor of old age disability. Journal of Medical Association (JAMA). 1999 Feb 10; 281(6):558-60.
7. Luís Carrasco, et.al. Grip Strength in Young Top-level Table Tennis Players, International Journal of Table Tennis Sciences, 2010; 6.
8. Nicola M Massy-Westropp, et.al. Hand Grip Strength: age and gender stratified normative data in a population-based study. BMC Research Notes. 2011; 4:127

9. Leo, et.al, The Effects of Handwriting on Grip Strength[internet]2011[updated 2011 May] Available from: <http://15stevenw.blogspot.in/2011/05/csb-8-effects-of-handwriting-on-grip.html>
10. Sonia Nair. Causes of numbness in fingers [internet] 2011[updated 2011 May]. Available from: <http://www.buzzle.com/articles/finger-numbness-at-night.html>
11. Robert West, Why do you feel the prickly feeling after releasing pressure on a nerve [internet] 1997[updated 1997 Jan]. Available from: <http://www.madsci.org/posts/archives/1996-12/850996021.Ns.r.html>
12. Yu Suzuki, et.al, Interaction Technique Combining Gripping and Pen Pressures. Knowledge-Based and Intelligent Information and Engineering Systems, 2010, September, Vol-4,440-448

# Measurement of Obesity and Related Perceptions among College Girls of Agra

Thakkar HK<sup>1</sup>, Singhal RK<sup>2</sup>, Misra SK<sup>3</sup>, Gupta SC<sup>4</sup>, Chaturvedi M<sup>5</sup>

<sup>1</sup>Assistant Professor, North Delhi Municipal Corporation Medical College & Hindu Rao Hospital, Delhi

<sup>2</sup>Assistant Professor, Department of Community Medicine, Saraswati Institute of Medical Sciences, Hapur, <sup>3</sup>Professor & HOD, Department of Social and Preventive Medicine, S.N. Medical College, Agra, <sup>4</sup>Professor & HOD, Department of Community Medicine, Saraswati Institute of Medical Sciences, Hapur, <sup>5</sup>Department of Community Medicine, School of Medical Sciences & Research, Sharda University, Greater Noida

## ABSTRACT

**Background:** Overweight and obesity now ranks as the fifth leading global risk for mortality. In addition, 44% of the diabetes burden, 23% of the ischemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity.

**Objective:** To measure prevalence of obesity and to get an idea of related perceptions among college girls of Agra

**Study design:** Cross sectional study

**Setting:** Degree colleges of Agra

**Study period:** January to June 2009

**Sample size:** 400 college going girls of 18-24 years

**Study variable:** Height, Weight, Semi-structured and semi-open ended performa

**Statistical Analysis:** Percentage, mean, standard deviation, logistic regression analysis

**Results:** The prevalence of overweight and obesity was found to be 18.5% & 4.5% respectively according to Body mass index. Logistic regression model revealed that the odds ratio for weight, height, age, religion and mothers education of the subjects were statistically significant in prediction of prevalence of obesity. Majority (65.7%) of the respondents perceived overweight as body weight being more than normal [comparatively more (72.2%) obese subjects opined] whereas 14.0 and 13.8 percent viewed it as body weight disproportionate to height & age and as extra fat over body respectively. Majority (67.7%) of the respondents perceived obesity as extra fat deposition over abdomen and thighs. Overwhelming majority (96.0%) of the subjects attributed diet responsible for obesity. Almost all the subjects (95.7%) believed high fat foods responsible as obesigenic whereas more than half of the subjects (56.7%) blamed fast food items such as burger, noodles & pizza along with chocolates.

**Conclusion:** It is generally accepted that comprehensive and coordinated interventions which support and facilitate physical activity and healthy diets in the context of a social-determinants-of-health approach represent the best way forward for obesity prevention.

**Keywords:** Body Mass Index, Perception, Overweight, Obesity, Obesigenic Food

## INTRODUCTION

Obesity is prevalent throughout the developed and developing world, with children as well as adults affected.<sup>[1]</sup> An escalating epidemic of overweight and

obesity is affecting many countries in the World, and if action is not taken now to stem the pandemic, millions of people will develop non communicable diseases and other health disorders.<sup>[2]</sup> Obesity is now well recognized as a disease in its own right, one which

is largely preventable through changes in life style. This fact, together with its association with the leading causes of illness and death, has made obesity a high priority problem in the world. <sup>[2]</sup> A precondition of individual motivation to lose weight is the perception or consciousness that one's weight is higher than normal for good health. <sup>[3,4]</sup> Most research on perceived weight has focused on qualitative aspects related with personal satisfaction with body weight <sup>[5,6]</sup> or social acceptability <sup>[7,8]</sup> whereas few studies have investigated to what extent people recognize the presence of overweight and obesity <sup>[9,10]</sup>. It is also essential to know how far the population is aware of the causes and consequences of obesity and what steps, if any, is to be taken by the people to avoid obesity or to reduce weight. An assessment of the knowledge about the linkages between food, physical work and overweight is also important to plan intervention activities. Certain Asian Countries' studies brought out some interesting findings. <sup>[11]</sup> Some think that over weight means the person is happy and sometimes even considered beautiful.

This study, therefore, was designed to find out the extent of the problem of obesity and investigate subjects' perceptions of overweight/obesity and the relative importance of dietary causes of obesity.

## SUBJECTS AND METHOD

A cross-sectional study has been conducted in 2009 among college girls aged 18-24 years in randomly selected degree colleges of Agra. The sample size was estimated by using the formula  $4pq/d^2$  where prevalence was taken as 24%. <sup>[12]</sup> The required precision of the estimate (d) was set at 20%. Using the above-mentioned formula, the sample size was estimated to be 316 and for the sample to be more representative of population, a total of 400 subjects were included in the study.

The girls were selected using a multistage stratified random sampling technique. The list of colleges was obtained from Agra University. Colleges were divided into two educational levels, undergraduate (UG) and postgraduate (PG). After numbering the colleges, two colleges (one UG and one PG) were chosen randomly from each geographical region (urban & rural). The girls were selected from each college by a systematic random sampling procedure from college records till the desired sample size was completed.

## ANTHROPOMETRIC MEASUREMENTS

These were done by a single professional investigator. Height and weight of the subjects were measured using the standard procedure by Jelliffe. <sup>[13]</sup> BMI (weight in kilograms/ height<sup>2</sup> in metres) <sup>[14]</sup> used to assess the weight status in the subjects. The girls were grouped into four categories according to WHO standards of BMI. <sup>[14]</sup>

A semistructured pre-tested interview schedule was given to all the subjects to elicit information on demographic parameters and perceptions pertaining to overweight/obesity. Data were analysed using SPSS 17 to find out the mean and standard deviation. Differences in categorical data were tested using logistic regression models. The designated level of statistical significant was  $p < 0.05$  (two-tailed).

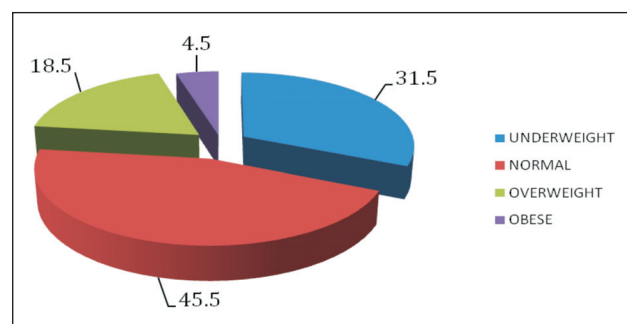
All measurements were performed in accordance with relevant guidelines and informed verbal consent and cooperation was sought from all subjects prior to their participation in the study. The research was compliant with basic ethical standards.

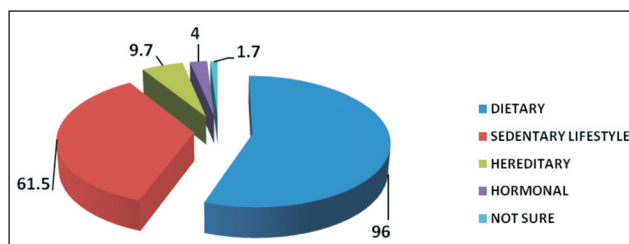
## FINDINGS AND DISCUSSION

### Prevalence of obesity

Using BMI cut-off points <sup>[14]</sup> the findings revealed that 23% of the subjects were either overweight (18.5%) or obese (4.5%) (Chart1). Study conducted by Augustine & Poojara (2003) <sup>[12]</sup> on urban college going girls of Ernakulam also showed the higher prevalence of overweight (24%) and obesity (10.5%), the difference might be due to different criteria (WHO Regional Report, 2000) used in their study. Study conducted by P. Tiwari and A. Sankhala (2007) <sup>[15]</sup> had given the nearly same prevalence of obesity (4.4%) among college girls of Udaipur.

Chart 1: Prevalence of obesity by BMI (WHO, 2000)



**Chart 2: Subjects' opinion regarding causes of obesity**

The study done by Sidhu and Prabhjot(2002)<sup>[16]</sup> have reported a higher prevalence of overweight and obesity of 28.2% & 15% respectively. It may be because of the difference in culture and food habits. Study conducted by M. Mehta et al. (2002)<sup>[17]</sup> among affluent adolescent girls of New Delhi found relatively higher prevalence of obesity. It could be because of affluent societies which are transitioning to westernized lifestyles and probably experiencing an obesogenic environment.

### Logistic Regression Model

Analysis revealed that the odds ratio for weight, height, age, religion and mothers education of the subjects were statistically significant in prediction of prevalence of obesity (Table 1). Tarek Tawfik Amin et al. (2007)<sup>[18]</sup> also reported that age of children, low maternal educational status and maternal occupational status are positively associated with the development of obesity and overweight as revealed in the present study.

### Family History of Obesity

As obvious from the table 2, overall 28.7%, 10.5% & 6.3% of the subjects were having their mothers, fathers and siblings obese respectively according to them. Likewise, only 5.4% of overweight & obese subjects had their siblings obese. Our study could not find any significant genetic relationship with obesity. This can be explained on the basis of the reality that reporting bias might have occurred among the subjects due to their hesitation in leveling their parents/siblings as obese. Although there are genetic predispositions to obesity<sup>[19]</sup>, the rapidly increasing frequency of overweight and obese individuals in many parts of the world cannot be due to increase in frequencies of

any of the obesity related genes. Also, O'Rahilly and Farooqi<sup>[20]</sup>, reviewing all known genetic mechanisms of obesity, concluded that obesity is a more of a neuro-behavioral than a metabolic phenomenon.

### Perception regarding overweight & obesity

Table 3 shows majority (65.7%) of the respondents perceived overweight as body weight more than normal with comparatively more (72.2%) obese.

According to table 4, majority (67.7%) of the respondents perceived obesity as extra fat deposition over abdomen and thighs. Almost similar percentage of normal(68.2%) & overweight (68.9%) viewed obesity as excess body weight with just 55.5 % of obese. Strangely, none of the obese accepted obesity as fatty folds over abdomen.

### Perception regarding causes of obesity

When the girls were asked about factors contributing to obesity, an overwhelming majority (96.0%) of the subjects attributed diet followed by sedentary lifestyle (61.5%) responsible for obesity (Chart 2). Among dietary causes almost all the subjects (95.7%) believed high fat foods responsible as obesogenic (Table 5). More than half of the subjects (56.7%) blamed fast food items such as burger, noodles & pizza along with chocolates. Close to half (53.3%) of the subjects named other carbohydrate rich food items like potato, sweet, rice, cake/pastries and bread.

An attempt was further made to analyze the knowledge of respondents according to their BMI weight category status, it revealed that almost similar no. of normal & underweight (42.8%) and overweight (43.2%) attributed samosa & kachori as the food responsible for obesity with comparatively more (72.2%) of obese. Among the weight categories, perception regarding obesogenic food items was more or less similar.

Study conducted by V. Sekar et al. (2003)<sup>[21]</sup> among women in Coimbatore showed quite lower level of awareness (69.6%) as compared to our study (96.0%) regarding diet as a cause for obesity. They also reported that a large proportion of the overweight women failed to mention lack of exercise (26%) as contributing to obesity.



Table 1: Results of multivariate analysis using logistic regression model

Variables	Total (n=400) No. (%)	Normal & Underweight (n=308) No. (%)	Overweight & Obese (n=92) No. (%)	Odds ratio (95%CI) and p value
Weight in kg(mean±SD)	53.51±8.35	50.67±6.34	63.36±6.57	11.57 (4.566-29.31)***
Height in cm(mean±SD)	157.14±7.24	157.05±7.31	157.44±7.02	0.507 (0.278-0.924)*
Age in years(mean±SD)	20.71±1.59	20.74±1.57	20.59±1.66	1.454 (1.241-1.704)*
<b>Religion</b>				
• Hindu	346(86.5)	267(86.7)	79(85.9)	3.271(1.797-5.952)***
• Muslim#	42(10.5)	33(10.7)	9(9.8)	
• Sikh	12(3.0)	8(2.6)	4 (4.3)	
<b>Mothers education</b>				
• Illiterate	54(13.5)	40(13.0)	14(15.2)	1.06 (1.007-1.117)*
• Upto Intermediate	130(32.5)	103(33.4)	27(29.4)	
• College & above	216(54.0)	165(53.6)	51(55.4)	
<b>Fathers education</b>				
• Illiterate	4(1.0)	4(1.3)	0(0)	1.007 (0.947-1.072)
• Upto Intermediate	86(21.5)	65(21.1)	21(22.8)	
• College & above	310(77.5)	239(77.6)	71(77.2)	
<b>Working mother</b>				
• Yes	87(21.8)	65(21.1)	22(23.9)	0.998 (0.993-1.004)
• No	313(78.2)	243(78.9)	70(76.1)	
<b>Working father</b>				
• Yes	400(100)	308(77.0)	92(23.0)	0.961 (0.912-1.013)
• No	0(0)	0(0)	0(0)	
<b>Type of family</b>				
• Nuclear	340(85.0)	260(84.4)	80(87.0)	1.263 (0.675-2.363)
• Joint	60(15.0)	48(15.6)	12(13.0)	
<b>Family size</b>				
• >4	296(74.0)	267(86.7)	29(31.5)	1.07 (0.626-1.829)
• ≤4	104(26.0)	41(13.3)	63(68.5)	
<b>Socio-economic status</b>				
• Upper	122(30.5)	97(31.5)	25(27.2)	0.911 (0.795-1.043)
• Middle	256(64.0)	189(61.4)	67(72.8)	
• Lower	22(5.5)	22(7.1)	0(0)	

#Muslims and Sikhs included together \*statistically significant association

Table 2: Distribution of subjects according to family history of obesity

BMI	Family members							
	Mother		Father		Both parents		Siblings	
	Normal	Obese	Normal	Obese	Normal	Obese	Normal	Obese
Normal & Underweight(n=308)	220(77.2)*	88(76.5)	276(77.1)	32(76.2)	304(77.0)	4(80)	288(76.8)	20(80)
Overweight&Obese (n=92)	65(22.8)	27(23.5)	82(22.9)	10(23.8)	91(23.0)	1(20)	87(23.2)	5(20)
Total (n=400)	285(71.3)	115(28.7)	358(89.5)	42(10.5)	395(98.7)	5(1.3)	375(93.7)	25(6.3)

\*Numbers given in parentheses suggest percentages.

**Table 3: Perception of the subjects regarding overweight**

Perception	Normal & Underweight (n=308)		Overweight (n=74)		Obese(n=18)		Total(n=400)	
	No.	%	No.	%	No.	%	No.	%
Weight more than normal	203	65.9	47	63.5	13	72.2	263	65.7
Wt. disproportionate to height & age	44	14.3	9	12.2	3	16.7	56	14.0
Extra fat over body	40	13.0	13	17.6	2	11.1	55	13.8
Not sure	21	6.8	5	6.7	0	0	26	6.5

**Table 4: Perception of the subjects regarding obesity**

Perception	Normal & Underweight (n=308)		Overweight (n=74)		Obese(n=18)		Total(n=400)	
	No.	%	No.	%	No.	%	No.	%
Extra fat deposition over abdomen and thigh	210	68.2	51	68.9	10	55.5	271	67.7
Excess body weight	30	9.8	6	8.1	3	16.7	39	9.7
Fatty folds over abdomen	27	8.8	9	12.1	0	0	36	9.0
Overweight & disproportionate figure	18	5.8	3	4.1	4	22.2	25	6.3
Not sure	13	4.2	3	4.1	0	0	16	4.0
Overweight & fat accumulation	10	3.2	2	2.7	1	5.6	13	3.3

**Table 5: Perception regarding food responsible for obesity**

Obesigenic Food items	Normal & Underweight (n=308)		Overweight (n=74)		Obese(n=18)		Total(n=400)	
	No.	%	No.	%	No.	%	No.	%
<b>High fat foods</b>								
Deep fried food: samosa, kachori	132	42.8	32	43.2	13	72.2	177	44.2
Ghee/Butter/Cheese/Ice cream	121	39.3	33	44.6	12	66.7	166	41.5
Meat /Fish/Egg	32	10.4	8	10.8	0	0	40	10.0
<b>High carbohydrate foods</b>								
Burger/Noodles/Pizza	95	30.8	22	29.7	3	16.6	120	30.0
Chocolates	82	26.6	20	27.0	5	27.7	107	26.7
Potato	52	16.9	13	17.6	2	11.1	67	16.7
Sweets	42	13.6	10	13.5	1	5.5	53	13.2
Rice	32	10.4	8	10.8	1	5.5	41	10.2
Cakes/pastries	25	8.1	6	8.1	1	5.5	32	8.0
Bread	17	5.5	3	4.1	1	5.5	21	5.2
<b>Beverages</b>								
Cold drink	32	10.4	8	10.8	1	5.5	41	10.2
Tea/coffee	12	3.9	3	4.1	0	0	15	3.7
Not sure	16	5.2	4	5.4	0	0	20	5.0

### RECOMMENDATIONS

Changes in the food environment, including the proliferation of convenience and fast foods high in energy and fat content, have paralleled the obesity epidemic. Globalization of food systems has created economic and social drivers of obesity like urbanization, free markets, cross-border media and cultural transitions, along with a greater availability

of energy dense foods. Preventing weight gain from an early age, i.e. in childhood, is therefore recognized as a strategy across the whole population, operating in a variety of settings and at multiple levels of government. One approach to combating obesity is to educate the public about nutrition and the nutritional components of the food they purchase. Action must span policy, programmes and advocacy.

**Acknowledgement:** The authors are thankful to all the subjects for their cooperation and patience.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** The relevant university's ethics committee approval was obtained for this study.

## REFERENCES

1. World Health Organization. Obesity, preventing and managing the global epidemic, Report of the WHO consultation on obesity WHO: Geneva; 2000.
2. Kopleman P. Obesity as a medical problem. *Nature* 2000; 404:635.
3. Gutierrez - Fisac J L, Garcia E L, Rodriguez - Artalego F et al. Self perception of being overweight in Spanish adults. *Eu. J. Clin. Nutrition* 2002; 56 (9): 866-72.
4. National Institute of health. Clinical guidelines on the identification, evaluation and treatment of overweight and obesity in adults. The Evidence Report 1998.
5. Pingitese R, Spring B, Garfield D. Gender difference in body satisfaction. *Obes. Research* 1997; 5: 402-9.
6. McElhone S, Kearney J M, Giachetti I, Zunft H F, Martinez JA. Body image perception in relation to recent weight changes and strategies for weight loss in a nationally representative sample in the European Union. *Public Health Nutri.* 1999; 2: 143-51.
7. Rand CSW, Resnick JL. Assessment of socially acceptable body sizes by University students. *Obes. Res.* 1997; 5: 425-29.
8. Craigh PL, Catterson ID. Weight and perception of body image in women and men in Sydney sample. *Community Health studies* 1990; 4: 373-83.
9. Gorynski P, Krzyzanowski M. A study of self perception of being overweight in adult inhabitants in Cracow. *J. Clin Epidemiol.* 1989; 42: 1149-54.
10. Blokstra A, Burns C M, Seidell JC. Perception of weight status and dieting behavior in Dutch men and women. *Int. J. Obes. Relat. Metab. Disord* 1999; 23: 7-17.
11. Jackson A, Cole C, Esquiro J et al. Obesity in Primary care patients in Kelantan, Malaysia: Prevalence and patient's knowledge and attitudes. *South East Asian J. Trop. Med. Pub. Health* 1996; 27 (4): 776-79.
12. Augustine, L.F. and Poojara. Prevalence of obesity, weight perceptions and weight control practices among college girls. *Ind. J. Comm. Medi* 2003; 25(4): 189-90.
13. Jelliffe BD. The assessment of the nutritional status of the Community. Geneva, World Health Organization 1966; 63-78.
14. World Health Organization (WHO). The World Health Report: Reducing Risks, Promoting Healthy Life. Geneva. 2002.
15. Priyanka Tiwari and Aarti Sankhala. Prevalence of Obesity, Weight Perception and Dietary Behaviour of Urban College Going Girls *J. Hum. Ecol.* 2007; 21(3): 181-183.
16. Sharda Sidhu and Prabhjot Prevalence of Overweight and Obesity Among the College-going Girls of Punjab *Anthropologist*, 2004; 6(4): 295-297.
17. Mehta M, Bhasin SK, Agrawal K, Dwivedi S. Obesity amongst affluent adolescent girls. *Indian J Pediatr* 2007;74:619-22.
18. Tarek Tawfik Amin, Ali Ibrahim Al-Sultan, Ayub Ali. Overweight and obesity and their association with dietary habits, and sociodemographic characteristics among male primary school children in Al-Hassa, Kingdom of Saudi Arabia. 2008; 33(3): 172-181.
19. Reed DR, Lawler MP, Tordoff MG (2008) Reduced body weight is a common effect of gene knockout in mice. *BMC genetics* 9: 4.
20. O'Rahilly S, Farooqi IS (2006) Genetics of obesity. *Phil Trans R Soc B* 361: 1095-1105.
21. V. Sekar, Anil C. Mathew, Thomas V. Chacko. Awareness of women about complications and causes of obesity a cross sectional study in Coimbatore, South India, *South Asian journal of preventive cardiology*

# A Comparative Study of Different Morphometric Measurements of Liver Specimens from Adult Cadavers and Dead Foetuses

Neelima Pilli<sup>1</sup>, Ragam Ravi Sunder<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Anatomy, <sup>2</sup>Assistant Professor, Department of Physiology, RIMS, Ongole, India

## ABSTRACT

**Objective:** The main objective of the present study is to record various measurements regarding the morphometry of 98 liver specimens and compare them with those values given in the textbooks of standard authors. The knowledge regarding such measurements forms an important criterion in the day to day practice for the Surgeons, Physicians, Radiologists and Pathologists while performing various surgical interventions, in diagnosing the disease patterns & in various treatment regimens.

**Materials and method:** Livers from 48 adult cadavers and 50 dead foetuses were acquired from the government general hospital over a period of 8 years. Cadavers and foetuses were injected with embalming fluid (standard composition) and the livers were dissected out. Morphometric measurements of liver specimens in various aspects were done. Dimensions of the liver specimens from adult cadavers with respect to length, width, thickness, base, height, volume and weight were measured under standard procedures. The measurements of foetal livers were done in terms of length, width, thickness, weight; circumference. The symmetry of lobes of the foetal livers was also kept as a criterion for the comparison. The gestational age and total body weight of the foetuses was also included in the study as these factors also play a vital role for the liver to attain various sizes.

**Result:** The morphometry of liver regarding various dimensions were compared and collaborated with those given in Gray, Gardener, and Orahilly & Hamilton. The weights of foetal livers fell short of few points with those given in Hamilton. The weights of adult livers coincided with those illustrated in Gray, Gardener & Orahilly. The volume of adult livers correlated with those depicted in Henderson, Heymsfield, and Horowitz & Kutner.

**Conclusion:** The values of the present study approximately coincided with the study of various authors.

**Keywords:** *Morphometric Measurements, Liver Specimens, Adult Cadavers, Foetuses*

## INTRODUCTION

Liver is the largest gland in the body that sub serves the function of maintaining body's internal milieu. The anatomical position of the liver is the key to fulfilling this function as almost all absorption of foreign material into the body takes place in the gut and the portal blood draining the gut flows into the liver which subsequently controls the release of absorbed nutrients into the systemic circulation. The peculiar feature that attributes to its utmost importance is its enormous power to regenerate.

Liver occupies most of the right hypochondrium, epigastrium, and frequently extends into left hypochondrium<sup>1</sup>. The ratio of liver to the body weight decreases with growth from infancy to adulthood. The liver weighs approximately 5% of body weight in infancy and decreases to approximately 2% in adulthood. The size of the liver also varies according to sex, age and body size<sup>1</sup>. Liver varies in its morphometric measurements with respect to diaphragmatic surface, visceral surface, circumference, volume, weight, number of fissures, lobes etc.

The morphometry and appearance of liver varies in different pathological conditions. During congestion and oedema, liver plates can be stretched and during blood loss, they may become thicker without alteration of the basic architecture.<sup>2</sup>

In haemosiderrosis, cholestasis and in different types of jaundice, there is loss of lobular architecture. Haemangioma are mostly sub capsular. Hepatic adenomas occur singly. Liver is the most common site of metastasis. These lesions are grossly multiple with characteristic umbilications. In Reye's syndrome, liver is yellowish orange and enlarged. In Budd-Chiari syndrome, there is hepatomegaly with tense capsule and red-purple liver. Amoebic or pyogenic liver abscess commonly affects the right lobe of the liver<sup>3</sup>. In alcoholic liver disease, micronodular cirrhosis is seen.

Hence it is observed that liver shows diverse variations in various conditions both anatomically and pathologically. The dimensions of liver vary in persons with different physiques. The ratio to body weight is same in both sexes but varies with age. In foetus and children, it is relatively large and heavy. The details of lobes of liver are its morphological, physiological or surgical segmentation is of considerable value to Surgeons in lobectomy or any other invasive procedures. Liver volume has been used to assess liver regeneration after hepatectomy. It is also used to assess whether or not the patient will have enough amount of liver substance post-operatively to avoid liver failure.

Having considered all these parameters, the present study demands the gravity to gain knowledge regarding different morphometric measurements of liver so that it will be helpful in various faculties of medicine.

## MATERIALS & METHOD

The human material comprised of 48 adult cadavers and 50 dead foetuses obtained from the government general hospital over a period of 8 years. Age of cadavers ranged from 30-60 years and that of foetuses from 18-42 weeks as judged by the crown-rump length. Cadavers and foetuses were injected with embalming fluid (composed of standard proportions of formalin, glycerol, spirit, sodium bicarbonate & citrate, and thymol crystals with eosin liquid). The livers were dissected and morphometric measurements of the liver specimens from adult cadavers was calculated under standard procedures, in relation to length and width of different surfaces, total length, total width, thickness, base, height, volume and weight. The measurements of foetal livers were done in terms of length, width, thickness, weight, and circumference. The symmetry of lobes of the foetal livers was also kept as a criterion for the comparison. The graphical representation of these values was illustrated and compared with those given in the standard books of various authors.

## OBSERVATION & RESULTS

**Table 1: Morphometric measurements of liver specimens from adult cadavers:**

No.	sex	Surface length(cm)		Surface width(cm)		Total length (cm)	Total width (cm)	Thickness (cm)	Base (cm)	Height (cm)	Volume (cm)	Weight (cm)
		Diaphragmatic	Visceral	Diaphragmatic	Visceral							
1	M	20.5	13.5	18.75	14.5	17	16.6	15.5	10.5	17.2	1553.1	1350
2	F	20.25	13.5	18.5	14	16.8	16.25	15.2	10.2	17.3	1526.3	1260
3	F	19.5	13.75	17.75	14.25	16.6	16	15.1	10.3	15.2	1189.8	1325
4	F	19.25	13.25	17.5	14.75	16.25	16.1	15.4	10.2	16.3	1355	1275
5	F	16.5	12.75	17	12.25	14.6	14.2	14	9.7	15.7	1195.4	1310
6	M	15.5	10	16.5	12.75	12.6	14.6	12.9	9.1	17.2	1346	1360
7	F	14.25	9.25	15.75	11.5	11.75	13.6	12.6	10.3	17.2	1523.5	1270
8	F	13.25	8.5	15.25	11	10.8	13.1	11.5	10.4	15.2	2402.8	1345
9	F	12	8.25	15.25	11.5	10.1	13.3	10.5	9.2	15.1	1048.8	1250
10	M	26	15.5	20	15.25	20.7	17.6	16.75	10.5	17.5	1607.8	1475
11	M	30.5	18	22	17	24.25	19.5	20.5	11.2	19.5	2129.4	1500
12	F	22	13.5	18.25	14.25	17.75	16.25	15.5	10	17.2	1479.2	1350
13	M	23.5	14.25	19	14	18.8	16.5	15.75	10.3	17.3	1541.3	1370



**Table 1: Morphometric measurements of liver specimens from adult cadavers: Contd.)**

No.	sex	Surface length(cm)		Surface width(cm)		Total length (cm)	Total width (cm)	Thickness (cm)	Base (cm)	Height (cm)	Volume (cm)	Weight (cm)
		Diaphragmatic	Visceral	Diaphragmatic	Visceral							
14	F	28.25	16.5	20.75	16	22.3	18.3	17.5	10.7	18	1733.4	1300
15	F	29	17	21	16.5	23	18.75	18.25	11	19.2	2027.5	1330
16	M	26.5	16	20.5	15.5	21.25	18	17	10.4	17.8	1647.5	1380
17	F	18.5	12	17.75	13	15.25	15.3	14.7	9.3	17.2	1227.7	1270
18	M	15.25	11.25	16	12.75	13.25	14.3	13.5	10.6	17.6	1641.7	1420
19	F	30	17.75	21.75	16.5	23.8	19.1	19.5	11.2	19	2021.6	1285
20	M	25	15	19.5	14.75	20	17.1	16	10.3	17.4	1559.2	1390
21	F	28.5	17.25	21	16.25	22.8	18.6	18	10.8	18.5	1848.1	1255
22	F	24	14.5	19	14.5	19.25	16.75	15.75	10.3	17	1488.3	1305
23	F	21	13	14	14	17	16	15	10	17	1445	1300
24	M	13.75	8.25	11.75	11.72	11	13.3	11.9	9.1	16	1164.8	1400
25	M	17.75	12.5	13.25	13.25	15.1	15.25	14.6	9.5	15.5	1141.1	1480
26	M	18.25	12.5	12.5	13.5	15.3	15.3	14.8	9.4	17.1	1374.3	1410
27	F	17.25	12.25	12.25	13.75	14.75	15.6	14.5	10.6	16.6	1460.4	1280
28	M	16.7	14.5	11.5	12.5	14.1	14.3	13.9	10.2	15.8	1273.1	1490
29	F	15.75	10.5	10.5	12.25	13.1	14.3	12.5	9.2	16.3	1222.1	1340
30	M	13.25	8.5	8.5	11	10.8	13.1	11.5	10.4	15.2	2402.8	1430
31	F	12.75	8.25	8.25	11.25	10.5	13.5	11.3	9.4	16.2	1233.4	1290
32	M	15.5	10.5	10.5	12.25	13	14.25	13.2	10.3	16.7	1436.2	1500
33	F	29.5	17.5	17.5	16.5	23.5	18.25	19	11.1	19.5	2110.3	1320
34	F	28.5	16.5	16.5	16	22.5	18.3	17.75	10.7	18.2	1772.1	1250
35	M	25.5	15.5	15.5	15	20.5	17.6	16.5	10.5	17.4	1589.4	1440
36	M	29.5	17.5	17.5	16	23.5	18.75	18.75	11	19.4	2069.9	1460
37	M	23	14	14	14.5	18.5	16.5	15.75	10.2	17.3	1526.3	1375
38	F	25	15.25	15.25	15	20.1	13.3	16.25	10.2	17.5	1561.8	1300
39	M	26.75	16.25	16.25	15.5	21.5	18	17.5	10.6	17.8	1679.2	1355
40	F	28.75	17.25	17.25	16.25	23	18.6	18	10.9	18.5	1865.2	1350
41	M	26.25	16	16	15.25	21.1	17.6	17	10.5	17.6	1626.2	1300
42	M	16.75	11.5	11.5	12.25	14.1	15	13.6	9.7	16.3	1288.5	1450
43	F	14.25	9.75	9.75	11.25	12	13.2	12	9.8	15	1100.5	1275
44	F	27	16.25	16.25	15.75	21.6	17.8	17.25	10.6	18	1717.2	1425
45	M	12.75	9.25	9.75	11.75	14.25	13.5	11	9.3	17.3	1242	1295
46	F	22.5	14	14	14.25	15.25	16.3	15.5	10.2	17.2	1508.7	1400
47	M	29.5	17	17	16.5	23.12	19	18.5	11	19.3	2048.6	1355
48	M	14.75	9.5	9.5	11	12.1	13.1	12.2	10.6	17.6	1641.7	1240

Average measurements calculated from the table 1:

Diaphragmatic surface: length-21.99cm, width-18.31cm;

Visceral surface: length -13.35cm, width-13.96cm;

Length of liver-16.81cm, breadth-16.01cm, thickness-15cm,

Volume-1556.8cc, weight-1355.5gm.

Table -2: Morphometric measurements of liver specimens from dead fetuses:

No.	Gest. age	Sex	Surface length (cm)		Surface width(cm) (cm)		Thickness (cm)	Length (cm)	Width (cm)	Weight (kg)	Body Weight	Symmetry of lobes (kg)	Circumference (cm)
			Superior	Inferior	Superior	Inferior							
1	28	M	11.9	6.2	3.5	3.5	2.1	9.05	3.5	0.03	0.9	S	15.1
2	32	F	13.1	7.6	4.2	4.8	4.8	10.35	4.5	0.1	1.8	A	16.5
3	38	M	14.8	8.7	7.8	6	5.8	11.75	6.9	0.09	2.5	A	18.2
4	40	F	14.8	8.8	7.5	7	6.1	11.8	7.25	0.13	2.4	A	25.5
5	40	F	15.1	8.8	8.1	7.1	6.2	11.9	7.6	0.17	3.2	A	26.2
6	18	M	5.8	4.1	2.8	1.8	1.8	4.95	2.3	0.04	0.5	S	12.5
7	36	F	13	6.2	4.3	3.8	5.2	9.6	4.05	0.13	2.1	A	25
8	40	M	14.2	8.8	6.3	4.4	5.8	11.5	5.8	0.13	2.8	A	28.5
9	34	M	12.6	8	5.5	6	5.5	10.3	5.7	0.17	2.5	A	23
10	42	M	14.9	9.2	8.2	7.1	6.1	12.05	7.6	0.15	3	A	29
11	32	M	12.6	5.9	4.2	3.4	3.2	9.25	3.8	0.06	1.6	A	23.5
12	38	M	13.5	7.3	5.2	4.2	5.7	10.25	4.7	0.14	2.5	A	25
13	32	M	12	7.8	5.2	5.5	5.3	9.9	5.3	0.11	2	A	23.2
14	40	F	14.3	9	7.2	6.9	6	11.65	7.1	0.14	2.8	A	28
15	40	M	15	8.9	7.6	7.2	6.2	11.9	7.4	0.18	3.1	A	27.5
16	38	F	14.8	8.6	6.5	6.5	5.6	11.7	6.5	0.13	2.5	A	19.2
17	40	M	15	9	7.9	7	6	12	7.45	0.16	2.6	A	27
18	20	F	6	4.3	3	2	1.9	5.15	2.5	0.06	0.7	S	13.5
19	36	M	13.5	8.5	6	5.1	5.2	11	5.5	0.11	2.3	A	16
20	38	M	14.6	8.5	7.5	6.9	5.8	11.5	7.5	0.13	2.2	A	23.2
21	32	M	12.6	7.2	4	4	3	9.9	4	0.06	1.2	S	19
22	28	M	11.7	6.1	3.4	2.9	2.3	8.55	3.15	0.06	1.1	A	15.5
23	36	F	14	8	7.2	5.9	5.2	11	6.5	0.11	2	A	19.2
24	36	F	14	8.3	6.2	5.5	5	11.15	5.8	0.12	2.25	A	15
25	32	F	13	7.4	4.1	5.2	3.7	10.2	4.15	0.07	1.3	A	18.5
26	28	F	12	6.5	3.5	3.5	2.2	9.25	3.5	0.05	0.9	S	16.5
27	30	M	12.8	7.2	3.6	5.1	4.4	10	4.3	0.05	1.1	S	16.2
28	32	F	14	7.8	3.9	4.5	4.6	10.9	4.2	0.08	1.9	A	14.1
29	28	F	11.5	6.5	3.7	3.9	2.2	9	3.8	0.04	1	A	16
30	36	M	13.8	8.5	6	5.5	5.1	11.15	5.7	0.12	2.4	A	16.5
31	30	F	13.6	7.5	3.8	4.5	3.5	10.05	4.15	0.07	1.4	A	14
32	38	M	14.1	8.8	6.4	6.5	5.6	11.45	6.45	0.12	2.8	A	28.2
33	32	F	11.9	7.6	6	5.2	5	9.75	5.6	0.13	2	A	20.1
34	38	F	13.8	6.9	4.7	4	5.4	10.35	4.35	0.13	2.1	A	26.5
35	34	F	13.4	5.5	4.1	3.5	4.6	9.4	3.8	0.11	2	A	22.5
36	22	F	6.5	4.5	3	2.3	2.5	5.5	2.6	0.04	1	S	16.2
37	34	M	13.3	6.2	4.8	3.5	3.5	9.7	4.1	0.09	1.9	A	24
38	24	M	7.8	5.8	3.2	2.9	3	6.8	3.05	0.05	1	S	18.5
39	24	F	7.2	5.5	3.1	2.5	2.8	6.3	2.8	0.07	0.9	S	20
40	40	M	14.5	8.5	6.6	4.5	5.8	11.5	5.7	0.19	3	A	27.2
41	36	M	13.9	8.3	6.5	6.4	5.5	11.15	6.45	0.15	2.6	A	27
42	40	F	14	8.3	6.9	4.5	5.9	11.15	5.7	0.16	3	A	26.6
43	38	F	13.6	7.1	5.5	3.9	5.4	10.35	4.7	0.11	2.6	A	27.5
44	36	M	12.5	6.1	5.3	3.1	5.3	9.35	4.2	0.14	2.25	A	25
45	32	M	12.8	5.5	4	3.7	3.5	9.15	3.8	0.08	1.5	A	21.2
46	34	F	13.5	6	4.2	3.2	3.7	9.75	3.7	0.08	1.8	A	23.2
47	34	F	12.8	8.2	5.4	5.8	5.2	10.5	5.6	0.13	2.2	A	20.5
48	32	M	12.5	7.5	5.8	4.9	5	10	5.3	0.09	2.1	A	20
49	38	M	14.2	8	6.9	6.5	5.7	11.1	6.7	0.08	2.3	A	21.5
50	36	F	13.2	6.5	4.5	4	5.5	9.8	4.25	0.15	2.4	A	23.5

Average measurements calculated from table 2:

Diaphragmatic surface:-length-13.8cm, width-5.17cm;

Visceral surface:-length-7.4cm, width-4.89cm;

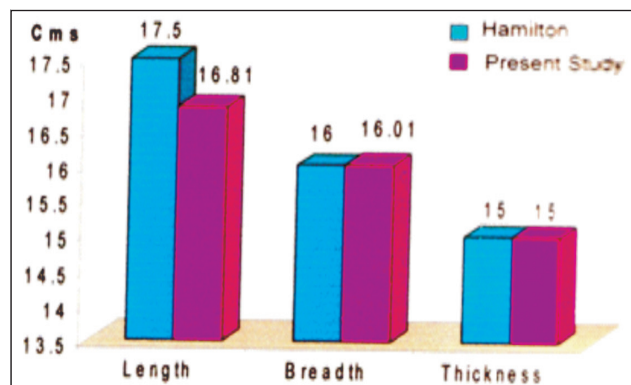
Length of the liver-10.86cm, width-4.95cm, thickness-4.71cm, circumference-21.59cm,

Weight-0.11kg, Bodyweight of fetuses-3.06 kg.

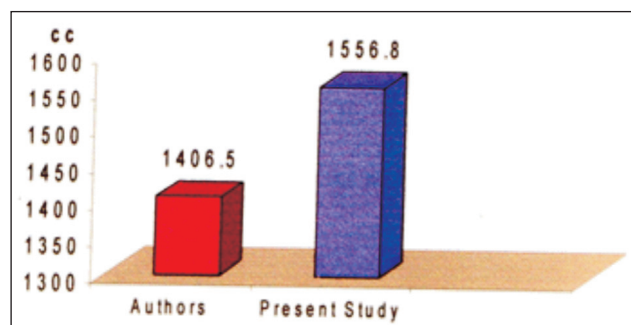
16%of the foetal livers showed symmetry of the lobes and 84% are asymmetrical.

2 fetuses belonged to II trimester, 48 are in III trimester.

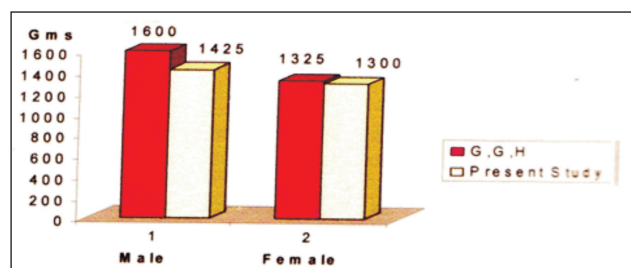
**Graph: 1-**The graph below shows the comparison of averages of various dimensions of adult livers of present study with those given in Hamilton



**Graph: 2-**The graph below depicts the comparison of average volume of livers with those given in Henderson, Heymsfield, Horowitz, Kutner



**Graph: 3-**The graph below illustrates comparison of average weights of livers in males and females with those given in Gray, Gardener, and Orahilly.



## DISCUSSION

Morphometry of liver in terms of size, situation, shape (length, breadth, and thickness), volume, weight, dimensions of various surfaces was studied. The figures were compared and collaborated with those given in Gray, Gardner, Orahilly & Hollinshead. The various dimensions of different surfaces of the present

study correlated with those shown in Hamilton. The weights of foetal livers fell short of few points given in Hamilton. The weights of adult livers coincided with those given in Gray, Gardner, and Orahilly. The volume of the adult livers correlated with those depicted in Henderson, Heymsfield, and Horowitz & Kutner. The values of the present study approximately correlated with the study of various authors.

**Acknowledgement:** I owe my thanks to the department of Anatomy for permitting me to get the specimens of liver from the unclaimed cadavers and donated cadavers. I also thank the department of Obstetrics Gynaecology for providing the dead foetuses required for the study. I extend my sincere thanks to the department of Forensic Medicine for providing the unclaimed cadavers to the department of Anatomy.

**Conflict of Interest:** The conflict of interest for the present study is to reveal the diverse variations in the different morphometric dimensions of the liver in different age groups starting from the foetuses till 60 years of age group so that it will be helpful for the Surgeons, Physicians Pathologists and Radiologists in treating, diagnosing and in various operative procedures. Liver, being the largest gland is readily seen at laparoscopy so that its morphometric study plays a major role in various operative procedures and treatment regimens.

**Source of Funding:** The material for the present study is in the form of adult cadavers and dead foetuses. The liver specimens from the cadavers were obtained from the department of Anatomy, Andhra Medical College, which were collected from 8 years as the department belongs to one of the oldest medical colleges in the entire state. The dead foetuses were collected from the Victoria General Hospital and King George Hospital, with due permission from the respective Professors and Heads of the respective departments of the teaching hospital.

**Ethical Clearance:** Of the 48 liver specimens collected from the adult cadavers, 39 cadavers were considered as unclaimed and were handed over to the department of Anatomy from the department of Forensic Medicine through proper channel over a period of 8 years from 2002-2010. The remaining 9 cadavers were donated to the department of Anatomy for teaching purpose with their records preserved in the department. The specimens from 50 aborted and dead foetuses were collected from renowned Victoria General Hospital and King George Hospitals with the permission from

the respective Professors and Heads of the department of Obstetrics and Gynaecology through proper channel maintaining the records in both the departments.

#### REFERENCES

1. Gray H. Gray's Anatomy 40<sup>th</sup>ed. New York: Churchill Livingstone, 1989:1163-1175
2. Elias and Petty D. (1953) Gross Anatomy of the blood vessels and ducts within the human liver. *Amer J. Anat.* 90, 59-112
3. Harsh Mohan Textbook of Pathology 4<sup>th</sup> ed. Jaypee, 596-598
4. Schaffer F. Popper., (1957). Liver disease: Morphological considerations. *Amer. J. Med* 16, 98-117.
5. *Journal of gastroenterology and hepatology* 21(11), 1710-1713, Nov 2006. Estimation of standard liver volume in Japanese.
6. *Journal of anatomical society of India* vol 54; no.1 (2005-21-2005-03; 1) ultrasonographic study of diameters of liver in adults.

# MR Imaging Findings of Balo's Concentric Sclerosis, a Rare Variant of Multiple Sclerosis: a Case Report

**Anindita Mishra**

*Associate Professor in Radiology, GSL Medical College, Rajahmundry*

## ABSTRACT

Balo's concentric sclerosis (BCS) is a rare demyelinating disease considered to be a variant of multiple sclerosis. The initial terminology for this entity was leuko-encephalitis periaxialis concentrica, which is based on its early definition of "a disease in the course of which the white matter of the brain is destroyed in concentric layers in a manner that leaves the axis cylinders intact". The most common clinical features are headache, aphasia, cognitive or behavioural dysfunction and/or seizures. CSF studies often reveal mononuclear inflammatory reaction and occasionally monoclonal bands.<sup>2</sup> The typical MR imaging changes associated with BCS consist of concentric rings or a whorled appearance on T2-weighted and contrast-enhanced T1-weighted images. Differentiating BCS from multiple sclerosis or neoplasm can be difficult clinically, but MR imaging findings noted in this case may be pathognomonic. In this case report we present a case of Balo's concentric sclerosis diagnosed on MRI.

**Keywords:** *Balo's Concentric Sclerosis, Multiple Sclerosis*

## INTRODUCTION

Balo concentric sclerosis (BCS) is widely believed to be a rare variant of multiple sclerosis. It may present as clinically similar to multiple sclerosis, affecting young adults with mild cognitive impairment without frank dementia, or be associated with altered behavior and focal CNS deficits. Of the <60 reported cases in literature most have involved young adults (age range 4-56 yrs)<sup>3-7</sup>. Historically, the diagnosis was made post mortem or histopathologically in the presence of specific CNS lesions consisting of concentric rings of demyelination alternating with myelinated white matter. Current literature and research, however, suggest that BCS exhibits characteristic imaging findings that aid in antemortem diagnosis<sup>8</sup>, the following case further confirms this impression. Additionally, differentiating between demyelinating lesions and CNS tumors, such as gliomas, in the presence of solitary lesions has always been difficult and problematic. The pathognomonic MR imaging

findings presented herein resolve this issue. Finally, initial reports of BCS also predicted that the disease was rapidly progressive and fatal<sup>9</sup>, but others have concluded that antiinflammatory corticosteroids have shown efficacy against neurologic deficits associated with BCS<sup>7</sup>. Therefore, the role of MR imaging in patients with BCS can dramatically influence the course of the disease, allowing earlier diagnosis and therapy. BCS is a rare demyelinating disease related to multiple sclerosis. Concentric lesions of demyelination occur while sparing adjacent white matter in a pattern that is directly identifiable on contrast-enhanced MR imaging. The ability of MR imaging to diagnose BCS earlier in its progression may have a significant effect on morbidity and mortality associated with the disease

## CASE REPORT

A 48 year old male presented with 5 days onset of left lower limb spastic paralysis, mild cognitive impairment and altered behaviour. CSF findings showed an albumin level of 100mg and mononuclear inflammatory infiltrates. On initial CT scans Focal hypodense areas in the centrum semi-ovale in bilateral parietal lobes and right occipital lobe with mild perilesional edema were noted (Fig 1). No enhancement is seen post contrast (Fig 2).

---

### Corresponding author:

**Anindita Mishra**

Associate Professor

Department of Radiology, GSL Medical College,  
Rajahmundry, Andhrapradesh - 533296

Cell No: +91 9441011800

E MAIL: dr.anindita.mishra@gmail.com



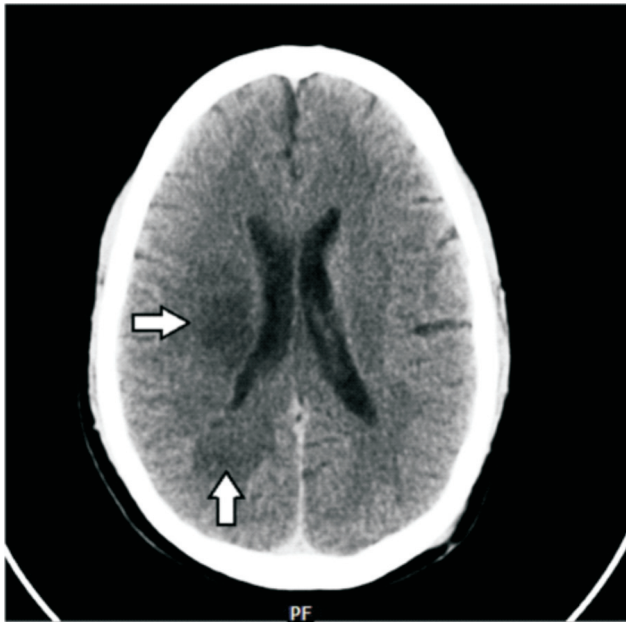


Fig 1: plain axial CT scan shows focal hypodense area in the centrum semi ovale in the right parietal and occipital lobes (Arrows)



Fig 2: Axial contrast enhanced CT – no enhancement noted in the lesions (Arrows).

MRI was done to rule out malignant lesions which showed focal areas of T2 WI/FLAIR hyper intense signal noted in the centrum semiovale in bilateral parietal lobes and right occipital and frontal. The lesions show two separate concentric zones of demyelination in the centrum semiovale of bilateral parietal lobes and right occipital and frontal lobe represented as two different degrees of increased T2 signal.

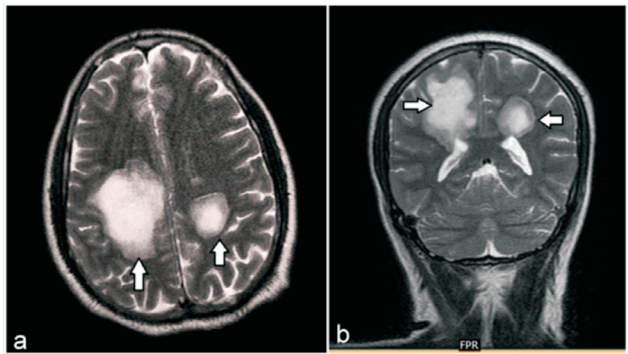


Fig 3: (a & b) Axial (a) and coronal (b) T2 weighted images showing hyperintense lesions in the centrum semiovale of bilateral parietal lobes. The lesions show two separate concentric zones of demyelination (Arrows).

Post gadolinium contrast enhanced images showed concentric ring enhancement in these lesions.

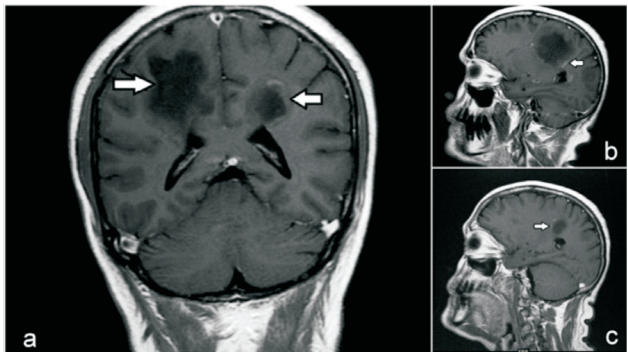


Fig 4 (a, b & c): Coronal (a) & sagittal (b & c) post gadolinium T1 weighted FLAIR images showing concentric ring enhancement (Arrows).

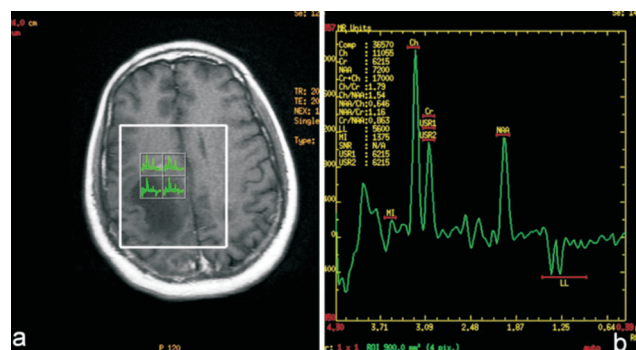


Fig 5 (a & b): Multivoxel MR spectroscopy shows elevated choline peaks at 3.2 ppm. Choline creatinine ratio of 1.79. NAA creatinine ratio in the central region of the lesion is 1.16. NAA levels are normal.

MR spectroscopy findings are in keeping with demyelinating disease<sup>14</sup>. Based on these clinical, CSF and MR imaging findings a diagnosis of demyelinating – inflammatory disease of BCS was reached. This type of concentric pattern has not been described in any other inflammatory disease except BCS and thus a

diagnosis of disseminated encephalomyelitis was excluded.<sup>10</sup> The patient was treated with high dose IV corticosteroids (1000mg /day for 7days). He showed significant clinical improvement after treatment with corticosteroids.

## DISCUSSION

The clinical, imaging, pathologic and immunogenetic studies looking into the different forms of multiple sclerosis and various other inflammatory central nervous diseases that fall within the same clinical spectrum are relatively recent mostly in the past decade<sup>2</sup>. BCS also falls within the spectrum of multiple sclerosis. It shares a basic pathology similar to multiple sclerosis except the lamellar pattern<sup>10</sup>. The characteristic concentric pattern of demyelination which distinguishes this disorder has given rise to much speculation regarding its pathogenesis. It is hypothesized that the lesions begin at the central core which is often a venule and the demyelinating activity spreads from this focus. Although the initial triggering event is not known a centrifugally spreading band of lymphocytes or factors emanates from this initial site. The polarity of the demyelinating bands suggests that the demyelinating activity is periodically reactivated and then fades in strength as it migrates from the center, only to be rejuvenated when the next bolus of activating substances arrives. Candidate modulators of immune activity include the many cytokines, some of which are known to undergo periodic fluctuations in levels.<sup>6</sup>

Patients usually present with symptoms of an acute/subacute onset that progress over a period of weeks to months, suggesting a space-occupying lesion of the brain, similar to that in our first case. Because of the absence of antemortem diagnosis before the advent of MR imaging, the majority of patients reported had a monophasic course resulting in death within the first few weeks or months<sup>2</sup>.

Clinical differential diagnosis includes acute disseminated encephalomyelitis, multiple sclerosis, neoplasms, and infections such as abscesses. However, the typical concentric pattern on MR images as described above, which is similar to other reports, is highly suggestive of BCS. The concentric pattern is not always observed if the MR imaging is not performed early in the course of the disease<sup>13</sup>.

Characteristic MR findings suggest the diagnosis of BCS in lieu of previous postmortem histologic

analysis. T2-weighted images suggest separate concentric zones of demyelination (Fig 3). T1-weighted images following administration of IV Gd-DTPA readily depict separate rings of enhancement at sites of increased blood brain-barrier permeability and inflammatory white cells responsible for demyelination in a characteristic concentric pattern (Fig 4). As a result of the pathognomonic MR imaging findings clearly identified in our case, the role of MR imaging in diagnosis may prove to influence the morbidity and mortality of BCS significantly by allowing clinicians earlier diagnosis of and intervention for patients suffering from this unusual but radiographically distinct variant of multiple sclerosis.

In contrast to multiple sclerosis, BCS is believed to run a fulminant and fatal course<sup>1, 11</sup>. With the application of radiographic techniques, however, BCS can be identified earlier when the characteristic pattern of demyelination is seen. As a result, early interventional therapy can be instituted to provide symptomatic relief and slow the progression of inflammatory demyelination. Specifically, reports of clinical improvement after the administration of corticosteroids (i.e. prednisolone 60mg/d) have been published<sup>7, 12</sup>.

Various theories have been proposed to explain the pathogenesis of BCS and radiographic findings. Early researchers suggested that the alternating zones of myelinated and demyelinated white matter reflected a vascular obstructive process resulting from embolization of lipid particles produced at primary multiple sclerosis lesions<sup>7</sup>. Others have hypothesized that the areas of myelination represent regions of remyelination at the outer edges of multiple sclerosis plaques after acute demyelination<sup>4</sup>. More recent reports dismiss the notion of remyelination and suggest that the regions of myelination are more indicative of myelin breakdown at an earlier stage of development than seen in frank demyelination. These same reports highlight the limited supportive evidence for the role of toxins and infectious/inflammatory agents in the pathogenesis of BCS<sup>5</sup>.

This report confirms that a pathognomonic MR imaging appearance is present in BCS. The alternating zones of demyelinated and myelinated white matter best appreciated on MR imaging after IV administration of Gd-DTPA presented in this case define BCS. The difficulty in differentiating this rare demyelinating process from the more common entities

such as multiple sclerosis and CNS neoplasm can be eliminated when the classical lesion outlined herein exists.

### CONCLUSION

This case report further supports the theory that BCS may be a self-limited disease that is not always fatal; MR imaging might show the pathognomonic features correlating with histopathological findings of BCS and allow antemortem diagnosis when performed at the onset of the disease; and, in addition to the typical concentric pattern on MR images, multiple white matter lesions consistent with demyelinating disease may also be detected.

**Acknowledgement:** Mr. J Narasing Rao, Senior MRI technician.

### REFERENCES

1. Baló J. Encephalitis periaxialis concentrica. *Arch Neurol Psychiatry* 1928;19:242-264
2. Weinschenker BG, Miller D. Multiple sclerosis: one disease or many? In: Siva A, Kesselring J, Thompson AJ, eds. *Frontiers in Multiple Sclerosis*. vol 2. London: Martin Dunitz Ltd.; 1999:37-46.
3. Gray F, Leger JM, Duyckaerts C, Bor Y. Balo's concentric sclerosis: lesions restricted to the pons. *Rev Neurol (Paris)* 1985; 141:43-45
4. Kim MO, Lee SA, Choi CG, Huh JR, Lee MC. Balo's concentric sclerosis: a clinical case study of brain MRI, biopsy, and proton magnetic resonance spectroscopic findings. *J Neurol Neurosurg Psychiatry* 1997; 62:655-658
5. Murakami Y, Matsuishi T, Shimizu T, et al. Balo's concentric sclerosis in a 4-year-old Japanese infant. *Brain Dev* 1998; 20:250-252
6. Moore GR, Neumann PE, Suzuki K, Lijtmaer HN, Traugott U, Raine CS. Balo's concentric sclerosis: new observations on lesion development. *Ann Neurol* 1985; 17:604-611
7. Ng SH, Ko SF, Cheung YC, Wong HF, Wan YL. MRI features of Balo's concentric sclerosis. *Br J Radiol* 1999;72:400-403
8. Chen C-J, Chu N-S, Lu C-S, Sung C-Y. Serial magnetic resonance imaging in patients with Balo's concentric sclerosis: natural history of lesion development. *Ann Neurol* 1999; 46:651-656
9. Chen CJ, Ro LS, Wang LJ, Wong YC. Balo's concentric sclerosis: MRI. *Neuroradiology* 1996;38:322-324
10. Baló's Concentric Sclerosis: Clinical and Radiologic Features of Five Cases
11. Courville CB. Concentric sclerosis. In: Vincken PJ, Bruyn GW, eds. *Handbook of Clinical Neurology*, Volume 9. Amsterdam: North Holland 1970;437-451
12. Bolay H, Karabudak R, Tacal T, Onol B, Selekler K, Saribas O. Balo's concentric sclerosis: report of two patients with magnetic resonance imaging follow-up. *J Neuroimag* 1996;6:98-103
13. Siva A, Kantarci O. An introduction to the clinical spectrum of inflammatory demyelinating disorders of the central nervous system. In: Siva A, Kesselring J, Thompson AJ, eds. *Frontiers in Multiple Sclerosis*. vol 2. London: Martin Dunitz Ltd; 1999:1-9
14. Saindane AM ; Cha S ; Law M ; et al. Proton MR Spectroscopy of tumefactive demyelinating lesions *American Journal of Neuroradiology* Volume: 23 Issue: 8 Pages: 1378-1386 Published: SEP 2002

# Clinically Mild Encephalitis with Isolated Transient Reversible Splenial Lesion - Uncommon Clinicoradiological Entity

Parakh RB<sup>1</sup>, Mohsin KM<sup>2</sup>, Rajoor UG<sup>2</sup>, Aithal KR<sup>3</sup>, Patil PB<sup>4</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate professor, <sup>3</sup>Professor, Department of Medicine, <sup>4</sup>Assistant Professor, Department of Radio-diagnostics, SDM College of Medical Sciences and Hospital, Sattur, Dharwad, Karnataka, India

## ABSTRACT

Clinically mild encephalitis with an isolated transient reversible lesion in the splenium of the corpus callosum (SCC) is a uncommon described clinicoradiological entity that are seen in a number of clinical conditions with varied etiologies. Awareness of these lesions is necessary to be differentiated from other infective or non infective causes. We report a case of postpartum young female presenting with mild encephalitis. The patient had a short clinical course and made a full recovery. Initial magnetic resonance (MR) images showed an isolated lesion in the centre of the SCC, which resolved completely on a repeat MR imaging done two weeks later. This isolated reversible clinicoradiological entity irrespective of multiple differential diagnosis described in the literature carries an excellent prognosis. Its proposed pathophysiology still need to be well understood and full emphasis should be on avoiding unnecessary investigation and therapeutic intervention.

**Keywords:** *Splenium, Corpus Callosum, Encephalitis, Magnetic Resonance Imaging*

## INTRODUCTION

Transient isolated splenial lesions are rare radiologic findings that may be seen in a wide spectrum of diseases. These reversible lesions are oval shaped homogenous, non-hemorrhagic, non-enhancing lesions seen in the central part of the splenium of the corpus callosum (SCC). The lesions are bright on T2W and FLAIR images; they are slightly hypointense on T1W images and show restricted diffusion<sup>1</sup>. These lesions are many of times incidentally detected when imaging is done for encephalopathy or encephalitis or seizures, and the actual incidence may be more than what reports indicate<sup>2</sup>. Recognizing these lesions is of importance, both for the treating physician and radiologist, as the differential diagnoses include a wide varied number of conditions with varying clinical significance. Complete resolution of the lesion on repeat imaging and full clinical recovery are hallmarks of this syndrome, with just supportive therapy. We will brief on possible differential diagnosis and its postulated pathophysiology.

## CASE REPORT

A previously healthy 21 years old lady on her post partum fifteenth day after uneventful normal delivery presented to emergency department with history of increasing drowsiness with aphasia following a history of 3 days fever. Physical examination showed patient had pallor and mild grade fever (38.8° C), other vitals were stable. On neurological examination she was drowsy, had mixed transcortical aphasia and no other focal neurological deficit. Rest of systemic examination was normal. Blood investigations revealed normal leucocyte count with mild lymphopenia. Renal profile, liver profiles were normal. Blood and urine cultures were negative. MRI revealed a well defined ovoid hyper intense lesion in SCC on diffusion weighted images (DWI), T2-weighted images (T2WI) and fluid attenuated inversion recovery images (FLAIR) (Figure1). The lesion is hypointense on the apparent diffusion coefficient images (ADC) and iso-intensity on T1-weighted images. No contrast enhancement is seen in the lesion. Specifically, no lesions were detected



in the rest of the corpus callosum, frontal and parietal subcortical white matter, basal ganglia and posterior circulation brainstem were normal. MR angiography was unremarkable. Cerebrospinal fluid (CSF) examination was normal. Electroencephalography (EEG) showed normal basic activity with no paroxysmal discharge. The patient became afebrile four days after admission and had normal sensorium

and speech two days later with supportive treatment. A follow-up MR imaging done two weeks later (Figure 2) showed complete resolution of the central splenic lesion with normalisation of ADC values. Based on the clinical picture and imaging findings, a diagnosis of clinically mild encephalitis with isolated transient reversible splenic lesion was made.

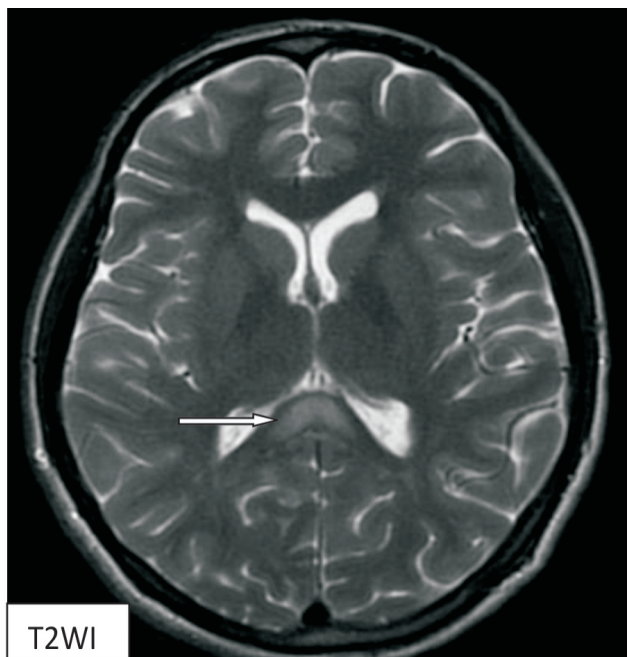
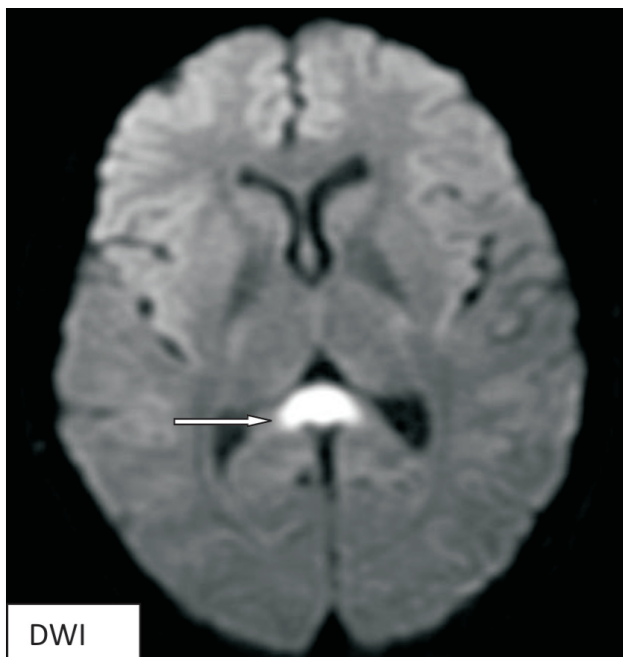


Fig. 1. Showing ovoid hyper intense lesion in central part of SCC on DWI and T2WI.

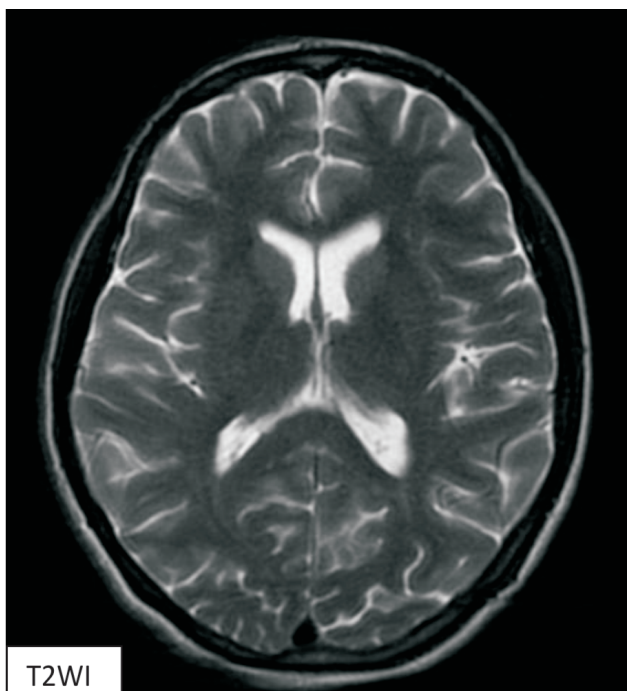
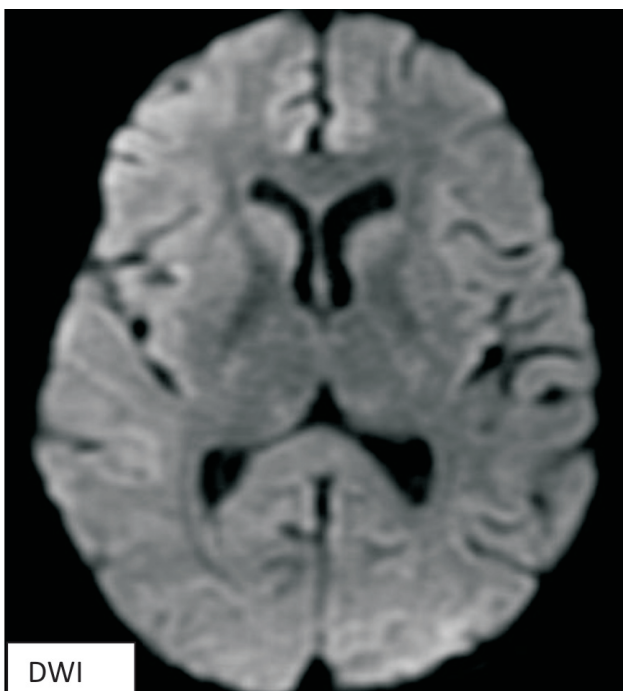


Fig. 2. Follow-up MRI done 2 weeks later showed complete resolution of lesion on DWI and T2WI.



## DISCUSSION

A isolated, reversible lesion in the centre of the SCC associated with a clinically mild encephalitis/encephalopathy is a uncommon unique phenomenon. The isolated transient feature of the lesion and other clinical and laboratory findings allows to differentiate the infectious causes from others, but it is difficult to presume the exact infectious causative agent by clinical and radiologic findings. Case reports of similar splenial lesions occurring as an infective encephalitis/encephalopathy have been published in influenza<sup>3</sup>, rotavirus<sup>4</sup>, measles<sup>5</sup>, herpesvirus<sup>6</sup>, Salmonella organisms<sup>7</sup>, mumps<sup>8</sup>, varicella-zoster virus<sup>8</sup>, adenovirus<sup>8</sup>, E coli<sup>9</sup>, and Legionnaires' disease<sup>10</sup>. Noninfective differential diagnosis of lesions involving the SCC includes ischemia, posterior reversible encephalopathy syndrome, diffuse axonal injury, multiple sclerosis, hydrocephalus, Marchiafava-Bignami disease, adrenoleukodystrophy, lymphoma, epilepsy and antiepileptic drug usage<sup>11</sup>. These noninfective conditions as the cause can be eliminated clinicoradiologically as in our case.

The isolated involvement of the SCC in clinically mild encephalitis/encephalopathy is an interesting finding for which there is no clear explanation. It has been postulated that the splenial lesion could arise from intramyelinic oedema due to separation of myelin layers or another possible mechanism is the influx of inflammatory infiltrate with related cytotoxic oedema<sup>12</sup>. The pathogenesis of the reported cases was postulated to be direct viral invasion leading to cell damage<sup>4</sup> or verotoxin binding causing axonal damage<sup>9</sup> that could not be applied to all the cases.

Although the splenium is the only region of corpus callosum supplied by vertebrobasilar system which is primarily supplied by the carotid system<sup>13</sup>, the absence of other lesions in this vascular territory makes vascular cause unlikely for the splenial lesions. So still the exact pathogenesis remains uncertain and enigmatic.

All the described isolated transient SCC lesions revealed complete resolution on repeat imaging performed three days to two months following the abnormal study. No enhancement of lesion seen after contrast administration. The shape of the SCC lesion was either ovoid or extended, (i.e. extending into the lateral portion of the SCC), and appeared independent of the causative agent, scan date, neurological symptoms and laboratory findings<sup>8</sup>. The clinical

course for all reported patients was mild and complete recovery occurring amongst most within a month after the onset of neurological symptoms, with some patients recovering within a week. Clinical recovery was achieved with or without treatment, and none of the patients suffered permanent neurological deficits<sup>14</sup>.

## CONCLUSION

With increasing usage of neuroimaging in patients with encephalitis or other causes of encephalopathy, a good number of isolated SCC lesions have been demonstrated. Despite of various described etiologies, the benign course that these lesions have, is well documented and published worldwide, so for this reason, a conservative approach is what should be recommended. Emphasis should be on avoiding unnecessary additional investigations, therapies or interventions and a follow-up limited MRI study to demonstrate resolution of the lesion for the sake of treating clinician and utmost to reassure the patient of their wellbeing is advisable.

**Source of Funding:** nil

**Previous Presentation:** nil

**Conflict of Interest:** nil

**Acknowledgement:** Nil

SDM Medical College Ethical Committee's Clearance Taken

## REFERENCES

1. Singh P, Gogoi D, Vyas S, Khandelwal N. Transient splenial lesion: Further experience with two cases. *Indian J Radiol Imaging* 2010;20:254-7
2. Oztoprak I, Engin A, Gümüs C, Egilmez H, Oztoprak B. Transient splenial lesions of the corpus callosum in different stages of evolution. *Clin Radiol* 2007;62:907-13.
3. Takanashi J, Barkovich AJ, Yamaguchi K, et al. Influenza-associated encephalitis/encephalopathy with a reversible lesion in the splenium of the corpus callosum: a case report and literature review. *AmJ Neuroradiol* 2004; 25:798-802.
4. Kobata R, Tsukahara H, Nakai A, et al. Transient MR signal changes in the splenium of the corpus callosum in rotavirus encephalopathy: value of diffusion-weighted imaging. *J Comput Assist Tomogr* 2002;26:825-28

5. Mito Y, Yoshida K, Kikuchi S. Measles encephalitis with peculiar MRI findings: report of two adult cases [in Japanese]. *Neurol Med* 2002;56:251–56
6. Kato Z, Kozawa R, Hashimoto K, et al. Transient lesion in the splenium of the corpus callosum in acute cerebellitis. *J Child Neurol* 2003;18:291–92
7. Kobuchi N, Tsukahara H, Kawamura Y, et al. Reversible diffusion-weighted MR findings of Salmonella enteritidis-associated encephalopathy. *Eur Neurol* 2003;49:182–84
8. Tada H, Takanashi J, Barkovich AJ, et al. Clinically mild encephalitis/encephalopathy with a reversible splenial lesion. *Neurology* 2004; 63: 1854-1858
9. Ogura H, Takaoka M, Kishi M, et al. Reversible MR findings of hemolytic uremic syndrome with mild encephalopathy. *AJNR Am J Neuroradiol* 1998;19:1144–45.
10. Morgan JC, Cavaliere R, Juel VC. Reversible corpus callosum lesion in Legionnaires' disease. *J Neurol Neurosurg Psychiatry* 2004;75:651–54
11. N.Bulakbasi, M.Kocaoglu, C.Tayfun, T.Ucoz. Transient Splenial Lesion of the Corpus Callosum in Mild Influenza-Associated Encephalitis/ Encephalopathy. *AJNR Am J Neuroradiol* 2006;27:1983– 86
12. Saluja M, Mcgrath N. Isolated Splenial Lesion in the Corpus Callosum in Combination with Urinary Retention in a case of Aseptic Meningoencephalitis. *International Journal of Case Reports and Images* 2011;2(11):6-9.
13. Kakou M, Velut S, Destrieux C. Arterial and venous vascularization of the corpus callosum. *Neurochirurgie* 1998;44:S31–S37
14. Yeh IB, Tan LCS, Sitoh YY. Reversible splenial lesion in clinically mild encephalitis. *Singapore Med J* 2005; 46(12): 726.

# Microbiological and Biochemical Profile of Cerebrospinal Fluid (CSF) in Various Non-Tuberculous Cases of Meningitis in HIV Positive Patients

Susheela Chaurasia<sup>1</sup>, Ashwini Saminder Waghmare<sup>2</sup>, Ameeta Joshi<sup>3</sup>, Sitalakshmi Shivram<sup>4</sup>

<sup>1</sup>Senior Resident, Department of Microbiology, ESIC Model Hospital cum ODC, Mumbai, <sup>2</sup>Microbiologist, Department of Microbiology, Government Medical College, Latur, <sup>3</sup>Associate Professor, <sup>4</sup>Senior Lab Technician, Department of Microbiology, J J hospital, Mumbai

## ABSTRACT

**Aim:** To study the microscopy, culture and biochemistry profile of cerebrospinal fluid (CSF) in various non-tuberculous cases of meningitis and the utility of cryptococcal latex agglutination test in HIV-positive and negative patients suspected of having cryptococcal meningitis.

**Materials and method:** Study design: Prospective. Study period: October 2007 to May 2009. The samples for the study were received from all age groups of HIV-positive patients suspected of having meningitis admitted to either medicine or paediatric ward and HIV-negative patients with signs and symptoms of meningitis were taken as control group.

After collection, CSF was subjected to the following tests: Unstained wet mount, Gram stain, Acid fast stain, India ink preparation (IIP), bacteriological & fungal culture of CSF and antigen detection test for *Cryptococcus neoformans*.

**Results:** The prevalence of meningitis among the clinically suspected HIV-positive patients was 18.3%. The most common cause of meningitis in HIV-positive patients was *S. pneumoniae* (60%) followed by *N. meningitidis* (40%). In HIV-negative patients, the most common cause was *N. meningitidis* (30.8%) followed by *S. Pneumoniae* and *K. pneumoniae* (23.1% each). The other causes of meningitis were *E. coli*, *P. aeruginosa* and *A. baumannii*. India ink preparation, cryptococcal antigen detection test and the culture showed a correlation of 83.3% in cases of cryptococcal meningitis. It was observed that cryptococcal antigen detection test was more sensitive (100%) as compared to culture (81.8%) and India ink preparation (68.2%).

**Conclusion:** Patients with CD4 count <200 cells/ $\mu$ l were more prone to cryptococcal meningitis in HIV positive patients.

**Keywords:** Cerebrospinal Fluid, Cryptococcal Meningitis, Culture, CD4 Count

## INTRODUCTION

HIV is a neurotropic virus. Therefore, neurological manifestation is the first to occur in 10-20% of symptomatic HIV positive patients among the various

other manifestations. These neurological manifestations are seen in 60% of advanced HIV. <sup>(1)</sup> Among the non-tuberculous causes of meningitis, cryptococcal meningitis tops the list with prevalence around 5% in India and 5% to 7% in U.S. <sup>(2)</sup> The present study was carried out to find out the causes of these non-tuberculous cases of meningitis in HIV/AIDS patients.

---

### Corresponding author:

**Ashwini Waghmare Saminder**

Microbiologist

Government Medical College, Latur

Email: ashwinishivani@gmail.com

Mobile: 08888493258

## MATERIAL AND METHOD

A prospective study was carried out in Department

of Microbiology of a tertiary care hospital from October 2007 to May 2009 on laboratory diagnosis of non-tuberculous meningitis in HIV/AIDS patients. The samples for the study were received from all age groups of HIV-positive patients suspected of having meningitis admitted to either medicine or paediatric ward and HIV-negative patients with signs and symptoms of meningitis were taken as control group. Cases of post-traumatic meningitis and meningitis developing after cranial surgery were excluded from the study.

Detailed clinical history as regards to the age, sex, clinical signs and symptoms, previous history of similar illness, any previous treatment or investigations done and treatment history were obtained from both HIV-positive and HIV-negative groups. CSF was collected after taking informed consent by the clinician by performing lumbar puncture with all aseptic precautions. The bulbs were labelled and transported to the microbiology laboratory immediately. These specimens were

processed in the laboratory without any delay. After collection CSF was subjected to the following tests:

Gross examination of CSF, Microscopic examination, unstained wet mount, Gram stain, Acid fast stain, India ink preparation (IIP), Culture of CSF: Bacteriological culture, fungal culture, Antigen detection test for *Cryptococcus neoformans*.

Statistical analysis was done by SPSS software version 15 demo. Data was represented in the form of frequency and percentages. A  $p$  value of  $< 0.05$  was considered to be statistically significant.

## RESULTS

A total of 25,897 samples were received of which 14,378 samples were from medicine and pediatric departments. Of these, 1,224 were tested positive for HIV antibodies (as per the NACO HIV testing guidelines). Of the total 1,224 HIV-positive patients, 224 had clinical signs and symptoms of meningitis. The prevalence of meningitis among the clinically suspected HIV-positive patients was 18.3%.

**Table no. 1: Diagnosis based on clinical suspicion in hiv positive patients and hiv negative control group**

Clinical diagnosis		HIV positive (n=224)	HIV negative (control group) (n=181)	Total (n=405)
		No.	105	77
Tuberculous meningitis (TBM)	%	46.9%	42.5%	44.9%
	No.	72	23	95
Cryptococcal meningitis	%	32.1%	12.7%	23.5%
	No.	34	66	100
Pyogenic meningitis	%	15.2%	36.5%	24.7%
	No.	6	1	7
Toxoplasmosis	%	2.7%	0.6%	1.8%
	No.	4	11	15
Viral meningitis	%	1.8%	6.1%	3.7%
	No.	3	3	6
Syphilitic meningitis	%	1.3%	1.7%	1.5%
	No.	224	181	405
Total	%	100.0%	100.0%	100.0%

Among the 224 HIV-positive patients, maximum cases (197 cases i.e. 87.9%) of meningitis were suspected in the age group 16-45 years, followed > 45 years age group (23 cases i.e.10.3%). Males

outnumbered females in both the HIV-positive (176 cases i.e.78.6%) and the HIV-negative (128 cases i.e. 70.7%) control group.

**Table no. 2: Meningitis on basis of clinical suspicion, biochemical parameters and the culture positivity**

Status of patients		Meningitis on the basis of clinical suspicion (n=405)	Meningitis on the basis of biochemical parameters (n=195)*	Meningitis on the basis of culture (bacterial and fungal culture) (n=36)
HIV-positive	No.	224	80	23
	%		35.7%	10.2%
HIV-negative(control group)	No.	181	99	13
	%		54.7%	7.2%

**Table no. 3: Bacterial isolates among the hiv positive patients and the hiv negative control group**

Organisms(n=18)		HIV positive (n=5)	HIV negative (control group) (n=13)	Total
N. meningitidis	No.	2	4	6
	%	40.0%	30.8%	33.3%
S. pneumoniae	No.	3	3	6
	%	60.0%	23.1%	33.3%
E. coli	No.	0	1	1
	%	0.0%	7.7%	5.6%
K. pneumoniae	No.	0	3	3
	%	0.0%	23.1%	16.7%
P. aeruginosa	No.	0	1	1
	%	0.0%	7.7%	5.6%
A. baumannii	No.	0	1	1
	%	0.0%	7.7%	5.6%
Total	No.	5	13	18
	%	100.0%	100.0%	100.0%

Fungal culture was positive in 18 patients in HIV-positive group. *C. neoformans* was uniformly isolated from all 18 cases, 14 (77.8%) were males and four (22.2%) were females.

Out of the 18 culture positive cases, 15 (83.3%) were positive for IIP. The remaining three (16.7%) were positive only for culture. In the remaining 387 culture negative cases, 206 HIV-positive patients and the 181 HIV-negative patients (control group) were all negative for India ink preparation. Antigen detection

test was done on 160 patients irrespective of their HIV status. Of these, 22 cases were found to be positive for the cryptococcal antigen detection test; only 18 cases were culture positive and the remaining four (2.82%) were culture negative. All the 22 patients were from HIV-positive group. Majority (18, 81.8%) of the HIV-positive patients with cryptococcal meningitis, had CD4+ T-lymphocyte cell count < 200 cells/µl. The remaining four had CD4 cell count in the range 200-499cells/µl.

**Tableno.4: Comparison of cases of bacterial & fungal meningitis**

Parameters		Bacterial Meningitis (n=19)*	Fungal Meningitis (n=22)**	Total (n=41)
<b>HIV Status</b>				
Positive	No.	5	22	27
	%	26.3%	100.0%	65.9%
Negative	No.	14	0	14
	%	73.7%	0.0%	34.1%



Tableno.4: Comparison of cases of bacterial & fungal meningitis (Contd.)

Parameters		Bacterial Meningitis (n=19)*	Fungal Meningitis (n=22)**	Total (n=41)
<b>CD4+ T-Lymphocyte Range</b>				
> 500	No.	0	0	0
	%	0.0%	0.0%	0.0%
200-499	No.	2	4	6
	%	10.5%	18.2%	14.6%
<200	No.	3	18	21
	%	15.8%	81.8%	51.2%

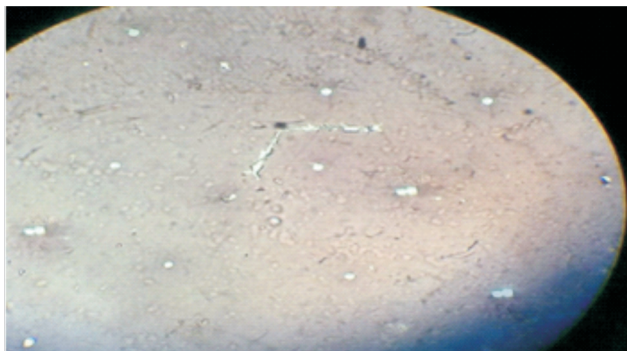


Fig. 1. India ink preparation showing encapsulated budding

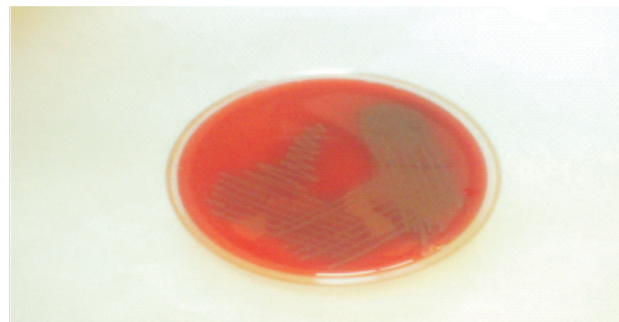


Fig. 4. Blood agar plate showing Alfa haemolytic colonies of *Streptococcus pneumoniae*

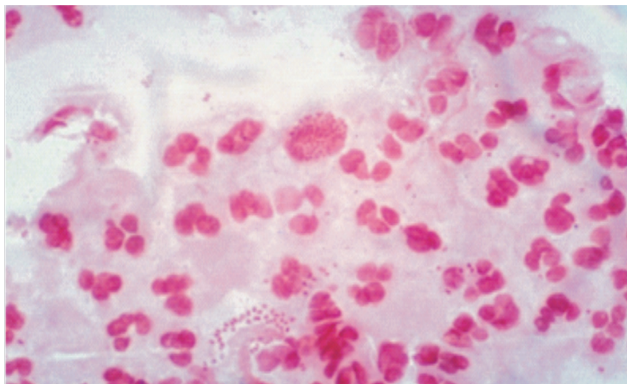


Fig. 2. Gram smear showing pus cells with meningococci yeast cells of *Cryptococcus neoformans*.



Fig. 3. Latex Cryptococcus antigen detection kit

### DISCUSSION

Two opportunistic pathogens stand out as important problems in patients with AIDS – *C. neoformans* and *M. tuberculosis*, and together they account for about three-fourth of the cases of meningitis. The prevalence of clinically suspected cases of meningitis among HIV-positive patients in the present study was 18.3%. However, the prevalence of culture positivity (bacterial and fungal) among these cases was only 1.9%. This observation is in contrast to the study made by Rottbeck where out of a total 495 HIV positive patients, 86 (17.37%) cases were diagnosed with meningitis on the basis of culture.<sup>(3)</sup>

In the present study (Table no. 2), biochemical parameters were suggestive of meningitis in 35.7% HIV-positive patients and 54.7% in HIV negative patients.

The common bacterial isolates among the HIV-positive patients (Table No. 3) were *S. pneumoniae* (60%) and *N. meningitidis* (40%). Whereas, *C. neoformans* was the only type of fungal isolate obtained from all the 18 fungal culture positive cases.

In Rottbeck's study, out of the 86 (17.37%) diagnosed cases of meningitis; *C. neoformans* (64%) was the most common, followed by TBM (24%), and bacterial meningitis was seen in 11.6% cases.<sup>(3)</sup> In the study of Nikoumaou et al, there were 1202 clinically suspected cases of meningitis. Bacterial meningitis was diagnosed on culture in 261 (22%) patients, 23% were HIV positive, and 19.8% were HIV-negative.<sup>(5)</sup>

In the present study, maximum culture positivity in both groups was seen in the age group 16-45 years. Similar observations were made by Schuchat et al,<sup>(6)</sup> while Almirante et al<sup>(7)</sup> found, the mean age in HIV infected patient was 36±4 years.

CSF was found to be turbid on gross examination in all culture positive cases of bacterial meningitis in both the groups (HIV-positive and HIV-negative). The biochemical parameters were affected in both groups of patients with raised CSF protein, low sugar, high CSF total leucocyte count, predominance of neutrophils and low percentage of lymphocytes. However, these parameters were found to be more deranged in HIV-negative control group as compared to HIV-positive patients. This may be due to the effect of poor cellular immune response in HIV-positive patients, which hinders them in mounting a good cellular response. Similar findings were seen by Almirante et al<sup>(7)</sup> and Mani et al study<sup>(8)</sup>

All the HIV-positive patients presenting with meningitis were gram smear as well as culture positive. The gram stain correlation with the culture was statistically significant irrespective of the HIV-status. In the study of Almirante et al, out of the 12 culture positive cases, gram staining of CSF was positive in six (50%) cases.<sup>(7)</sup>

Among the HIV positive patients, the commonest isolate was *S. pneumoniae* (three cases i.e. 60.0%) followed by *N. meningitidis* (two cases i.e. 40%). Among the HIV-negative control group also, the commonest isolate was *N. meningitidis* (four cases i.e. 30.8%) followed by *S. Pneumoniae* and *K. pneumoniae* [three (23.1%) each]. Similarly, Gordon et al found in their study, *S. pneumoniae* (17.5%) as the most common isolate, followed by *N. meningitidis* (12.7%)<sup>(4)</sup>. Nikoumaou et al reported *S. pneumoniae* as the most common isolate in HIV positive (45%) and negative (69%) patients, followed by *N. meningitidis* as the second most common isolate in HIV-positive (8%) and HIV-negative (30%) patients. Other isolates like *E.coli* (5.5%), *P. aeruginosa* (4%), *S. aureus* (1%) were seen only in HIV-positive cases.<sup>(5)</sup>

All the culture positive fungal isolates were obtained from HIV positive patients. *C. neoformans* was uniformly isolated from all these cases. This indicates that HIV positivity is an important risk factor associated with cryptococcal meningitis. No fungal isolates were obtained from HIV-negative control group. The overall prevalence of cryptococcal meningitis on the basis of culture positivity in HIV/AIDS patients with meningitis was 8%. Prasad et al observed in their study, that 18 to 65 years was the age group that was affected in patients with cryptococcal meningitis.<sup>(9)</sup>

In the present study, biochemical parameters were slightly deranged with raised CSF protein and lymphocytes seen in 14 (77.8%) cases each, low sugar was seen in eight (44.4%) cases. However, the total leucocyte count was raised in all the 18 cases. Reviewed literature mentions that most of the time, these biochemical parameters are non-specific.<sup>(10, 11, 12)</sup>

In the present study, India ink preparation was positive in 15 (83.3%) out of the 18 (100.0%) culture positive cases, whereas, it was negative in the remaining three (16.7%) culture positive cases. Tunkel reported a 50% to 75% positivity rate of India ink examination in patients with cryptococcal meningitis. This yield increases to 88% in patients with AIDS.<sup>(13)</sup> Heyderman et al, in their study found that India ink preparation was positive for *C. neoformans* for 76 (85%) of 89 patients, CSF culture was positive for 77 (87%) out of 89.<sup>(12)</sup> In a study done by Khanna et al, India ink staining was positive in 13 out of the total 18 (72.2%) HIV-positive patients whereas, fungal culture was positive in all cases.<sup>(14)</sup>

A total of 22 cases were found to be positive for antigen detection test. Of these, 18 were also positive for culture. Heyderman et al, in their study observed that 76 (85%) of the 89 patients were positive by culture. Cryptococcal antigen was positive for 79 (92%) of 86 patients. In six (7%) cases, testing for India ink and culture was negative, but the cryptococcal antigen was positive.<sup>(12)</sup>

Cryptococcal antigen detection test was found to be more sensitive for detecting the antigens in the CSF, when compared with culture and India ink preparation. Similar findings were shown by Mitchell et al with cryptococcal antigen detection test sensitivity (95%) more than either culture (75%) or India ink preparation (50%).<sup>(15)</sup>

In the present study (Table no. 4), majority (81.8%) of the HIV positive patients with cryptococcal meningitis had CD4<sup>+</sup> T-lymphocyte cell count < 200 cells/ $\mu$ l and the remaining 18.2% (four patients) in the range 200-499cells/ $\mu$ l.

Therefore, patients with low CD4<sup>+</sup> T-lymphocyte count are more prone to develop meningeal infection with the yeast *C. neoformans*.

**Acknowledgment:** Authors would like to thank the Dean of Sir JJ Hospital, Head of the Department of Microbiology and all the staff of Microbiology department for cooperating in making this study.

**Ethical Committee Clearance was Obtained.**

No funding was required.

**Conflict of Interest:** Nil

#### REFERENCES

1. Wadia R S, Pujari S N, Kothari S, Udhar M, Kulkarni S, Bhagat S *et al.* Neurological Manifestation of HIV Disease. *JAPI* 2001; 49: 343-348.
2. Korálnik I J. Neurologic disease caused by Human Immunodeficiency Virus 1 and Opportunistic infections, Chapter 120. In: Mandell, Douglos and Bennett's Principles and practice of infectious diseases, 6Ed. Mandell G L, Bennett J E, Dolin R. Eds. Churchill livingstone, Edinburgh, 2000; 1583-1601.
3. Rottbeck R M. Epidemiological aspects, etiologies and clinical outcome of meningitis in HIV-infected patients in the Southern Province of Rwanda. National University of Rwanda. 2007: 1-25
4. Gordon S B, Walsh A L, Chaponda M, Gordon M A, Soko D, Mbwvinji M *et al.* Bacterial Meningitis in Malawian Adults: Pneumococcal Disease is Common, Severe, and Seasonal. *Clin Infect Dis* 2000; 31: 53-57.
5. Nikoumaou M O, Kombil M, Betha G, Clevenberg P. Bacterial and Mycobacterial Meningitis in HIV-Positive Compared with HIV-Negative Patients in an Internal Medicine Ward in Libreville, Gabon. *JAIDS* 2003; 32: 345-346
6. Schuchat A, Robinson K, Wenger J D, Harrison L H, Farley M, Reingold A L, Lefkowitz L, Perkins B A. Bacterial meningitis in the United States in 1995. *New Engl J Med* 1997; 337: 970-976.
7. Almirante B, Saballs M, Ribera E, Pigrau, Gavalda J, Gasser I *et al.* Favourable prognosis of purulent meningitis in patients infected with human immunodeficiency virus. *Clin Infect Dis* 1998; 27: 176-180.
8. Mani R, Pradhan S, Nagarathan, Wasiulla R, Chandramukhi A. Bacteriological profile of community acquired acute bacterial meningitis: A ten year Retrospective study in a tertiary neurocare centre in South India. *Ind J Med Microbiol* 2007; 25: 108-114.
9. Prasad K N, Agarwal J, Nag V L, Verma A K, Dixit A K, Ayyagari A. Cryptococcal Infection in patients with clinically diagnosed meningitis in a tertiary care centre. *Neurology India* 2003; 51: 364-366.
10. Aquinas S R, Tarey S D, Ravindran G D, Nagamani D, Ross C. Cryptococcal Meningitis in AIDS- Need for early diagnosis. *JAPI* 1996; 44: 178-180.
11. Capoor M R, Nair D, Deb M, Gupta B, Aggarwal P. Clinical and mycological profile of cryptococcosis in a tertiary care hospital. *Ind J Med Microbiol* 2007; 25: 401-404.
12. Heyderman R S, Gangaidzo I T, Hakim J G, Mielke J, Taziwa A, Musvaire P *et al.* Cryptococcal Meningitis in Human Immunodeficiency Virus-Infected Patients in Harare, Zimbabwe. *Clin Infect Dis* 1998; 26: 234-289.
13. Tunkel A R. Approach to the patient with central nervous system infections, Chapter 79. In: Mandell, Douglos and Bennett's Principles and practice of infectious diseases, 6Ed. Mandell G L, Bennett J E, Dolin R. Eds. Churchill livingstone, Edinburgh, 2000:1079-1127.
14. Khanna N, Chandramukhi A, Desai A and Ravi V. Cryptococcal infections of the central nervous system: an analysis of predisposing factors, laboratory findings and outcome in patients from south India with special reference to HIV infection. *J Med Microbiol* 1996; 45: 376-379.
15. Mitchell T G and Perfect J R. Cryptococcosis in the era of AIDS-100 years after the discovery of *Cryptococcus neoformans*. *Clin Microbiol Rev* 1995; 8: 516-535.



# A Study of Risk Factors Associated with Low Birth Weight Babies Born to Mothers Attending a Tertiary Hospital of Andhra Pradesh

Sipra Komal Jena<sup>1</sup>, S K Mishra<sup>2</sup>, Ganapathy Swamy<sup>3</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Professor & HOD, <sup>3</sup>Lecturer, Dept. of Community Medicine at GSL Medical College, Rajahmundry, A.P. India

## ABSTRACT

**Background:** Low birth weight is one of the most serious challenges in maternal & child health in both developed & developing countries. It has been emphasized that a community based prospective study would help to define the exact role of various factors affecting birth weight. This helps in preventing Low birth weight (LBW) babies through good prenatal care & intervention programmes rather than the treatment of LBW babies later.

**Objectives:** 1.To study the risk factor of LBW due to socio-demographic & economic causes. 2. To study the risk factors due to obstetric causes & factors due to personal origin.

**Materials And Method:** Around 120 mothers who gave birth to low birth weight babies in the month of September 2011 to December 2011 who were admitted in G.S.L Medical College & Hospital were examined, & interviewed with the help of a pre-tested questionnaire. Their socio- demographic, economic, physical profiles were studied.

**Results:** Lower age group of mother, illiteracy, socio economic status, decreased BMI, passive smoking, habit of taking caffeine etc are significant risk factors for low birth weight babies.

**Conclusions:** There is need of population based interventions in terms of improving maternal education & socioeconomic status. The results of this study suggest that for reducing LBW, the strategy needs to focus attention on nutrition education to facilitate better weight gain during pregnancy, encouraging appropriate birth spacing, avoidance of tobacco chewing & exposure to passive smoke & discouraging teenage smoking.

**Keywords:** Low Birth Weight Babies, Socio-Demographic Factors, Economic Factors, BMI

## INTRODUCTION

Low birth weight (LBW) is one of the most serious challenges in maternal & child health in both developed & developing countries. Low birth weight babies are neonates weighing less than 2500 grams. Low birth weight babies include two kinds of infants.

The babies born before 37 weeks are called preterm babies & the remaining are small for gestational age due to intra-uterine growth retardation (IUGR). A weight below 10<sup>th</sup> percentile of expected weight for the population suggests IUGR.<sup>1</sup> The predominant cause of LBW in developed countries is preterm, whereas in developing country is often IUGR. LBW is the key determinant of neonatal mortality, morbidity, subsequent growth & developmental retardation.<sup>2</sup> according to UNICEF, about 18 million low birth weight babies are born globally every year. Half of all perinatal & one third of all infant deaths are directly or indirectly related to LBW.<sup>3</sup> The lower the birth weight, lower is the survival chance, many children with LBW become victims of protein energy

---

### Corresponding author:

Sipra Komal Jena

Associate Professor

Dept.Of Community Medicine, G.S.L.Medical College,  
Rajahmundry, A.P. 533296

Cell No. 9848619923

E.Mail: Drsipra@Live.Com

malnutrition & infections. It is also incriminated for occurrence of many chronic diseases in adult life.<sup>4</sup> Incidence of LBW in India in the year 2008 was 30%<sup>5</sup> & till now it has not even achieved the required goal of 10% as per "Health for all by 2000 A.D". It is generally acknowledged that the etiology of LBW is multifactorial since many factors can influence the length of gestation or the rate of intrauterine growth.<sup>6</sup> Experts opine that the rate of LBW could be reduced to not more than 10% in all parts of the world<sup>7</sup>. It is clear from the multiplicity of causes that is no universal solution. Interventions have to be cause specific. It has been emphasized that a community based prospective study would help to define the exact role of various factors affecting birth weight. This helps in preventing Low birth weight (LBW) babies through good prenatal care & intervention programmes rather than the treatment of LBW babies later. In order to plan & institute meaningful interventions, it is pertinent to review the various factors which have been reported to be a cause of LBW. The present study was undertaken to study the various risk factors associated with low birth weight babies.

## MATERIALS AND METHOD

**Study design:** Cross sectional, Hospital based study

**Study area:** Department of Obstetrics & Gynaecology, G.S.L Medical College, Rajahmundry, Andhra Pradesh

**Study subjects:** All mothers giving birth to low birth weight babies during the study period.

**Sample size:** 120

**Study period:** September 2011 to December 2011.

**Sampling technique:** Simple random sampling technique

**Study variables:** Age, education, occupation, socioeconomic status, BMI, obstetric history, parity, birth interval, personal history, etc.

**Statistical analysis:** percentages and proportions, chi-square.

## METHODOLOGY

The study was carried out in the post natal ward of Department of Obstetrics & Gynaecology of G.S.L Medical College & Hospital, Rajahmundry, Andhra Pradesh, during the period of September 2011 to December 2011. All the mothers of low birth weight

babies i.e. less than 2.5 kg at birth, admitted during the study period were considered for study. The mothers were interviewed with the help of a pretested questionnaire which included the required details such as their personal & social history, obstetric history etc. after obtaining their consent. They were also clinically examined for anaemia, height, weight, BMI etc. The data collected was analyzed.

## RESULTS

Out of 120 subjects observed in our study, 106 (88.3%) were found to have given birth to low birth weight babies i.e. less than 2.5 kg but more than 1.5 kg & 14(11.7%) gave birth to very low birth weight babies i.e. less than 1.5 kg. Among the very low birth weight babies, 12 (85.71%) were female babies & remaining 2 (14.29%) were male babies. Among the low birth weight babies, 52 out of 106 (49.06%) were female babies & 54 (50.94%) were male babies. Table 1 shows the sociodemographic profile which reveals that more no. of low birth weight babies were born to 16 to 19 years & the difference was statistically significant ( $p=0.001$ ). it was seen that more no of low birth weight babies were born to illiterate & primary educated women i.e 116 out of 120 (96.66%) which was again statistically significant. ( $p=0.001$ ) It was found that 96 out of 120 mothers (80%) who gave birth to low birth weight babies, belonged to low socioeconomic group which is statistically significant ( $p<0.05$ ). Regarding work, it was found out that 88 out of 120 i.e. 73.33% of the mothers did hard work which is again statistically significant. ( $P<0.05$ ).

Table 2 shows that more no. of low birth weight babies i.e. 72 (60%) were born to those mothers whose BMI was less than 18.5 & it was found to be statistically significant ( $P<0.05$ ).

Around 58 women (54.7%) who gave birth to low birth weight babies less than 2.5kg but more than 1.5 kg had history of anaemia during pregnancy & 10 women (71%) of the women who gave birth to very low birth weight babies had history of anaemia during pregnancy. Around 96 (80%) had history of pregnancy induced hypertension & 60 (50%) had history of acute infection at the time of pregnancy. 42% of them had history of chronic infection in their previous pregnancy. Table 3 shows that the 98 (93%) of women who gave birth to low birth weight babies (<2.5 kg but >1.5kg) were multigravida whereas 10 (71.42%) of the ladies who gave birth to very low birth weight babies were multigravida. It also shows that out of the



10 mothers who gave birth to very low birth weight babies & were multigravida, 8 (57.1%) of them had spacing of 1-2 yrs whereas 62 (58.4%) of women in the other group overall had spacing of 1-2 years. About 98(87.5%) among the multigravid women who gave birth to low birth weight babies but more than 1.5 kg, had spacing of 1to 2 yrs between the first & second child.

Table 4 shows that 64 (60.37%) of women who gave birth to low birth weight babies but more than 1.5kg

& all the women 14(100%) of the women who gave birth to very low birth weight babies were habituated to coffee or Tea at least 5-6 times a day & it was statistically significant. ( P<0.05) None of the women had the habit of smoking, however it is seen that 72 (69.81%) of mothers who gave birth to low birth weight babies & 4 (28.57%) of mothers who gave birth to very low birth weight babies had exposure to passive smoking which is statistically significant (P<0.05).

**Table1- sociodemographic profile of mothers of low birth weight babies**

Profile of mothers	Babies weighing less than 1.5kg	Babies weighing 1.5 to less than 2.5 kg
<b>Age of mother</b>		
<15 yrs	2 (14.2%)	2 (1.88%)
15 – 19 yrs	8 (57.1%)	100 (94.33%)
19 - 23 yrs	2 (14.2%)	2 (1.88%)
23 – 27 yrs	2 (14.2%)	2 (1.88%)
27 – 31 yrs	-	-
31 – 35 yrs	-	-
>	35 yrs	- -
Total	14 (100.00%)	106 (100.00%)
<b>Education</b>		
Professional /Honors	-	-
Graduate/PG	-	-
Intermediate	2 (14.2%)	-
High school certificate	2 (14.2%)	-
Middle school certificate	-	-
Primary school certificate	2 (14.2%)	54 (50.94%)
Illiterate	8 (57.1%)	52 49.05%)
Total	14 (100.00%)	106 (100.00%)
<b>Nature of work</b>		
Heavy	10 (71.4%)	78 (73.5%)
Moderate	2 (14.2%)	22 (20.7%)
Simple or sedentary	2 (14.2%)	6 (5.66 %)
Total	14 (100.00%)	106 (100.00%)
<b>Socio-economic status</b>		
Upper	1	-
Upper middle	2 (14.2%)	2 (1.87%)
Lower middle	3 (21.43%)	16 (15.09%)
Upper lower	4 (28.57%)	44 (83.01%)
Lower	4 (28.57%)	44 (83.01%)
Total	14 (100.00%)	106 (100.00%)

Table 2. Table showing distribution of mothers according to BMI

BMI	Babies weighing less than 1.5kg	Babies weighing 1.5 to less than 2.5 kg
<18.5	10 (71.4%)	62 (58.49%)
18.5 – 24.99	0 (0%)	40 (37.73%)
25 - 29.99	4 (28.57%)	4 (03.77%)
30 & above	-	-
Total	14 (100.00%)	106 (100.00%)

Table 3. Table showing order of birth &amp; birth spacing

Para	Babies weighing less than 1.5kg	Babies weighing 1.5 to less than 2.5 kg
<b>Order of birth</b>		
Primipara	4 (28.57%)	8 (7.54%)
Multipara	10 (71.42%)	98 (92.45%)
Total	14 (100.00%)	106 (100.00%)
<b>Birth spacing</b>		
1 -2 years	8 (57.1%)	62 (58.4%)
3 years & above	2 (14.2%)	36 (33.9%)
First child	4 (28.57%)	8 (7.54%)
Total	14 (100.00%)	106 (100.00%)

Table 4. Table showing exposure to passive smoking &amp; caffeine.

Habituated to tea/coffee more than 4 - 5 times a day	Babies weighing less than 1.5kg	Babies weighing 1.5 to less than 2.5 kg
<b>Exposure to caffeine</b>		
Yes	14 (100%)	64 (60.38%)
No	0 (0%)	42 (39.62%)
Total	14 (100%)	106 (100.00%)
<b>Exposure to passive smoking</b>		
Yes	4 (28.57%)	74 (69.81%)
No	10 (71.43%)	32 (30.19%)
Total	14 (100.00%)	106 (100.00%)

## DISCUSSION

The birth weight of an infant is the single most important determinant of its chances of survival, healthy growth & development. Longitudinal studies by Sachdev et al<sup>8</sup> reveal that LBW infants demonstrates increased morbidity & mortality, significant growth retardation in all aspects in first five years of life. According to Falkner. F<sup>9</sup>, the causation of preterm or SFD babies include multiple births, acute infections, hard physical work, hypertensive disorders of pregnancy etc. which is concurrent with our study. As per WHO<sup>10</sup>, the factors associated with IUGR are multiple & inter related to mother. Malnutrition, severe anaemia, very young age, high parity, low socioeconomic status, close birth spacing, very young age are some of the additional factors influencing the growth of the foetus which has been observed in our

study. The studies by Harfouche<sup>11</sup>, Munesh K. Sharma,<sup>12</sup> Kashan et al<sup>13</sup>, Vega J et al<sup>14</sup>, Deshmukh et al<sup>15</sup> support the findings of our study where the maternal age, high parity, educational status & socio economic status of mother etc. have found to influence the growth of foetus resulting in low birth weight babies. Justin Konje et al<sup>16</sup> concluded that higher caffeine intake was associated with increased risk of low birth weight which is also seen in our study. Barker et al<sup>17</sup> demonstrated that

LBW correlated with the increased prevalence of hypertension, Diabetes & cardiovascular diseases which is similar to the findings of our study. Our study reports low proportions of LBW among better educated, elderly women having higher family income as in NFHS-3<sup>18</sup> it was also observed that low socioeconomic status, illiteracy of mother & teenage

pregnancy were statistically significant ( $P < 0.05$ ) risk factors for LBW. In our study, we have observed that passive smoking is a significant risk factor for LBW. Studies by Verma RC<sup>19</sup> & Krishna K<sup>20</sup> have shown that passive smoking & tobacco chewing reduces the weight of the baby. Passive smoking causes nicotine absorption in non smoking females resulting in fetal hypoxia & reduction of maternal blood supply to placenta<sup>21</sup>. The concentration of tar, nicotine, carbon monoxide & carbon dioxide are 2 to 10 times higher in side stream smoking than in the main stream stroke.<sup>22</sup>

### CONCLUSION AND RECOMMENDATIONS

Preterm babies need special medical care in a neonatal intensive care unit. There is a need for nutrient supplements to all low birth weight babies. Findings of present study suggest the need of population based interventions in terms of improving maternal education & socioeconomic status. The results of this study suggest that for reducing LBW, the strategy needs to focus attention on nutrition education to facilitate better weight gain during pregnancy, encouraging appropriate birth spacing, avoidance of tobacco chewing & exposure to passive smoke & discouraging teenage smoking.

**Acknowledgment:** The authors sincerely thank the management of G.S.L Medical College in granting us permission & encouragement to conduct this study. The authors are also grateful to the entire department of Obstetrics & Gynaecology for cooperating & helping us to conduct the study.

The authors wish to confirm that there are no known conflicts of interest associated with this publication & there has been no financial support for this work that could have influenced its outcome. Further, clearance was obtained from the Institutional Ethical Committee before the study.

### REFERENCES

1. WHO, Multicenter study on LBW & Infant mortality in India, Nepal & Srilanka, Regional health paper. SEARO. no. 25,1994.
2. WHO & UNICEF Low birth weight: Country. Regional & Global estimates, Geneva: WHO 2004.
3. Aurora S, Vishnu Bhat B, Habibullah S., Srinivasan S, Maternal Nutrition & birth weight. Indian Journal of Maternal & Child Health 1994;5:73-75.
4. Erickson JG.: The fetal origin hypothesis: 10 years on BMJ 2005;330: 1096-1097.
5. UNICEF (2008): state of World children 2008.
6. Kramer MS, Determinants of LBW, WHO Bulletin 1987: 65: 663-737.
7. WHO (1980) : Towards a better future: MCH.
8. Sachdev HPS, LBW in South Asia. Int.J.Diab Dev 2001;21(13-33)
9. Falkner F (1980), Prevention in childhood of health problems in adult life, WHO, Geneva.
10. WHO (1978): WHO chronicle, 32, 231.
11. Harfarche JK, (1979): WHO Bulletin, 57(3), 387-403.
12. Sharma MK, Kumar DK, A Huria, Gupta P, Maternal risk factors of low birth weight in Chandigarh, India, The internet Journal of Health, 2009, volume 9, number 1.
13. Khashan PS, Baker PN, Kenny LC, Preterm birth & reduced birth weight in first & second teenage pregnancy : a register based cohort study. BMC Pregnancy & child birth, 2010.
14. Vega J, Saez G, Smith M, Risk factors for low birth weight & intra-uterine growth retardation in Santiago, Chile.
15. Deshmukh JS, Motghare DD, Zodpey SP, Wadhra S.K, Low birth weight & Associated Maternal factors in an urban area, Indian Pediatrics Journal, volume 35, 1998.
16. Justin Konje, Caffeine in pregnancy associated with low birth weight risk, British Medical Journal, November 3, 2008.
17. Stein CE, fall, Kumaran K, Osmond C, Barker DJ, Fetal growth & Coronary Heart disease in south India, Lancet 1996, 348, 1269-73
18. International Institute of Population Sciences, National Family Health Survey, India 2005-2006 (NFHS-3/Vol1) 2007, pg 225.
19. Verma RC, Effect of Tobacco chewing by mother on fetal outcome. Indian Journal of Paeditric 1983, 20, 105-111.
20. Iwase A, Aiba M, Kira S. Respiratory nicotine absorption in non smoking females during passive smoking, Int Arch Occup Environmental Health, 1991, 63,139-143.
21. Krishna K. Tobacco chewing in pregnancy. Br J obstet gynecology 1978: 85, 726-728.
22. Abel EC, Smoking during pregnancy: A review of effects on growth & development of the offspring, Human biology 1980, 52, 593-625.

# Efficacy of Sildenafil in Secondary Pulmonary Arterial Hypertension

Lohia D<sup>1</sup>, Nandwani S<sup>2</sup>, Bhatnagar M<sup>2</sup>, Saluja M<sup>3</sup>, Gupta V<sup>2</sup>

<sup>1</sup>Post Graduate Student, <sup>2</sup>Professor, P.G. Department of Medicine, <sup>3</sup>Professor, P.G. Department of Pulmonary Medicine, P.G. Department of Medicine, Subharti Medical College, N.H.-58, Delhi-Haridwar-Meerut Bypass Road, Meerut, U.P. India

## ABSTRACT

**Objective:** To study the efficacy of sildenafil (Phosphodiesterase 5 inhibitor) on the basis of improvement in six minute walk test (6-MWT) and reduction in Pulmonary Arterial Systolic Pressure (PASP) as measured by 2-D Echocardiography in patient with Secondary PAH.

**Materials and Method:** After initial clinical evaluation, including Doppler Echocardiography and 6-MWT 30 patients with Secondary PAH were commenced on sildenafil 20 mg t.d.s. for a period of 12 weeks and 2D-Echocardiography and 6-MWT were repeated after 12 weeks. Paired t-test was applied to find the statistical significant difference at baseline and 12 weeks after therapy in six minute walk test and PASP at 5% level of significance.

**Results:** In our study of 30 patients there was a significant increase in 6-MWT distance from baseline (326.33 + 50.27 meters) to 12 weeks after therapy (412.67 + 56.01 meters) with a mean improvement of 86.33 + 31.78 meters ( $p < 0.05$ ), furthermore there was a significant reduction in mean pulmonary arterial pressure from 48.73 + 5.06 mm Hg to 40.53 + 5.49 mm Hg with a mean reduction of 8.20 + 4.59 mm Hg ( $p < 0.05$ ) after therapy. There was no serious side effects with sildenafil.

**Conclusion:** Our study suggests that sildenafil can be used as a valuable drug in treatment of Secondary Pulmonary Arterial Hypertension.

**Keywords:** PAH (Pulmonary Arterial Hypertension), PASP (Pulmonary Arterial Systolic Pressure), 6MWT (Six Minute Walk Test)

## INTRODUCTION

Pulmonary Arterial Hypertension (PAH) is a multifactorial, progressive disease with substantial mortality and morbidity. It is defined as a sustained elevation in mean pulmonary arterial pressure  $> 25$  mm of Hg at rest or 30 mm of Hg after exercise in the absence of raised left-sided cardiac pressure.<sup>1</sup>

Primary pulmonary hypertension is described as idiopathic hypertensive vasculopathy exclusively affecting the pulmonary circulation, whereas secondary pulmonary hypertension is associated with a causal underlying disease process.<sup>1</sup> Secondary PAH is commonly due to lung disease (COPD, interstitial lung disease, alveolar hypoventilation disorders), thromboembolism, left ventricular muscle and valve disease, associated with connective tissue diseases (scleroderma / CREST syndrome), congenital left to right shunts, porto-pulmonary hypertension, HIV associated pulmonary hypertension and drug induced (e.g. Anorexigens).<sup>2</sup>

---

### Corresponding author:

**Deepthi Lohia**

Post Graduate Student,  
P.G. Department of Medicine, Subharti Medical College, N.H.-58, Delhi-Haridwar-Meerut Bypass Road, Meerut - 250 005  
Mob.: +91 9997813453  
E-mail: deepthilohia@hotmail.com

The increased pulmonary arterial pressure is due to disturbance in key vascular mediator pathways including relative deficiencies of vasodilators such as

Nitric Oxide and Prostacyclin as well as exaggerated production of vasoconstrictors such as endothelins and thromboxanes.<sup>3</sup> It is primarily a disease of the small pulmonary arteries, characterized by vascular proliferation, remodelling and progressive increases in pulmonary vascular resistance (PVR), leading ultimately to right ventricular failure and death. It is a progressive, often fatal debilitating disorder<sup>3,4</sup> having clinical hallmark of progressive breathlessness, exertional limitation and failure of right ventricle.

There are many treatments available but there is no known cure<sup>3,5</sup> and although therapeutic options continue to evolve, the treatment of patients with severe form of disease remains a challenge. Present therapeutic applications have limitations, as Epoprostenol is effective only if given intravenously through a small plastic tube that must remain in the vein permanently.<sup>6,7</sup> Another treatment involves continuous inhalation of Nitric Oxide gas that also dilates blood vessels in the lungs. A newer approach was having an inhaled mist form of epoprostenol called Iloprost but each mist treatment lasted only about 60 minutes and so upto 12 treatments per day were required. Abnormalities of hepatic function are associated with Bosentan and hence frequent monitoring is required. Thus each of these treatments has its own drawbacks.<sup>3,4</sup>

Sildenafil is a selective phosphodiesterase inhibitor that has been reported to be a potent pulmonary vasodilator. It selectively inhibits phosphodiesterase 5 (PDE 5 is abundant in pulmonary and penile tissue) which leads to stabilization of cyclic guanosine monophosphate (cGMP). cGMP is a second messenger of nitric oxide (NO), stabilization of cGMP results in increasing NO at the tissue level leading to pulmonary vessel vasodilation. It may also have antiproliferative effects on pulmonary vascular smooth-muscle cells.<sup>8</sup>

## MATERIAL AND METHOD

This prospective clinical trial was conducted at Chhatrapati Shivaji Subharti Hospital. A total of 35 patients having age > 18 years who were diagnosed as a case of PAH on the basis of having Pulmonary Artery Systolic Pressure (PASP) of more than 40mmHg as measured by Doppler echocardiography were enrolled. Out of these 35 patients 5 were lost to follow up during the course of the study period. So data

analysis was done in a total of 30 patients.

Patients were not included if they had any of the following exclusion criteria: Severe Pulmonary Hypertension (PASP > 60mm Hg), those requiring or likely to require the following medications – organic nitrates,  $\alpha$ -blocker therapy, potent cytochrome P<sub>450</sub> 3A4 inhibitors (Erythromycin, Ketoconazole, Cimetidine, HIV protease inhibitors), Acute Myocardial Infarction, Stroke or life threatening Arrhythmia within the last 6 months, Hypotension, Retinitis Pigmentosa, Anatomical deformity of penis, severe renal impairment with creatinine clearance < 30ml/min and Pregnant or lactating women.

A baseline history, clinical examination and basic laboratory investigations including complete hemogram, liver function test, kidney function test, blood sugar, peripheral saturation by pulse oximeter, chest X-ray, ECG, pulmonary function testing (PFT), HIV, ANA to find out the cause for secondary PAH was done. The patients were also classified according to WHO functional class assessment for PAH.

The patients enrolled in our study were administered oral Sildenafil in the dosage 20mg three times a day for a duration of 12 weeks. Bronchodilators and other regular medications which the patients were taking earlier, were continued.

In 6MWT, patients were asked to walk back and forth in a 15-m (50-foot) corridor in a period of 6 min at a sub-maximal effort as per the protocol by American Thoracic Society (ATS).<sup>9</sup> The baseline measurements of pulse, BP, and pulse oximetric saturation (Sp<sub>o</sub><sub>2</sub>) were measured and were repeated at the end of the walk. The PASP was measured by a transthoracic two-dimensional echocardiography with colour Doppler, a reliable, non-invasive investigation to screen for PAH and was done on VIVID 3 echocardiography machine. Values above 40mmHg were considered highly specific for detection of PASP. It was used to measure PASP on the basis of presence of Tricuspid Regurgitation and pressure was calculated by modified Bernoulli equation.<sup>10,11</sup>

## Statistical Analysis

A group of 30 patients were studied for 6MWD and PASP at different time points (i.e. at baseline and after 12 weeks). All the values were expressed in terms of



mean and standard deviation respectively. However paired t-test was applied to find significant improvement in 6MWD and PASP from baseline to 12 weeks at 5% level of significance. The same test was also applied to see whether there was a significant fall in mean blood pressure as hypotension is one of the side effects of Sildenafil.

## RESULTS

Thirty patients completed the study. The mean  $\pm$  S.D. of age in our study came out to be  $54.07 \pm 7.49$  years. Out of 30 patients, 22 patients (73.10%) presented with a history of smoking. Although causes of secondary pulmonary arterial hypertension are many but in our study majority of patients 29 out of 30 (97%) were due to COPD and only 1 patient was due to post tuberculosis fibrosis (3%). According to WHO functional assessment classification of Pulmonary Hypertension 2/3<sup>rd</sup> of patients in the present study were in class III and rest 1/3<sup>rd</sup> were in class II. The mean FEV1 was 46% with 20 out of 30 (67%) patients belonged to stage III of GOLD Criteria for COPD and rest 1/3<sup>rd</sup> (33%) were from stage II.

In our study it was seen that the average of mean B.P. at baseline which was  $87.86 \pm 7.12$ mmHg and the average of mean B.P. at 12 weeks which was  $87.04 \pm 5.75$ mmHg were almost similar with a difference of only 0.82 which was non-significant (students t-test).

In the study, there was a significant improvement in results of 6 MWT from  $326.33 \pm 50.27$  metres at baseline to a mean of  $412.67 \pm 56.01$  metres at 12 weeks with an improvement of  $85.33 \pm 31.78$  metres which is statistically significant ( $p < 0.05$ ). Also PASP has shown to be decreased from a mean value of  $48.73 \pm 5.06$  mmHg at baseline to  $40.73 \pm 5.49$  mmHg at 12 weeks after administration of Sildenafil with a mean decrease of  $8.2 \pm 4.59$  mmHg which is statistically significant ( $p < 0.05$ ).

**Table 1: The Mean and Standard Deviation of different characteristics at Baseline & after 12 weeks**

S. No.	Characteristics	Mean $\pm$ S.D.	
		At Baseline	After 12 weeks
1.	Blood Pressure	$87.8667 \pm 7.1234$	$87.0440 \pm 5.7493$
2.	6 MWT	$326.3333 \pm 50.2740$	$412.6667 \pm 56.0131$
3.	PASP – ECHO	$48.7333 \pm 5.0578$	$40.5333 \pm 5.4881$

**Table 2: The Mean and Standard Deviation for the calculated difference in variables at Base line and after 12 weeks**

S. No.	Characteristics	Mean $\pm$ S.D. (Difference between Baseline & 12th Week)
1.	Blood Pressure changes	$0.8227 \pm 3.4474$
2.	6 MWT	$86.3333 \pm 31.7841$
3.	PASP on ECHO	$-8.2000 \pm 4.5893$

## DISCUSSION

In the present study sildenafil has shown improvement in the 6 MWD and a decrease in the PASP in patients with PAH without any serious adverse events causally related to sildenafil therapy. Supporting our results the largest clinical trial Sildenafil use in pulmonary arterial hypertension (SUPER) study by Galie N. et al<sup>12</sup> in which 278 patients with secondary PAH were enrolled, the mean 6-MWD increased by 45 m and mean PVR decreased by 122 dynes/cm respectively as compared to the placebo group. In another multicenter, collaborative, open label trial by Tohru et al<sup>13</sup>, PAH patients taking Sildenafil showed sustained improvement in the 6-MWT by 87.5 m and 84.2 m. at weeks 8 and 12 of administration without any serious adverse events.

There is a great interest in knowing whether new specific PAH therapy could also be beneficial in more prevalent forms of PAH, such as that associated with COPD. The use of Sildenafil, which acts on the NO cyclic guanosine monophosphate pathways could be a reasonable alternative for the treatment of COPD – associated PAH as this pathway is impaired in these patients. The novel finding in the present study extends and complements previous studies using vasodilators in COPD.

Similarly in a study by Rao RS et al<sup>14</sup> 37 patients with severe COPD received either Sildenafil or placebo for 12 weeks. There was a significant increase in 6 MWD from baseline after three months of follow-up in Sildenafil users (median change in distance covered in 6MWD = 190 m) as compared to placebo users. The PASP decreased significantly ( $\chi^2 = 14.94$ ,  $p < 0.05$ ) in Sildenafil group after 3 months while it did not change significantly among placebo group. ( $\chi^2 = 3.84$ ,  $p > 0.05$ ).

Increased contractility of right ventricle (RV) in setting of RV hypertrophy is commonly observed in severe COPD patients. Recently it has been proposed

that Sildenafil reverses remodelling of RV<sup>15,16</sup> and may improve breathing capacity as PDE type5 inhibition also has been implicated in reverting bronchoconstriction.<sup>17</sup> Transformation of pulmonary fibroblast to myofibroblast mediated by transforming growth factor-beta (TGF- $\beta$ ) plays an important role in various pathophysiologic events related to COPD and IPF. It has been shown that combining Sildenafil with the guanylyl cyclase activator suppresses TGF- $\beta$  induced differentiation and may affect the course of the disease.<sup>18</sup>

Blanco I et al<sup>19</sup> studied the acute effects of Sildenafil in patients with COPD associated PAH both at rest and during exercise. Eleven patients were assigned to 20 mg and 9 patients to 40 mg of Sildenafil. Both Sildenafil doses reduced the mean pulmonary arterial pressure at rest and during exercise, without differences between them. Overall, PASP decreased 6mmHg at rest and 11mmHg during exercise. So they concluded that in patients with COPD-associated PAH, Sildenafil improves pulmonary hemodynamics at rest and during exercise.

In contrast to present study, a study by Rietema H et al<sup>20</sup> on 15 COPD patients (9 with PAH and 6 without PAH), a 3 months course of oral Sildenafil failed to show improvement in stroke volume and exercise capacity. Different effects of Sildenafil probably can be explained on the basis that in my study all patients of COPD having PAH were recruited compared to this study in which 6 were without PAH. Also mean FEV1 in that study was 49% of predicted while patients in current study had mean FEV1 of 46%, baseline mean 6 MWD was 326 meters in my study in comparison to 385 meters in their study. Probably these results suggest that sildenafil is effective in patients with more severe COPD.

The drug was well tolerated with no serious adverse events in the study group. The most common side effect came out to be headache which was complained by 4 patients out of 30 (13%) and one patient had an event of flushing (3%) and no other side effects like altered color vision, blurring of vision, dyspepsia, priapism, epistaxis were observed. Our results are supported by the study done by Rao RS et al<sup>14</sup> and the SUPER trial<sup>12</sup> which enrolled the largest number of patients in a controlled clinical trial to see effect of sildenafil in PAH. In both of these studies also headache was the most common side effect. The incidence of headache in the SUPER study was 46%, the difference of which can be due to large number of

patients (278) in their study as compared to a small group in ours.

## CONCLUSION

Sildenafil significantly increased the 6MWD and reduced PASP in patients with PAH. Also the drug has good safety profile as no major side effects were seen.

**Acknowledgement:** We thank the Management of Subharti Medical College and Hospital who allowed us to carry out this work.

**Conflict of Interest:** We, the authors declare that each one of us has equally contributed in the preparation of this manuscript and we have no conflict of Interest amongst us.

**Source of Support:** We declare that we have not received any financial assistance from any source.

**Ethical Clearance:** The ethical clearance was taken before starting the study ( reference number 35 of clearance list)

## REFERENCES

1. Gaine SP, Rubin LJ. Pulmonary Hypertension. *Lancet* 1999;353:74-6.
2. Archer SL, Michelakis ED. Phosphodiesterase 5 inhibitors for pulmonary arterial hypertension. *N Engl J Med* 2009;361:1864-71.
3. Mehta S. Sildenafil for pulmonary arterial hypertension: exciting, but protection required. *Chest* 2003;123(4):989-92.
4. Claveilla SQ. New insight into the treatment of pulmonary arterial hypertension. *Formulary* 2003;38(3):150-60.
5. Galie N, Manes A, Branzi A. Emerging medical therapies for pulmonary arterial hypertension. *Prog Cardiovasc Dis* 2002;45:213-24.
6. Sitbon O, Humbert M, Simonneau G. Primary pulmonary hypertension: Current therapy. *Prog Cardiovasc Dis* 2002;45:115-28.
7. Hoper MM, Schwarze M, Ehlerding S, Adler-Schuermeier A, Spiekerkoetter E, Niedermeyer J, et al. Long term treatment of primary pulmonary hypertension with aerosolised iloprost, a prostacyclin analogue. *N Engl J Med* 2000;342:1866-70.
8. Tantini B, Manes A, Fiumana E, Pignatti C, Guarnieri C, Zannoli R, et al. Antiproliferative effect of sildenafil on human pulmonary artery

- smooth muscle cells. *Basic Res Cardiol* 2005;100:131-8.
9. ATS statement: guidelines for the six-minute walk test. *Am J Respir Crit Care Med* 2002;166:111-7.
  10. E Bossone, Bodini BD, Mazza A, et al. Pulmonary Arterial Hypertension: The Key Role of Echocardiography. *Chest* 2005;127:1836-43
  11. Selimovic N, Rundqvist B, Bergh CH, Andersson B, Petersson S, Johansson L, et al. Assessment of pulmonary vascular resistance by doppler echocardiography in patients with pulmonary arterial hypertension. *J Heart Lung Transplant* 2007;26(9):927-34
  12. Galie N, Ghofrani HA, Torbicki A, et al. Sildenafil citrate therapy for pulmonary arterial hypertension. *N Engl J Med* 2005;253:2148-57.
  13. Satoh T, Saji T, Watanabe H, et al. A phase III, multicentric, collaborative, Open- Label Clinical trial of sildenafil in Japanese patients with pulmonary arterial hypertension. *Circ J* 2011;75:677-82.
  14. Rao R.S, Singh S, Sharma BB, Agarwal VV, Singh V. Sildenafil improves six-minute walk distance in Chronic Obstructive Pulmonary Disease: A randomised, double-blind, placebo-controlled trial. *Indian J Chest Dis Allied Sci* 2011;53:81-5.
  15. Nagendran J, Archer SL, Soliman D, et al. Phosphodiesterase type 5 is highly expressed in hypertrophied human right ventricle, and acute inhibition of phosphodiesterase type 5 improve contractility. *Circulation* 2007;116:238-48.
  16. Wolferen SA, Boonstra A, Marcus JT, et al. Right ventricular reverse remodelling after sildenafil in pulmonary hypertension. *Heart* 2006;92:1860-1.
  17. Charan NB. Does sildenafil also improve breathing? *Chest* 2001;120:305-6.
  18. Dunkern TR, Feurstein D, Rossi GA, Sabatini F, Hatzelmann A. Inhibition of TGF-beta induced lung fibroblast to myofibroblast conversion by phosphodiesterase inhibiting drugs and activators of soluble guanylyl cyclase. *Eur J Pharmacol* 2007;572:12-22.
  19. Blanco I, Gimeno E, Munoz PA, et al. Hemodynamic and Gas Exchange Effects of Sildenafil in Patients with Chronic Obstructive Pulmonary Disease and Pulmonary Hypertension. *Am J Respir Crit Care Med* 2010;181:270-8.
  20. Rietema H, Holverda S, Bogaard HJ, et al. Sildenafil treatment in COPD does not affect stroke volume or exercise capacity. *Eur Respir J* 2008;31:759-64.

# Detection of AmpC $\beta$ -lactamases Producing Multidrug Resistant Gram Negative Bacteria in a Tertiary Care Hospital

Veena Manjunath<sup>1</sup>, Archana Sharma<sup>2</sup>, Mridula Raj Prakash<sup>3</sup>

<sup>1</sup>Assoc Professor, Dept of Microbiology, J.J.M. Medical College, Davangere, <sup>2</sup>Senior Resident, Dept of Microbiology, ESI Hospital, New Delhi, <sup>3</sup>Asst Professor, International Medical School, MS Ramaiah Medical College, Bangalore

## ABSTRACT

**Background and objectives:** Strains producing AmpC  $\beta$ -lactamases are emerging in many countries. Yet there remains a standard method to be found to detect the strains producing these enzymes. Many researchers have used a variety of methods to detect the enzyme production. We, in this study have made an attempt to find out the enzyme production from different gram negative bacteria and their prevalence in our tertiary care hospital.

**Method:** Isolates were preliminarily screened for the production of AmpC enzyme using cefoxitin (30?g) disk. All the isolates resistant to cefoxitin were further subjected to AmpC disk test for confirmation. The results were analysed and tabulated.

**Results:** From a total of 300 isolates, 118(39%) showed resistance to cefoxitin (Screen positives). These were further tested for confirmation by AmpC disk test. 42(36%) were confirmed to be true AmpC producers. E.coli (41%) followed by Klebsiella (26%) were found to be the highest AmpC producers. The isolates also showed resistance to routinely used antibiotics. Maximum sensitivity was only for cefepime.

**Conclusion:** The increasing occurrence of AmpC producers has led to treatment failures of infections caused by gram negative bacteria. Hence their threat to the existing healthcare is immense and needs to be taken seriously.

**Keywords:** AmpC, Gram Negative Bacilli, E.coli, Cefoxitin, AmpC Disk Test

## INTRODUCTION

Since the late 1970s, the emergence of Amp C beta lactamases which belongs to class C, group 1 of Bush's functional classification have gained more importance as mediators of antimicrobial resistance in gram negative bacilli. AmpC beta lactamases are of two types - plasmid mediated and chromosomal or inducible AmpC <sup>[1]</sup>. These preferentially hydrolyze narrow, broad, and extended - spectrum

cephalosporins and cephamycins and resist inhibition by clavulanate, sulbactam and tazobactam <sup>[2]</sup>. Amp C beta lactamases have been described in pathogens like *Klebsiella pneumonia*, *Escherichia coli*, *Salmonella spp.*, *Proteus mirabilis*, *Citrobacter freundii*, *Acinetobacter spp.*, *Enterobacter spp.*, and *Pseudomonas aeruginosa* <sup>[1]</sup>. The capability to detect AmpC is important to improve the clinical management of infections and provide sound epidemiological data, but at present, there are no standardized phenotypic screening methods that are readily available to microbiology laboratories. Several methods of phenotypic detection of AmpC beta lactamases have been described but many are labour intensive, interpretation is subjective, lack sensitivity and or specificity and cannot be adopted routinely. PCR or multiplexed PCR can be used to confirm their presence but high costs and availability of equipment

---

### Corresponding author:

**Veena M**

Assoc Professor

Dept of Microbiology, J. J. M. Medical College,  
Davangere, Karnataka

Ph-9480599771

E-mail: veenaarush@gmail.com

has limited its utility<sup>[3]</sup>. In organisms which produce both ESBL and Amp C, detection of either of these enzymes poses a diagnostic challenge. Phenotypic confirmatory tests based on the detection of cephamycin hydrolysis or AmpC inhibition will distinguish AmpC beta lactamases from ESBLs and porin mutations. Confirmatory tests that detect cephamycin hydrolysis include the AmpC disk, Modified Hodge Test and the tree dimensional test<sup>[2]</sup>. Hence this study was carried out to estimate the presence of Amp C beta lactamases in gram negative bacteria in our tertiary care centre by AmpC disk test.

## MATERIALS AND METHOD

A total of 300 consecutive, non repetitive Gram negative bacilli were isolated from various clinical samples such as exudates (pus, ear swab, fluids), urine, sputum and blood coming to our departmental laboratory between May 2011 to April 2012 were included in the study. Samples were processed and isolates were identified by standard laboratory methods. Reference strains *K. pneumoniae* ATCC 700603 and *E. coli* ATCC 25922 obtained from Hi-Media, Mumbai, were used in this study.

**Antibiogram:** Antibiotic susceptibility testing was done according to CLSI guidelines using Kirby – Bauer disk diffusion method on Muller Hinton agar. The drugs tested were (all in µg) ampicillin (30), ceftazidime (30), cefotaxime (30), cefepime (30), ciprofloxacin (5), gentamycin (5), amikacin (30), ceftazidime (30) and imipenem (10) (Hi Media laboratories, Mumbai) and confirmation was done using Amp C disk test.

**ESBL screen test:** isolates were also tested for ESBL production by the CLSI confirmatory method using ceftazidime and cefipime with and without clavulanic

acid. A  $\geq 5$  mm increase in zone diameter of ceftazidime/ cefipime alone and in combination with clavulanic acid was indicative of ESBL production. Such isolates were excluded from the study.

**AmpC screen test:** Isolates showing resistance to ceftazidime (zone size  $\geq 18$  mm) were considered as screen positives and were selected for detection of AmpC beta lactamases.

**Amp C disk Test:** All ceftazidime resistant isolates were confirmed using AmpC disk test. A lawn culture of *E. coli* ATCC 25922 was done on MHA plate. Saline moistened sterile disk (6mm) was inoculated with several colonies of the test organism and was placed beside a ceftazidime disk (almost touching) on the inoculated plate. The sterile disk is then inverted so that the inoculum comes in contact with the medium below. The plate was then incubated overnight at 35°C. The flattening or indentation of the ceftazidime inhibition zone in the vicinity of the test disk was interpreted as positive for Amp C production and undistorted zone was interpreted as negative.

## RESULTS

A total of 300 isolates were included in this study obtained from various clinical samples. Different samples and the isolates from each of them are shown in **table-1**. Most common organism isolated from various samples was *E. coli* followed by *Klebsiella* and *Pseudomonas*. Among 300 samples processed, 118(39%) showed resistance to ceftazidime (Screen positives). These were considered probable AmpC producers. All 118 isolates were then subjected to AmpC disk test. By this method 42(36%) were confirmed to be true AmpC producers. The details of the same are shown in table-2

**Table 1: Sample wise distribution of all isolates:**

Samples	<i>E. coli</i>	<i>Klebsiella</i> spp	<i>Pseudomonas</i> spp	<i>Acinetobacter</i> spp	<i>Proteus</i> spp.
Urine (156)	49	51	25	13	18
Pus (67)	22	11	16	9	9
Blood (32)	17	11	0	0	4
Sputum (24)	5	5	7	5	2
Suction tip(21)	3	4	9	5	0
Total (300)	96	82	57	32	33



**Table 2: Showing isolates wise distribution of AmpC producing organisms**

Organisms	No. of AmpC producers	%
E.coli	17	41
Klebsiella	11	26
Pseudomonas	8	19
Acinetobacter	3	7
Proteus	3	7
Total	42	



Fig. 1. Showing the result of AmpC disk test

## DISCUSSION

Currently *E.coli* is the most predominant pathogen seen in early onset of sepsis and neonatal meningitis [4]. Presence of  $\beta$ -lactamases in these isolates have threatened the use and effect of commonly used antibiotics. A plasmid mediated  $\beta$ -lactamase indistinguishable from the chromosomal AmpC in *E.coli* was first described in a strain of *Proteus mirabilis* in 1976 [5]. Since then more than 20 different plasmid-mediated AmpC  $\beta$ -lactamases have been discovered [6]. Although a chromosomal AmpC gene is present in *Escherichia coli*, it is not usually expressed because of the presence of a transcriptional attenuator coupled with a weak promoter [7,8]. The transfer of AmpC genes to plasmids has resulted in their dissemination among *Enterobacteriaceae*, with the consequence that AmpC-encoded beta-lactamases are now present in strains of *Klebsiella spp.*, *E. coli*, *Proteus mirabilis*, and *Salmonella spp.* Plasmid-mediated AmpC enzymes have been described from diverse geographic areas, including the United Kingdom, the United States, and Asia [9,10,11,12,13]. Detecting AmpC-R is a challenge for laboratories [14]. But their detection is of prime importance as they have become responsible for many nosocomial outbreaks.

At present, phenotypic tests are not able to differentiate between chromosomal AmpC genes and AmpC genes that are carried on plasmids. Perez-Perez and Hanson described a multiplex PCR for six families of plasmid-carried AmpC genes (some originating from *Hafnei alvei*, *Citrobacter freundii*, *Morganella morganii*, and *Enterobacter cloacae*), which may be used to detect the presence of these externally acquired AmpC genes in *E. coli*, *Klebsiella spp.*, and *Proteus spp.* [15]. Enzyme extraction methods have traditionally been cited as the optimum phenotypic detection method for AmpC activity. However, these are labor-intensive and not suitable for routine clinical use. Hence in our study more feasible screening and confirmatory tests were done. On screening we could detect 118 (39%) out of 300 isolates to be probable AmpC producers. Of these 118, only 42 (36%) were true AmpC producers by AmpC disk test. The remaining had shown false positive result. This could be due to alterations in the outer membrane permeability as a result of loss of OMP (Outer membrane porins) [16,17,18,19]. In a study done by Hemalatha et al (1) the AmpC production was seen in 9.2% of the isolates and in another study done by Shoorashetty et al (3) it was 6%. Whereas Singhal et al [20] showed 36% of their isolates to AmpC producers. Vikas et al [21] have found 21% of their study isolates to be AmpC producers. In our study we found that 36% of our isolates were AmpC producers. This is similar to results found by Singhal et al. Many researchers have used different phenotypic methods and have found that the prevalence of AmpC producers vary geographically. It has also been found that there are some newer Ambler class C type enzymes which have relatively a lower activity to cefoxitin [22] and hence appear susceptible. Such isolates have to be confirmed by molecular methods. The specificity and also sensitivity of our detection method could have been increased by using boronic acid in combination with cefoxitin. In the present study *E.coli* (41%) was the leading producer of AmpC while *Acinetobacter* (7%) and *Proteus* (7%) showed the least level of AmpC production. Emerging evidence suggests that probably all *Acinetobacter* isolates produce a chromosomal AmpC enzyme [23]. This means they might have 'silent genes' or that there might be low level expression of AmpC genes that was not detected by the present method. Since only genes that are expressed cause resistance, a phenotypic test like modified three dimensional test or AmpC disk test proves to be more valuable than the genotypic methods. Moreover, Indian strains of *Acinetobacter spp.* might be less likely to express AmpC genes than

Western strains <sup>[21]</sup> . The isolates also showed 98% resistance to ciprofloxacin, 96% resistance to amikacin and 96% were resistant to cefotaxime. 96% of them showed sensitivity to cefepime only. Studies have shown that antibiotic co-resistance was high among ESBL, AmpC and co-producers when compared to non-producers and iAmpC. This may be due to the fact that plasmids carrying these enzymes may carry co-resistance genes for other antibiotics <sup>[31]</sup> .

### CONCLUSION

So far many studies have shown that a mixed type of drug resistance is seen in many gram negative bacilli and it is involving many antibiotics leading to treatment failure. Though a number of detection methods are being used and developed, less cumbersome, economical and reliable methods like inhibitor based method using boronic acid and AmpC disk test can be routinely used. It is also seen that cefoxitin-boronic acid method though reliable may give false negative results when other mechanisms for cefoxitin resistance are operating. Some studies have proved that three dimensional extract test has high specificity compared to other phenotypic methods. But the major limitation is more elaborate and cumbersome of the procedure. Yet many studies have also shown that AmpC disk test is equally sensitive and specific. Thus AmpC disk test which is less laborious and more reliable can be routinely used to detect the dreaded AmpC producing organisms, however the genotype should be confirmed by any of the molecular methods to prevent their spread worldwide. In doing so, one can at least prevent treatment failure and provide better healthcare to the community.

**Acknowledgement:** We thank our Dr. Viswanath.G Prof & Head, Dept Of Microbiology, J.J.M. Medical College, Davangere, for all his support and encouragement to carry out this study.

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

**Ethical Committee Clearance:** Institutional Ethical Committee Clearance has been taken to conduct this study.

**Source of Funding:** Since this study was done in the Institution, all the media, antibiotic discs were utilized from the Dept of Microbiology, JJM Medical College, Davangere. So it's the Institution (Dept) which funded this project.

### REFERENCES

1. Hemalatha V, Padma M, Uma Sekar, Vinodh TM, Arunkumar AS. Detection of AmpC beta lactamases in *Escherichia coli* & *Klebsiella* by an inhibitor based method. *Indian J Med Res* 2007; 126: 220-223.
2. Kenneth S Thomson. Extended – Spectrum –  $\beta$ -lactamase, AmpC , and Carbapenemase Issues. *J. Clin. Microbiol* 2010; 48: 1019-1025.
3. Shoorashetty RM, Nagarathnamma T, Prathibha J. Comparison of the boronic acid disk potentiation test and cefepime-clavulanic acid method for the detection of ESBL among AmpC-producing Enterobacteriaceae. *Indian J. Med Microbiol.* 2011;29(3):297-301.
4. Jia-Horng J, Nan-Chang C, Fu-Yang H, Chun-Chih P. Neonatal sepsis in the neonatal intensive care unit: characteristics of early versus late onset. *J Microbiol Immunol Infect* 2004;37(5): 301-306.
5. Bobrowski M, Barath P. Plasmid-determined beta-lactamase indistinguishable from the chromosomal beta-lactamase of *Escherichia coli*. *J Bacteriol* 1976; 125(1): 149-157.
6. Baurenfeind A, Chong Y, Schweighart S. Extended broad spectrum beta-lactamase in *Klebsiella pneumoniae* including resistance to cephamycins. *Infection* 1989; 17(5): 316-321.
7. Mulvey MR, Bryce E, Boyd DA, Ofner-Agostini M, Land AM , Simor AE *et al.* Molecular characterization of cefoxitin-resistant *Escherichia coli* from Canadian hospitals. *Antimicrob. Agents Chemother.* 2005; 49:358–365.
8. Tracz DM., Boyd DA, Hizon R, Bryce E, McGeer A, Ofner-Agostini M *et al.* AmpC gene expression in promoter mutants of cefoxitin-resistant *Escherichia coli* clinical isolates. *FEMS Microbiol. Lett.* 2007; 270:265–271.
9. Koh TH, Song LH, Wang G, Hsu LY , Lin RT, and Tee NW. Emerging problems with plasmid-mediated DHA and CMY AmpC beta lactamases in Enterobacteriaceae in Singapore. *Int. J. Antimicrob. Agent* 2007; 30:278–280.
10. Lee K, Hong SG, Park YJ, Lee HS, Song W, Jeong J, *et al.* Evaluation of phenotypic screening methods for detecting plasmid-mediated AmpC beta-lactamases-producing isolates of *Escherichia coli* and *Klebsiella pneumoniae*. *Diagn. Microbiol. Infect. Dis.* 2005; 53:319–323.
11. Moland ES, Hanson ND, Black JA, Hossain A, Song W, and Thomson KS. Prevalence of newer

- beta-lactamases in gram-negative clinical isolates collected in the United States from 2001 to 2002. *J. Clin. Microbiol.* 2006; 44:3318–3324.
12. Pitout JD, Gregson DB, Church DL, and Laupland KB. Population-based laboratory surveillance for AmpC beta-lactamase producing *Escherichia coli*, Calgary. *Emerg. Infect. Dis.* 2007; 13:443–448.
  13. Woodford N, Reddy S, Fagan EJ, Hill RL, Hopkins KL, Kaufmann ME, *et al.* Wide geographic spread of diverse acquired AmpC beta-lactamases among *Escherichia coli* and *Klebsiella* spp. in the UK and Ireland. *J. Antimicrob. Chemother.* 2007; 59:102–105.
  14. Subha A, Devi VR, and Ananthan S. AmpC beta-lactamase producing multidrug resistant strains of *Klebsiella* spp. and *Escherichia coli* isolated from children under five in Chennai. *Indian J. Med. Res.* 2003; 117:13–18.
  15. Perez-Perez F J and Hanson ND. Detection of plasmid-mediated AmpC beta-lactamase genes in clinical isolates by using multiplex PCR. *J. Clin. Microbiol.* 2002; 40:2153–2162.
  16. Hernandez-Alles S, Conejo M, Pascal A, Tomas JM, Benedi VJ, Martinez-Martinez L. Relationship between outer membrane alterations and susceptibility to antimicrobial agents in isogenic strains of *Klebsiella pneumoniae*. *J. Antimicrob. Chemother.* 2000;46:273–277.
  17. Babini GS, Danel F, Munro SD, Micklesen PA, Livermore DM. Unusual tazobactam-sensitive AmpC beta-lactamase from two *Escherichia coli* isolates. *J. Antimicrob. Chemother.* 1998; 41: 115–118.
  18. Cao VT, Arlet G, Ericsson BM, Tammelin A, Courvalin P, Lambert T. Emergence of imipenem resistance in *Klebsiella pneumoniae* owing to combination of plasmid-mediated CMY-4 and permeability alteration. *J. Antimicrob. Chemother.* 2000;46:895–900.
  19. Stapleton PD, Shannon KP, French GL. Carbapenem resistance in *Escherichia coli* associated with plasmid-determined CMY-4 -lactamase production and loss of an outer membrane protein. *Antimicrob. Agents Chemother.* 1999; 43:1206–1210.
  20. S Singhal *et al.*, Evaluation of methods for ampC  $\beta$ -lactamase in gram negative clinical isolates from tertiary care hospital. *Indian J. Med Microbiol.* 2005; 23(2):120-124.
  21. Vikas Manchanda, Narendra P. Singh. Occurrence and detection of AmpC  $\beta$ -lactamases among Gram-negative clinical isolates using a modified three dimensional test at Guru Tegh Bahadur Hospital, Delhi, India. *J. Antimicrob Chemother.* 2003; 51: 415–418.
  22. Baurenfeind A, Schneider I, Jungwirth R, Sahly H, Ullman U. A novel type of AmpC beta lactamase, ACC-1, produced by a *Klebsiella pneumoniae* strain causing nosocomial pneumonia. *Antimicrob Agents Chemother* 1999;43:1924-31.
  23. Bou G, Beltran JM. Cloning, nucleotide sequencing and analysis of the gene encoding an AmpC beta-lactamase in *Acinetobacter baumannii*. *Antimicrobial Agents and Chemotherapy* 2000;44, 42



# Health and Psycho-Social Problems of Elderly Persons in Rural Area of Andhra Pradesh

P Sukla<sup>1</sup>, S H N Zaidi<sup>2</sup>, Karun Dev Sharma<sup>3</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Assistant Professor, Department of Community Medicine, S.S.S. Medical College & Research Institute, Kancheepuram, Tamil Nadu, <sup>3</sup>Assistant Professor, Department of Community Medicine, Kamineni Academy of Medical Sciences and Research centre, Hyderabad, Andhra Pradesh

## ABSTRACT

**Objective:** To study the different health and psycho-social problems of the elderly people in rural South Andhra Pradesh.

**Method:** A cross-sectional study was carried out to assess the health and psycho-social problems among the elderly persons. A pilot study was conducted distributing questionnaires to the respondents with the help of their relatives.

**Results:** Among the total 122 participants, 69 males and 53 females participated in the study. The most common health problems encountered among the elderly include problems of eye-sight, hearing, joint pains, nervous disorders, weakness, complaints related to heart, asthma, urinary problems and others. More health problems were reported by women compared to men.

**Conclusion:** Certain common specific factors that influence the health and psycho-social problems among the elderly belong to gender-wise distribution. Hence, these findings raise a number of issues for formulating appropriate health policies for the elderly.

**Keywords:** Health Problems, Psycho-Social, Elderly People, Rural Area

## INTRODUCTION

India is greying. Currently there are an estimated 100 million elderly live in India. By 2050 it is projected to 326 million (projections made by UN in their 1996 revision)<sup>[1]</sup>. With better standards of living and medical breakthroughs there is life beyond sixties. Ageing brings about a number of physiological changes. It not only affects a person's looks, but also becomes a cause of physical deterioration. An elderly person who continues to be physically active, mentally alert can retard this ageing process to some extent and reduce associated physical and psychological problems.

Social, economical, psychological and health problems are the most commonly faced by the elderly in our country. Of these problems, health and medical problems are generally considered to be important as they affect a large majority of the elderly. Rao et al., (2003) in a study of health status of the rural elderly in Andhra Pradesh found that health problems tend to increase with advancing age and very often the problems aggravate due to neglect, poor economic status, social deprivation and inappropriate dietary intake<sup>[2]</sup>. Singh (2005) in his study in rural Haryana reported that the majority of landless rural elderly were suffering from one or the other health problems and physical disabilities<sup>[3]</sup>. Factors related with ageing such as social isolation, decreased autonomy, financial insecurity, poor health and impending death might be expected to increase the prevalence of depression in later part life. It is very important to understand the health needs of the elderly and solicit their opinion in improving the existing health-care system in the

---

### Corresponding author:

**Pradeep Sukla**

Associate Professor

Department of Community Medicine, S.S.S. Medical College & Research Institute, Kancheepuram, Tamil Nadu  
Contact No.09884660288

E-mail: sukla.jyoti@rediffmail.com



country. Herein, an attempt is made to describe the situation and major health problems faced by the elderly populations of aged 60 and above in rural area of district-East Godavari, Andhra Pradesh.

## MATERIALS & METHOD

**Type of Study:** - A community-based, cross-sectional study.

**Study Area:** Rural health & training centre, the field practice area department of community medicine of GSL Medical College and General Hospital Andhra Pradesh.

**The study period:** 21<sup>st</sup> October 2010 to 20<sup>th</sup> March 2011.

**Methodology:** The study - subjects were subjected for personal interview using a pre-tested and semi-structured schedule containing questionnaires. Clinical examinations and checking of individual records were also used as study tools in order to collect data on demographic, socio-economic, environmental and morbidity conditions. "Informed consent" was taken from the Study subjects.

**Sample Size:** From National Sample Survey Organization (NSSO) in a survey report that 77% of

the elderly persons were having multiple ailments<sup>[4]</sup>. The minimum sample size of the present study was calculated on the basis of the above mentioned prevalence by the formula  $n=4pq/L^2$ , that came out to be 122.

Geriatric depression scale (GDS) - A total of 15 numbers of questions were asked to know the presence or absence of probable depression. This scale was taken from KAPLAN AND SADOCK'S Comprehensive text book of Psychiatry, Vol II, 7<sup>th</sup> edition<sup>[5]</sup>. The elderly person had to answer either Yes/No to the question asked. **Scoring** > 5 indicates "probable depression" and point < 5 indicate no depression.

MMSE Scale -KAPLAN AND SADOCK'S Comprehensive text book of Psychiatry, Vol II, 7<sup>th</sup> edition<sup>[5]</sup>. A 30 point cognitive test for providing bedside assessment of cognitive functions in assessment of dementia in study-subjects. The cut-off point of dementia was 22, which indicates persons scoring >22 did not have dementia.

Using Statistical Package SPSS the analysis was carried out with 95% confidence interval. Simple descriptive frequencies were used. Correlation among the male (69) and female (53) respondents was carried out.

## RESULTS AND DISCUSSION

**Table 1: Distribution of study-subjects according to demographic status**

Age (yrs)	Male (%)	Female (%)	Total
60-69(Young Old)	31 (44.92%)	31 (58.49%)	62 (50.8%)
77-80(Old-Old)	31 (44.92%)	22 (41.51%)	53 (43.5%)
>80( Oldest Old)	7 (13.20%)	Nil	7(5.7%)
Total	69(100%)	53(100%)	122(100%)
<b>Marital Status</b>			
Married	56 (81.16%)	26 (49.06%)	82 (66.47)
Widowed	NA	27 (50.94%)	27 (22.38%)
Never Married	3 (4.35%)	Nil	3 (2.70%)
Widower	10 (14.49%)	NA	10 (8.45%)
Total	69(56.06%)	53(43.04%)	122(100%)
<b>Education</b>			
Illiterate	12 (17.40%)	22 (41.52%)	34 (27.87%)
Just Literate	14 (20.29%)	10 (18.86%)	24 (19.67%)
Primary	14 (20.29%)	18 (33.96%)	32 (26.23%)
Secondary	17 (24.62%)	3 (5.66%)	20 (16.39%)
College	12 (17.40%)	Nil	12 (9.84%)
Total	69(56.06%)	53(43.04%)	122(100%)

Table -1, shows majority of the study- subjects were in the age- group of 60-69 (50.8%), while (5.7%) were ≥ 80 yrs. old. The marital status of the study-subjects shows (66.47%) were married & (2.70%) were "Never

married". Nearly 27 out of 53 female study-subjects i.e. (22.38%) were widowed. The educational status of the study respondents shows (27.87%) were illiterate of which (17.40%) were males and (41.52%) were

females which indicates a comparatively higher level of literacy among elderly females which was statistically significant ( $\chi^2=8.68, p<0.01$ )

**Table 2: Distribution of study-subjects according to body mass index (bmi)**

BMI	Male %	Female %	Total %
<17	15 (21.74%)	19 (35.85%)	34 (27.8%)
>17	54 (78.26%)	34 (64.15%)	88(72.2%)
Total	69 (100%)	53 (100%)	122 (100%)

$\chi^2 = 2.95, p=0.05$

The above Table depicts the chronic energy deficiency state of elderly persons assessed with the help of Body Mass Index (BMI). Out of 122 study subjects, 34 (27.8%) were having lower BMI <17 and rest 88(72.2%) registering normal BMI i.e.  $\geq 17$ . None of the study- subjects had BMI more than 25. Among 34 study-subjects with lower BMI or Chronic Energy Deficiency, i.e. BMI < 17. A total 15 (21.74%) were males and 19 (35.85%) were females.

It is observed that more number of females had low BMI as compared to males, but the difference was found to be statistically not significant ( $p>0.05$ ). The correlation(r) among male and female study-subjects ( $r=0.63$ ) shows relationship exists in BMI. Similar finding was reported by G.K.Medhi et al. (prevalence of underweight was 23.6%)<sup>[6]</sup>. Our results showed that 64.15% of female subjects were found to having normal BMI i.e.  $\geq 17$ . And among these, underweight elderly, 35.85% were females.

**Table 3: Distribution of respondents according to clinically diagnosed diseases (Multiple responses possible)**

Diseases	Male	Female	Total %
Ch. Bronchitis	22	15	37 (30.33)
TB	3	2	5(4.1)
BHP	4	0	4 (3.3)
UTI	1	3	4 (3.3)
Diabetes	6	2	8 (6.6)
Amoebiasis	10	6	16 (13.2)
Helminthiasis	14	8	22 (18.03)
Peripheral neuropathy	8	12	20 (16.4)
APD	6	10	16 (13.2)
Arthritis	8	16	24 (19.7)
Senile Tremor	12	8	20 (13.2)
Total	69	53	122

Table-3 depicts at the time of survey, out of 122 study subjects, 49 (40.16%) were having one or more than one type of disease diagnosed clinically. Among

the study- subjects, leading morbid conditions were chronic bronchitis (30.33%) followed by arthritis (19.7%) and helminthiasis (18.03). Least figures were reported with BHP and UTI (3.3% each). The first three common health problems in male were chronic bronchitis; helminthiasis and senile tremor and that in female were chronic bronchitis, Arthritis and Peripheral neuropathy. Similarly, Nair (1989), in a study on "The Aged in Rural India: A study of the Socio-Economic and Health Profile", revealed that the incident and prevalence of respiratory diseases were more followed by loco-motor illnesses and blood pressure<sup>[7]</sup>. On the contrary, the 2011 census<sup>[4]</sup> enumerates the top ten common diseases among elderly which were hypertension, cataract, osteoarthritis, COPD, IHD, diabetes, BHP, dyspepsia, constipation and depression. Similarly in a hospital based- study Singh GP et al. (2004) reported that hypertension (22.65%) and Diabetes-Mellitus (12.15%) were the most prevalent physical disorders diagnosed in study subjects<sup>[8]</sup>. However, many other parallel studies reported dissimilar findings reported that majority of study subjects were suffering from morbidity because of symptoms from musculo-skeletal system<sup>[9,10,11]</sup>. A considerably higher prevalence of chronic bronchitis may be attributed to domestic air pollution, lower socioeconomic status, poor housing facilities and overcrowding in the study areas.

**Table 4: Distribution of study subjects according to geriatric depression scale score (gds)**

GDS Score	Male %	Female %	Total %
$\leq 5$	40 (57.98%)	20 (37.74%)	60 (49.18%)
>5 (depressed)	29 (42.02%)	33 (62.26%)	62(50.82%)
Total	69 (100%)	53 (100%)	122 (100%)

The above table-4 illustrates the distribution of study subjects according to the GDS score. Out of 122 study subjects depression was present in 62 (50.82%) and absent in 60 (49.18%). A total of (42.02%) male and (62.26%) females were depressed. This difference thus observed was observed to be statistically significant ( $p<0.05$ ). Besides physical illnesses, elderly are more likely to be victims of poor mental health which arises from senility, neuroses and extent of life satisfaction. A health problem event can be an important factor in the etiology of psychiatric problems in this age group. As observed, another important finding of this study was that mood disorders, particularly depressive disorders were seen in nearly half (50.82%) of the elderly patients. Correspondingly, Singh GP et al. (2004) reported that depressive episode alone

contributed to 78(89.6%) of the total mood (affective) disorders. This observation is similar to other studies by Tiwari et al. (1998) in rural areas of Uttar Pradesh and Kumar LK et al. (2012) in a study conducted in

Andhra Pradesh. Both studies reported the prevalence of psychiatric morbidities to be 42% and 40%, respectively [12,13].

**Table 5: Assessment of cognitive function among the elderly using mini mental scale examination (mmse)**

Score	Cognitive Status	Male	Female	Total
>22	Normal	34 (49.27%)	8 (15.09%)	42 (34.43%)
19-22	Mild Dementia	19 (27.54%)	16 (30.19%)	35 (57.33%)
18-Oct	Moderate Dementia	12 (17.39%)	26 (49.06%)	38 (31.15%)
0-9	Severe Dementia	4 (5.80%)	3 (5.66%)	7 (5.74%)
Total		69 (100%)	53 (100%)	122 (100%)

Table-5, shows total 122 study subjects, 42 (34.43%) were having scored > 22, which indicates normal cognitive status in MMSE. The rest 80 study- subjects both from elderly male and female sex were having some degree of impairment of cognitive function. Total 35 study samples scored 19-22 in MMSE score and classified as having "mild dementia". Then in the descending order 38 study subjects (31.15%) within a range of 10-18 in the MMSE rating and were classified as having "moderate dementia" and lastly 7 (5.74%) of study population scored 0-9 and were grouped under "severe dementia". The cognitive function of the elderly person among the male and female shows that there is a positive relation among them with  $r=0.89$ . In our study, both elderly male (50.73%) and elderly female (84.91%) were found to have some degree of impairment of cognitive function. This finding is in accordance with a study by Goswami A. et al. (2006) community-based study nearly one-fifth of the elderly were found to have cognitive defect. On screening, 12.2 per cent of the males and 23.7 per cent of the females were found to have cognitive defect and the gender difference was statistically significant ( $p<0.001$ ) [14]. In a rural community-based study from Ballabgarh among non-demented people aged  $\geq 55$ , Ganguli et al. (1996) reported cognitive impairment in 10.2% of elderly [15]. Similarly in two community-based studies in rural areas from Spain Coria et al., and Japan Liang et al. in 1993 memory impairment was reported less than 10%, which was lower than the present study [16, 17]. The differences in the findings of these studies might be due to differences in methodology (age, cut-off point of different scales) as well as exclusion criteria.

## CONCLUSION

It is observed that various psycho-socio-economic factors play a stellar role in the causation as well as

prevention of early commencement of ageing process. Further certain common specific factors that influence the health status among the elderly belong to gender-wise distribution. Hence, these findings raise a number of issues for formulating appropriate health policies for the elderly. Thus, the findings are unique in many respects and should have far-reaching, theoretical, methodological, policy and program implications in the programmes meant to improve the quality of life of the elderly.

It can be addressed by drawing wisdom from experiences in life, cultivating independent living skills, develop philosophical & spiritual views in life, plan financial self-sufficiency, helping less fortunate ones,

**Acknowledgement:** The authors thank the management and staff at the department of community medicine GSL Medical College, Rajahmundry for their constant support during the study.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** The study was cleared by the institutional ethical committee.

## REFERENCES

1. Ageing Scenario. Available from <http://www.helpageindia.org/about-us/79.html>, accessed 12 Jan, 2013.
2. Rao A Venkoba: Health Status of the Rural Aged in Andhra Pradesh; A Sociological Perspective in Help Age India - Research & Development Journal. 2003. Vol.9, No. 2.
3. Singh CP. Socioeconomic Status and Health Conditions of Landless Rural Aged in Haryana.

- Help Age India - Research & Development Journal. 2005. Vol.11, No. 1.
4. NSS (National Sample Survey); 2011 census data, accessed 12 Jan, 2013.
5. Kaplan and Sadock's., *Text Book of Psychiatry*, Vol. II. 1999.
6. G.K.Medhi , NC Hazarika, PK Borah, J Mahanta ,Health problems and disability of elderly individuals in Two population group from same geographical location JAPI, July 2006,Vol-5.
7. Nair, P.S., *The Aged in Rural India; A Study of the Socio-Economic and Health Profile, Population Transition in India*, vol.2, B.R. Publishing, Delhi,1989.
8. Singh GP, Chavan B.S., Arun P., Lobraj, Sidana A. Geriatric Out-Patients with Psychiatric Illnesses in a Teaching hospital setting - A Retrospective Study. *Indian Journal of Psychiatry*, 2004, 46(2). p140-143
9. Srivastava K, Gupta S.C., Kaushal S.K., Chaturvedi M. Morbidity profile of elderly-A cross sectional study of urban Agra. *Indian Journal of Community Health*.Vol 21 No.2, Vol 22 No.1, July 2009-June2010.
10. Jain NC, Pawar AB, Hadiya Ravjibhai, Bansal RK. Morbidity Profile Of Elderly People In Slums Of Surat City. *National Journal of Community Medicine* 2010, Vol. 1, Issue 1.p53-54.
11. Kavita Banker, Bipin Prajapati, Geeta Kedia. Study Of Health Profile Of Residents Ofgeriatric Home In Ahmedabad District. *National Journal Of Community Medicine* Vol 2 Issue 3 Oct-Dec 2011. Page 378-382.
12. Tiwari SC, Srivatsava S. Geropsychiatric morbidity in rural Uttarpradesh. *Indian J Psychiatry* 1998;40:266-73.
13. Kalasapati Lokesh Kumar, Samrat Kar, Pavan K. Reddy. Psychiatric co-morbidity in geriatric inpatients. *Journal of Dr, NTR university of health sciences* 2012;1(2):81-85
14. Goswami A, Reddiah VP, Kapoor S.K. Singh B., Dey, Diwiedi, Kumar G. Prevalence and Determinants Of Cognitive Impairment In Rural Elderly Population In India. *Helpage India-Research & Development Journal*. Vol. 12. No. 2.May 2006. P.8-15.
15. Ganguli M, Chandra V, Joanne E, Gilby JE, Ratecliff G, Sharma SD, Pandav R, Seaberg EC, Belle S.. Cognitive Test Performance in a Community-Based Non-demented Elderly sample in rural India: the Indo-U.S. cross-national dementia epidemiology study. *International Psychogeriatrics*. 1996. Vol.8.4:507-24.
16. Coria F, Gomez de caso JA, Minguez L, Rodriguez-Artalejo F, Claveria LE.. Prevalence of Age associated memory impairment and dementia in a Rural Community. *Journal of Neurology, Neurosurgery and Psychiatry*. 1993. Vol.56: 973-76.
17. Liang J, Clark EB, Liu X, Sugisawa H.. Transitions in cognitive Status among the Aged in Japan. Paper presented at the 46th annual scientific meeting of the Gerontological Society of America; Nov; New Orleans. I. A. 1993.

# Comparison of Growth Pattern (Height and Weight) among HIV Infected and Uninfected Children Attending ART Centre, Hubli: a Prospective Study

Anil Kumar L<sup>1</sup>, Dattatreya D Bant<sup>2</sup>

<sup>1</sup>Postgraduate, <sup>2</sup>Professor and HOD, Department of Community Medicine, KIMS, Hubli

## ABSTRACT

**Background:** HIV-infected children are most vulnerable of all patients. Growth (height and weight) is an important indicators of a child's health. Poor growth was among the first manifestations of HIV infection to be recognized in children and it had a significant effect on short-term survival.

**Objective:** to compare the growth (height and weight) pattern among HIV infected and uninfected children.

**Methodology:** A prospective cohort study was conducted at ART centre, KIMS, Hubli and two link ART centres at Kundagol and Kalgatagi for a period of 6 months. Uninfected children were included from Paediatrics OPD and IPD wards.

**Results:** Among children aged < 2 years, there was no statistically significant difference among cases and controls for weight and height. Among children aged 3-13 years, there was a statistically significant difference among cases and controls for weight during 1st visit (P=0.03) and weight during 6th visit (P=0.039). There was no statistical significance in height either during the 1st visit (P=0.42) or at the 6th visit (P=0.28) among cases and controls.

**Conclusion:** Majority of infected children had moderate malnutrition followed by severe malnutrition. Thus ART alone may not be sufficient to improve outcome in children with HIV. Other factors like nutrition, social factors etc are crucially very important in prevention of opportunistic infections and for the better growth of the child.

**Keywords:** HIV Infected Children, Growth, Height, Weight, Malnutrition, ART Centre, Hubli

## INTRODUCTION

HIV/AIDS, ever since its identification in 1981, has become a pandemic with the greatest public health, social and economic crises of our time with no region of the world being spared.<sup>1</sup> Thousands of newborn babies were born to infected mothers. Millions of children are already suffering from AIDS, their quality of life has been hampered. HIV/AIDS has become a big threat to the public health.

With regard to HIV-infected children are most vulnerable of all patients. In infants who acquire HIV at the time of delivery, disease progresses rapidly in the first few months of life often leading to death. While

35% children do not see their first birthday, 53% do not celebrate their second birthday. If the exposed child receives prophylactic antibiotics (Cotrimoxazole) and anti-retroviral therapy (ART) as soon as is medically indicated, there is a significant chance of a long and healthy survival.<sup>2</sup>

Growth (height and weight) is an important indicator of a child's health. HIV infected children are at particular risk for problems related to growth and development. HIV and opportunistic infections often negatively influence the growth and development of young children. Poor growth was among the first manifestations of HIV infection to be recognized in children and had a significant effect on short-term



survival. Abnormal growth is also included in the criteria diagnosis of AIDS wasting, which is a category C criterion (AIDS-defining illness) within the CDC classification system for HIV-infected children.<sup>3</sup>

AIDS wasting is defined as weight loss of 10% or more of body weight or deceleration in weight gain resulting in downward crossing of 2 or more of the percentile lines for age (e.g., 95th, 75th, 50th, 25th, 5th) in a child older than 1 year or in the 25th percentile of weight for height on consecutive measurements separated by more than 30 days in addition to the presence of chronic diarrhea or chronic fever.<sup>3</sup>

According to findings by WHO, in 2013, the number of children newly infected with HIV in low- and middle- income countries declined by 40% to an estimated 240,000 [210,000–280,000] in 2013, down from the estimated 400,000 [370,000–450,000] who acquired HIV infection in 2009<sup>5</sup>. According to NACO Estimations 2012, the adult HIV prevalence at national level continued its steady decline from the estimated level of 0.41% in 2001 to 0.27% in 2011. Children less than 15 years of age accounted for 7% (1.45 lakh) of all infections in 2011<sup>6</sup>.

There is a lack of evidence to substantiate the suggestion that exposure to maternal human immunodeficiency virus (HIV) infection during fetal life may affect growth and developmental pattern in children. Hence the study was undertaken to compare the growth (height and weight) among infected and uninfected children.

## MATERIALS AND METHODOLOGY

- **Type of study:** Prospective cohort study
- **Study duration:** Six months (from April 2014 to September 2014)
- **Source of data:** HIV infected children attending the ART centres of KIMS, Hubli, Kundagol and Kalgatagi. Uninfected children were examined from Paediatrics OPD and IPD wards of KIMS hospital, Hubli.
- **Sampling:** All HIV infected children who visit ART centres of KIMS, Hubli and two link ART centres at Kundagol and Kalgatagi RHTC/PHC during the study period were included in the

study. Controls are selected randomly from the OPD and IPD wards of KIMS hospital, Hubli.

- A pilot study was done with a representative sample and a final structured proforma was prepared through which data was collected.

## HIV Infected and Uninfected Children

HIV infected children of age 0-13 years registered in ART centres of KIMS, Hubli, Kundagol and Kalgatagi RHTC were followed up for 6 months for anthropometric measurements.

Newborns were tested for HIV at 6 weeks and 18 months after delivery with two different tests (DBS and DNA PCR) each time. Once all tests were found to be negative, the child was considered as non-infected. The infected as well as uninfected children were followed up for a duration of 6 months to monitor the weight, height, CD<sub>4</sub> count and hemoglobin percentage.

## Anthropometry

- a. Weight was measured using a standard weighing scale.
- b. Height was measured by wall mounted measuring scale and stadiometer.

The change in the CD4 count from the time of enrollment up to 6 months were estimated. CD4 count and lymphocyte subsets were determined by standard flow-cytometry procedures using BD FACS Caliber machine.

## Statistical Analysis

All data was entered into computerized MS Excel sheet and subsequently analyzed using SPSS software. Descriptive analysis was done for baseline values. Longitudinal changes in growth parameters were analyzed for significance using repeated measures ANOVA and paired student t test. P value of < 0.05 was considered significant.

## Ethical considerations

The study has been approved by the Institutional Scientific and Ethical Committee at Karnataka Institute of Medical Sciences, Hubli. Respective higher authorities' permission was obtained before starting

the study including the DAPCO Officer, Dharwad, The Nodal Medical officer, ART Centre, KIMS, Hubli and The Senior Medical Officer, ART Centre, KIMS, Hubli.

## RESULTS

Of the 29 cases and controls < 2 years of age, 17 (58.62%) were males and 12 (41.37%) were females. Whereas, among 75 children aged 3-13 years, 37 (49.33%) were males and 38 (50.67%) were female cases; 49 (65.33%) were males and 26 (34.67%) were female controls. Among the 29 < 2 years, 9 (31.03%) resided in urban areas and 20 (68.97%) lived in rural

areas; 10 (34.48%) were residents of urban area and 19 (65.52%) were residing in rural areas in the control group. 54 (72%) of the 75 cases in 3-13 years group lived in an urban area, 21 (28%) lived in rural area; whereas 35 (46.67%) controls resided in urban area and 40 (53.33%) lived in rural area. Hindus showed a predominance in both age groups of cases and controls followed by Muslims. Almost all the children < 2 years of age were taken care by both parents. Children 3-13 years of age, though majority were cared by both parents, exceptions were observed in 11 (14.67%) cared for by their relatives and 8 (10.67%) looked after by NGOs among the cases.

**Table 1: Showing distribution according to socio demographic profile.**

	Less than 2 years		3 – 13 years	
	Cases (%)	Controls (%)	Cases (%)	Controls (%)
Male	17 (58.62%)	17 (58.62%)	37 (49.33%)	49 (65.33%)
Female	12 (41.37%)	12 (41.37%)	38 (50.67%)	26 (34.67%)
Total	29 (100%)	29 (100%)	75 (100%)	75 (100%)
<b>Residence</b>				
Urban	09 (31.03%)	10 (34.48%)	54 (72%)	35 (46.67%)
Rural	20 (68.97%)	19 (65.52%)	21 (28%)	40 (53.33%)
Total	29 (100%)	29 (100%)	75 (100%)	75 (100%)
<b>Religion</b>				
Hindu	20 (68.97%)	22 (75.86%)	59 (78.67%)	62 (82.67%)
Muslim	01 (3.45%)	07 (24.14%)	07 (9.33%)	12 (16%)
Christian	00 (0%)	00 (0%)	01 (1.33%)	01 (1.33%)
Others	08 (27.59%)	00 (0%)	08 (10.67%)	00 (0%)
Total	29 (100%)	29 (100%)	75 (100%)	75 (100%)
<b>Caretaker</b>				
Both parents	28 (96.55%)	29 (100%)	49 (65.33%)	74 (98.67%)
Only mother	00 (0%)	00 (0%)	03 (4%)	00 (0%)
Only father	01 (3.45%)	00 (0%)	01 (1.33%)	01 (1.33%)
Relatives	00 (0%)	00 (0%)	11 (14.67%)	00 (0%)
NGO	00 (0%)	00 (0%)	08 (10.67%)	00 (0%)
Grandparents	00 (0%)	00 (0%)	03 (4%)	00 (0%)
Total	29 (100%)	29 (100%)	75 (100%)	75 (100%)
<b>Socio-economic status</b>				
Class I	02 (6.90%)	01 (3.45%)	02 (2.99%)	04 (5.33%)
Class II	09 (31.03%)	04 (13.79%)	11 (16.42%)	07 (9.33%)
Class III	06 (20.69%)	07 (24.14%)	14 (20.90%)	18 (24%)
Class IV	12 (41.38%)	13 (44.83%)	35 (52.24%)	27 (36%)
Class V	00 (0%)	04 (13.79%)	06 (8.96%)	19 (25.33%)
Total	29 (100%)	29 (100%)	67 (100%)	75 (100%)

Socio-economic status

**Table 2: Showing association of CD4 count, hemoglobin, weight and height before and after follow up of infected children aged 3-13 years.**

		N	Mean	Std.Deviation	't' test score	P value
<b>CD4 count</b>						
	1st visit	75	904.12	545.88	2.34	0.022
	6th visit	75	984.37	504.05		
Hb%	1st visit	75	9.87	1.43	1.27	0.208
	6th visit	75	10.01	1.27		
<b>Weight</b>						
	1st visit	75	18.88	6.66	18.65	0.001
	6th visit	75	20.87	6.69		
<b>Height</b>						
	1st visit	75	110.48	12.51	12.40	0.01
	6th visit	75	111.36	12.35		

**Table 3: Showing association of weight and height of cases and controls < 2 years of age at 1st and 6th follow up visits.**

		N	Mean	Std.Deviation	't' test score	P value
Weight at 1st visit	Case	29	7.90	2.66	1.26	0.213
	Control	29	8.66	1.90		
Height at 1st visit	Case	29	76.24	10.23	0.22	0.826
	Control	29	76.82	8.69		
Weight at 6th visit	Case	27	10.55	2.48	0.32	0.750
	Control	29	10.73	1.74		
Height at 6th visit	Case	27	79.82	8.57	0.44	0.662
	Control	29	80.68	6.14		

**Table 4: Showing association of weight and height of cases and controls 3-13 years of age at 1st and 6th follow up visits.**

		N	Mean	Std.Deviation	't' test score	P value
Weight at 1st visit	Case	75	18.88	6.49	2.09	0.038
	Control	75	21.38	8.64		
Height at 1st visit	Case	75	110.48	12.51	0.79	0.426
	Control	75	108.66	13.36		
Weight at 6th visit	Case	75	20.86	6.69	2.08	0.039
	Control	75	23.63	8.91		
Height at 6th visit	Case	75	111.36	12.35	1.06	0.287
	Control	75	111.86	13.11		

From table 2: Among 75 cases of HIV infected children, CD<sub>4</sub> count (P=0.022), weight (P=0.001), height (P=0.01) was seen to of statistical significance. However there was no statistically significant (P=0.208) change in Hb% at the time of enrollment up to 6<sup>th</sup> month follow up.

From table 3: Among cases and controls of children aged < 2 years, there was no statistical significance (P=0.213) in weight during 1<sup>st</sup> visit and (P=0.750) at 6<sup>th</sup> visit. Also there was no statistical significance (P=0.82) in height at 1<sup>st</sup> visit and (P=0.66) at 6<sup>th</sup> visit.

From table 4: Among children aged 3-13 years, there was a statistically significant difference among cases and controls for weight at 1<sup>st</sup> visit (P=0.03) and at 6<sup>th</sup> visit (P=0.039). However, height at 1<sup>st</sup> (P=0.42) to 6<sup>th</sup> (P=0.28) visit was not found statistically significant.

## DISCUSSION

The existent study reveals that children born to HIV infected and uninfected mothers showed there is impairment in height and weight gain among HIV infected children when compared to uninfected

children aged 3-13years. Majority were moderately malnourished followed by severe malnutrition among the cases when compared to controls. Similar findings were seen in studies conducted by Philippe Lepage, D K Benjamin and Rahel Berhane.

Philippe Lepage<sup>13</sup> et al. study done in Kigali, Rwanda found Rwandan children born to HIV-infected and uninfected mothers followed from birth until 48 months of age demonstrate an early, severe and sustained impairment in height, weight gain among HIV infected children when compared with uninfected ones of the same age, birth order and socioeconomic status. D K Benjamin<sup>4</sup> et al. in South Carolina, USA reported that growth velocity (both height and weight) has been related to HIV disease progression. Children with substantial declines in growth velocity have been shown to be at higher risk of HIV-related morbidity and mortality. Increase in HIV RNA levels and decline in CD<sub>4</sub> cell counts have been correlated to growth velocity. A study guided by Rahel Berhane<sup>16</sup> et al. in Boston found striking inverse association between early nutritional status and mortality risk. The strong association between poor growth and mortality suggests two possible mechanisms. First, poor nutritional parameters may represent the general debilitation of infants with frequent opportunistic infections who eventually succumb and die. An alternative possibility is that, poor nutritional status accelerates the progression from asymptomatic HIV infection to AIDS.

The European collaborative study found neither height nor weight was associated significantly with the main effects of HIV infection status at birth, but differences between infected and uninfected children increased with age. Uninfected children had normal growth patterns from early ages. Infected children were estimated to be significantly shorter and lighter than uninfected children with growth velocity differences increasing with age. Differences in growth velocities between the infected and uninfected children increased after 2 years of age for height and after 4 years of age for weight and were more marked in the latter. By 10 years, uninfected children were on an average, estimated 7 kg heavier and 7.5cm taller than infected children<sup>9</sup>.

The study conducted in Bangalore, India by Prasanna K K<sup>10</sup> et al. reported that at the beginning of

the study period, median (25th percentile, 75th percentile) WAZ was "2.75 ("3.73, "2.05), HAZ was "2.69 ("3.06, "1.94) and WHZ was "1.30 ("2.29, "0.56). Overall, children showed improvement in their growth patterns over time as demonstrated by an increase in Z-scores.

## CONCLUSION

Majority of infected children were moderately malnourished followed by severe malnutrition. Human Immunodeficiency Virus infection is a catabolic disease associated with high resting energy expenditure. The opportunistic infections also cause a deficit in the energy balance of the body. Therefore, ART alone may not be sufficient to improve outcomes in children with HIV and other factors like nutrition and social factors are crucially very important in prevention of opportunistic infections and for the better growth of the child. HIV-infected children are frequently undernourished (low W-A) and stunted (low H-A) in comparison to the uninfected children. The poor nutritional status may play a major role in the progression of asymptomatic HIV infection to AIDS.

The limitation of the study was the small sample size and short period of follow-up. The current analysis is limited to growth experienced by the children and has not considered psychosocial well-being or cognitive growth of the children.

The recommendation of this study is to provide early nutritional intervention in HIV infected children such that it has a better impact on the growth and survival of such children. Community based programs should be encouraged to constantly improve the quality of life of the HIV infected children by emphasizing on education which includes vocational training and life skills management.

**Acknowledgment:** We heartily acknowledge the cooperation and support of ART centre staff and children, who participated in the study. We acknowledge the department staffs and postgraduates for their support.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

## REFERENCES

1. Viviane Simon et al. "HIV/ AIDS epidemiology, pathogenesis and treatment" *Lancet* 2006; 368: 489-504.
2. Kamalesh KJ "Early Infant Diagnosis: A New Tool of HIV Diagnosis in Children" *Indian Journal of Community Medicine*, Vol 36: Issue 2/April 2011.
3. Stephen MA "Growth failure in HIV-infected children" *World Health Organization* 2005.
4. Daniel K. Benjamin Jra et al. "A comparison of height and weight velocity as a part of the composite endpoint in pediatric HIV" *AIDS* 2003, Vol 17 No 16:2331-2336.
5. "HIV Reporting Global Update on Health Sector Response to HIV" *World Health Organization: Geneva*, 2014.
6. Annual Report 2013-14, Department of AIDS Control, Ministry of Health & Family Welfare, GOI.
7. Ira S "Pediatric HIV in India – Current Issues" *JK Science* Vol. 8 No. 4, October-December 2006
8. Newell ML, "Height, weight, and growth in children born to mothers with HIV-1 infection in Europe" *The European Collaborative Study, Pediatrics*, 2003;111:e52-60.
9. Elizabeth DL "Growth and Development In HIV-infected Children"
10. Prasanna KK "Growth and nutritional status of orphaned HIV-infected children living in an institutional facility in India" *St. John's National Academy of Health Sciences, Bangalore*.
11. Malathi Ram et al. "Growth pattern among HIV exposed infants receiving nevirapine prophylaxis in Pune, India" *BMC Infectious disease* 2012, 12:282.
12. Deepika Anand, Seema Puri "Anthropometric and Nutritional Profile of People Living with HIV and AIDS in India: An Assessment" *Indian Journal of Community Medicine/Vol 39/Issue 3/July 2014*.
13. Philippe Lepage "Growth of human immunodeficiency type 1-infected and uninfected children: a prospective cohort study in Kigali, Rwanda, 1988 to 1993" *Pediatr Infect Dis J*, 1996; 15: 479-85.
14. Sharon A Nachman "Growth in human immunodeficiency virus- Infected children receiving ritonavir containing antiretroviral therapy" *Arch Pediatr Adolesc Med*.2002; 156: 497-503.
15. Sheila Isanaka et al. "Patterns of postnatal growth in HIV-infected and HIV-exposed children" *Nutr Rev*. 2009 June; 67(6): 343-359.
16. Rahel Berhane et al. "Growth Failure as a Prognostic Indicator of Mortality in Pediatric HIV Infection" *Pediatrics*, 1997, Vol. 100:1.
17. Tracie L. Miller et al. "The Effect of Protease Inhibitor Therapy on Growth and Body Composition in Human Immunodeficiency Virus Type 1-Infected Children" *Pediatrics*, 2001; 107; e77.



# Effects of Intravenous Lidocaine on the Pharmacodynamics of Vecuronium

Sanjay Kumar Lal<sup>1</sup>, Sachin Narayan Rathore<sup>2</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Assistant Professor, Department of anaesthesiology, Rama Medical College & super speciality Hospital, NH-24, Hapur, U.P. India

## ABSTRACT

**Background And Objectives:** Vecuronium is an intermediate non depolarizing neuromuscular blocker (NMB) with onset in 3 to 5 minutes with predictable recovery time in 20 to 35 minutes and indicated in situations requiring tracheal intubation to secure and control respiration but also allow surgeon to perform surgery with ease. Intravenous lidocaine is often used to decrease hemodynamic responses to tracheal intubation. The association of NMB to local anaesthetics results in potentiation of NMB effects. The purpose of this study was to evaluate the influence of lidocaine on vecuronium pharmacodynamics determined by acceleromyography.

**Method:** Hundred and Six, ASA I-II patients, aged 18 to 65 years, were randomly distributed in two groups (CG: control and LG: lidocaine). Vecuronium was given to all patients for neuromuscular block. LG received lidocaine (1.5 mg.kg-1) 3 minutes before vecuronium. Neuromuscular function was evaluated by adductor pollicis muscle response to TOF. After NMB injection, times for first TOF response (T1) to reach 0% of baseline value and recover 25% contraction height (Dur25%) were recorded.

**Results:** This study has shown statistically significant differences between groups when onset of action and clinical duration of action of vecuronium between the two were compared. Onset time and clinical duration in LG were significantly higher as compared to CG.

**Conclusions:** Lidocaine associated to vecuronium has shorten the onset of Neuromuscular blockade and prolonged clinical duration of vecuronium.

**Keywords:** ANESTHETICS, Local: lidocaine, NEUROMUSCULAR BLOCKERS: Non depolarizing: vecuronium

## INTRODUCTION

Vecuronium bromide is an intermediate non depolarizing aminosteroid neuromuscular blocker (NMB)<sup>1</sup>. Among current non depolarizing MNBs, vecuronium has the rapid onset time of 3 to 5 minutes and indicated for elective surgery for straight forward airway intubation<sup>1</sup>.

Lidocaine is a popular intravenous agent used as antiarrhythmic<sup>2</sup> agent and in anaesthetic induction to blunt pressor response<sup>3</sup> associated to tracheal intubation.

There are evidences that intravenous doses of local anaesthetics decrease neuromuscular transmission with effects on motor neurons and muscle fibers and

enhance the neuromuscular block from both depolarizing and non-depolarizing muscle relaxant<sup>4,5,6</sup>. *In vitro* studies have shown that the association of these agents to NMB results in improved NMB effects<sup>7,8</sup>. In clinical practice, this synergistic effect of NMB and local anaesthetics could be useful if it resulted in early neuromuscular block installation, which would provide faster tracheal intubation and protection against cardiovascular effects inherent of the technique.

This study aimed at evaluating whether intravenous lidocaine preceding vecuronium for tracheal intubation would change the pharmacodynamics of this neuromuscular blocker.

## METHOD

This clinical prospective study was approved by the Research Ethics Committee and involved 106 male patients aged 18 to 65 years, physical status ASA I and II, with body mass index between 20 and 25 kg.m<sup>-2</sup>, submitted to elective surgical procedures under general anesthesia with tracheal intubation and mechanically controlled ventilation.

After their written and informed consent, patients were randomly distributed in two groups: CG (control) and LG (lidocaine). All patients were given vecuronium for neuromuscular block. LG patients received lidocaine 3 minutes before vecuronium, while CG patients received equal volume of saline solution. Exclusion criteria were situations interfering with neuromuscular blocker action, such as hypo or hyperproteinemia, renal failure, liver diseases, hypo or hyperthermia, changes in acid-base and electrolytic balance, pregnancy, neuromuscular diseases, chronic alcoholism and drugs affecting NMB pharmacology.

Patients were given premedication with inj. Glycopyrrolate 40mcg/kg intravenous, inj. Ranitidine 1mg/kg and inj. Metoclopramide 0.15 mg/kg. Pre operative analgesia carried out by inj. Pentazocine 0.6 mg/kg intravenous. Venous access was obtained in the arm with 18G catheter for hydration and drug administration. A tap was directly connected to the catheter to allow drugs to directly reach blood flow and rule out the influence of catheter size and length on lidocaine and vecuronium infusion time.

Monitoring consisted of cardioscopy, pulse oximetry, capnography, blood gases analyzer, noninvasive blood pressure, neuromuscular transmission monitoring by acceleromyography (TOF GUARD®), and esophageal and cutaneous thermometers.

Anesthesia was induced with fentanyl (2 µg.kg<sup>-1</sup>) and Propofol 2-2.5 mg/kg intravenous slowly till loss of eyelash reflex. Patients were maintained under manual ventilation with Oxygen: Nitrous oxide in 40:60 ration until stabilization of adductor pollicis response to electric ulnar nerve stimulation. Induction went on with 1.5 mg.kg<sup>-1</sup> lidocaine (LG) or equivalent volume of saline (CG). Vecuronium (0.1 mg.kg<sup>-1</sup>) was administered three minutes later during 15 seconds. Laryngoscopy and tracheal intubation was performed after abolishment of TOF responses.

Anaesthesia was maintained with inj. Propofol infusion 6 mg/kg/hr in oxygen and nitrous oxide 40:60 ratio and intermittent bolus of vecuronium. Central temperature was maintained between 36.5 and 37 °C and peripheral temperature was maintained above 34 °C throughout the procedure with the aid of thermal blanket with convection heat. Mechanical ventilation was adjusted to maintain end tidal CO<sub>2</sub> (P<sub>ET</sub>CO<sub>2</sub>) between 32 and 36 mmHg.

Neuromuscular function (NMF) was continuously monitored in the arm contralateral to intravenous access with TOF Guard (Denmark) monitor, using TOF stimulation (train of four), through supramaximal stimulation of the ulnar nerve with two surface electrodes on the wrist. This stimulation was maintained for at least 5 minutes to stabilize adductor pollicis muscle response. Neuromuscular block was quantified as the percentage of standard initial T<sub>1</sub>/T<sub>0</sub> response, where T<sub>1</sub> is the amplitude of first TOF response and T<sub>0</sub> is the amplitude of the first response before NMB administration.

After vecuronium administration, time needed for total muscle response abolishment (T<sub>1</sub> = 0) and 25% recovery time for T<sub>1</sub> were registered.

Mean blood pressure, heart rate, peripheral and central temperature were recorded simultaneously to data on neuromuscular function monitoring.

### Definitions of the evaluated parameters were

1. Onset: time for 100% muscle response abolishment, T<sub>1</sub> = 0, after end of neuromuscular blocker injection;
2. Clinical duration (Dur<sub>25%</sub>): time in minutes between end of vecuronium injection and spontaneous recovery of 25% of first TOF response;

The data obtained was subjected to statistical analysis using Student's unpaired *t* test and chi-square test wherever necessary, to find out the significance between the two groups. For all variables, significance level was 5% (p ≤ 0.05).

## RESULTS

There were 53 patients in each group. Demographic data means and standard deviations (age, weight and ASA1/2) are shown in table 1, and were statistically similar.

**Table 1: Demographic data**

Parameter	Control Group	Lidocaine Group	P value
Number of patients	53	53	
Average Age (yrs)	33.15±12.42	35.04± 11.88	0.426
Average weight (Kgs)	57.94± 9.70	60.0± 10.01	0.285
ASA ½	43/10	40/13	0.480

p value < 0.05 - Significant

There were 53 patients in each group. The two groups are comparable with respect to age, weight and ASA ½

**Table 2: Comparison of onset time of neuromuscular block**

Parameter	Control Group	Lidocaine Group	P value
Average onset time in minutes	5.5± 0.872	2.80± 0.507	0.000

p value < 0.01 - Highly significant

Table 2 shows mean and standard deviation of neuromuscular block installation variables. Time for onset of muscle response abolishment ( $T_1 = 0$ ), in seconds, for groups CG and LG were 5.5± 0.872 and 2.80± 0.507 respectively, with highly statistically significant differences (p = 0.000).

**Table 3: Comparison of Clinical duration of neuromuscular block between two groups**

Parameter	Control Group	Lidocaine Group	p value
Average Clinical duration in minutes	25.11 ± 2.16	27.62 ± 1.42	0.000

P value < 0.01 – Highly significant

Table 3 shows mean and standard deviation of clinical duration of neuromuscular block in each group. Clinical duration, in minutes, for CG and LG is 25.11 ± 2.16 and 27.62 ± 1.42 respectively, with highly significant difference (p < 0.01) between the two groups.

Clinical duration ( $Dur_{25\%}$ ), in minutes for groups CG and LG was 25.11 ± 2.16 and 27.62 ± 1.42 respectively, with statistically significant difference (p = 0.000).

## DISCUSSION

This study has followed the guidelines of GCRP (*Good Clinical Research Practice in pharmacodynamic studies of neuromuscular blocking agents*)<sup>9</sup>.

We have tried to standardize factors, which could interfere with neuromuscular block during anesthesia.

No benzodiazepine was used as premedication because they may promote muscle relaxation, thus potentiating NMBs<sup>10</sup>. Intraoperatively, we have tried to use drugs prioritizing hemodynamic stability and assuring adequate muscle perfusion, so that there would be no interference in neuromuscular blocker distribution to its biophase<sup>11</sup>. This way, propofol was chosen as hypnotic for the anesthetic induction.

Inhalational anaesthetics also potentiate neuromuscular blockers by different mechanisms. They depress central nervous system, increase muscle blood flow, decrease glomerular filtration, decrease liver blood flow, and decrease post-junctional membrane sensitivity to depolarization and have direct action on muscle fibers<sup>12-14</sup>. Among inhalational anaesthetic agents, nitrous oxide presents the lowest interaction with neuromuscular block<sup>15</sup>.

Hypothermia is common during surgical procedures<sup>16,17</sup>. Strict control of central and peripheral temperature is particularly important since NMBs pharmacology and neuromuscular function monitoring are affected by central and peripheral hypothermia, respectively<sup>9,18</sup>. Hypothermia potentiates NMB action by decreasing nervous conduction, urinary and biliary excretion and enzymes activity<sup>19,20</sup>. It is known that during neuromuscular function monitoring, decreased skin temperature to below 32 °C reduces evoked responses amplitude, while local heat decreases electrode impedance<sup>21-23</sup>. Care taken by the protocol to maintain central and peripheral temperature allows us to rule out the interference of this factor on results.

After anaesthetic induction, patients were submitted to manual ventilation for at least 5 minutes

before receiving NMB, to stabilize muscle response to electric stimulation. This is important because the level of neuromuscular block is estimated by comparing the amplitude of muscle contraction and a control value measured in the absence of neuromuscular block.

Practically, this control value is in general difficult to determine because repetitive motor nerve stimulation increases mechanical evoked response of the corresponding muscle, resulting in increased response to isolated stimulation. This is known as *staircase phenomenon*. Possible explanation for such finding is phosphorylation of the light myosin chain increasing isolated contraction strength to a certain amount of calcium released at each action potential. Practical implication of this event is that an anaesthesiologists unfamiliar with this potentiation may consider that, when isolated stimulation response reaches pre-blockade levels, recovery is complete<sup>24</sup>.

End tidal CO<sub>2</sub> concentration was maintained within a narrow range because respiratory alkalosis antagonizes NMB effects, while respiratory acidosis precipitates them<sup>25</sup>.

By controlling these variables and making groups homogeneous, it was possible to evaluate, as a single variable, the effects of intravenous lidocaine on the pharmacodynamics of vecuronium.

When rapid muscle relaxation is desired, succinylcholine is being increasingly replaced by other techniques due to its adverse effects<sup>26</sup>. Techniques to shorten non depolarizing NMB onset includes higher dose (more than twice DE<sub>95</sub>)<sup>27</sup> and priming dose<sup>28</sup>. These techniques, however, may involve undesirable effects, like prolonged neuromuscular block length, which is associated to possible cardiovascular effects or risk of bronchial aspiration, when increased dose or priming dose are used, respectively<sup>29</sup>.

Our study tried to evaluate the effects of the interaction of lidocaine and vecuronium.

Different studies have shown synergistic interaction of local anaesthetics and NMBs *in vitro* and *in vivo*, both intravenously<sup>30,31</sup> and epidurally<sup>32,33</sup>.

Local anaesthetics may interfere with neuromuscular function by acting on different myoneural junction components, both in pre and post-synaptic membrane. In the pre-synaptic membrane, local anaesthetics block motor nerve terminal fibers conduction<sup>7,34</sup>, decrease the quantal content of

acetylcholine or the number of quanta released at rest or after nervous stimulation<sup>7,35</sup>, and prolong the absolute refractory period and the fatigue to tetanic stimulation<sup>34</sup>. In the post-synaptic membrane, they bind to specific areas of nicotinic receptors different from ACh, promoting loss of sensitization of such receptors<sup>36,37</sup>, block open nicotinic receptors channels, where they seem to bind to a specific area located at ¼ of the transmembrane pathway<sup>38,39</sup> and directly interfere with muscle fibers by blocking sodium channels (procaine)<sup>40</sup> or sodium and potassium channels (lidocaine)<sup>41</sup>.

It is assumed that during neuromuscular function monitoring, depression and recovery of contraction strength to first TOF stimulation (T<sub>1</sub> or *twitch*) is a consequence of effects on post-synaptic membrane, while fatigue is related to pre-synaptic effects<sup>42</sup>.

Although our study design does not allow for the evaluation of actual mechanisms of lidocaine/vecuronium interaction, results do allow some speculations on possible actions on pre and post-synaptic areas.

In our study, the association lidocaine/vecuronium has promoted increased clinical duration of blockade and promoted faster onset of its blockade effect.

In a different study with a method similar to ours, authors have shown that lidocaine (1.5 mg.kg<sup>-1</sup>) 3 minutes before NMB was able to shorten vecuronium onset. However, these authors have not investigated the impact of the co-administration of both drugs on NMB duration<sup>43</sup>.

As to neuromuscular block recovery phase, and in line with data in the literature, our study showed that lidocaine prolonged recovery time for first TOF response, represented by Dur<sub>25%</sub>, which confirms its post-synaptic effects.

In our conditions, intravenous lidocaine administered before vecuronium was able to shorten its onset and prolonged its clinical duration.

## CONCLUSION

Administration of Lidocaine prior to vecuronium shorten the time of onset and prolongs clinical duration of neuromuscular block.

**Conflict of Interest:** None

**Source of Funding:** Self

## REFERENCES

1. Pharmacology of muscle relaxant and their antagonists: In Miller RD(Ed) anesthesia,5<sup>th</sup>edition , vol 1 ,Churchill Livingstone ,New York ,2002:457-464.
2. Local Anesthetics :In Robert K. Stoelting (Ed) Pharmacology and Physiology in Anesthetic Practice:3<sup>rd</sup> edition ,Lippincott-Raven ,New York 1999:177
3. Ischemic heart disease :In Robert K. Stoelting(Ed)Anesthesia and Co-Existing Disease: 4<sup>th</sup> edition , Churchill Livingstone, New York 2002:16
4. J.E Usubiaga et al .Interaction of intravenous administered procaine,lidocaine and succinylcholine in anesthetized subjects. *Anesthesia and Analgesia*,1967;46:39-45
5. Telivuo L ,Katz RL – the effects of modern intravenous local analgesics on respiration during partial neuromuscular block in man. *Anaesthesia* ,1970;25:30-35
6. Pharmacology of muscle relaxants and their antagonists : In Miller R.D(Ed).anesthesia :5<sup>th</sup> edition, volume 1 ,Churchill Livingstone ,New York 2000;
7. Matsuo S, Rao DB, Chaudry I et al - Interaction of muscle relaxants and local anesthetics at the neuromuscular junction. *Anesth Analg*, 1978;57:580-587.
8. Pederneiras SG - Interação de drogas com relaxantes musculares. *Rev Bras Anestesiologia*, 1988;38:63-73.
9. Viby-Mogensen J, Engbaek J, Eriksson LI et al - Good clinical research practice (GCRP) in pharmacodynamic studies of neuromuscular blocking agents. *Acta Anaesthesiol Scand*, 1996;40:59-74.
10. Feldman SA, Crawley BE - Interaction of diazepam with muscle relaxant drugs. *Br Med J*, 1970;1:336-338]
11. Gill RS, Scott RP - Etomidate shortens the onset time of neuromuscular block. *Br J Anaesth*, 1992;69:444-446.
12. Pollar BJ, Miller RA - Potentiation and depressant effects of inhalation anaesthetics on the rat phrenic nerve-diaphragm preparation. *Br J Anaesth*, 1973;45:404-440. ]
13. Karis JH, Gissen AJ, Nastuk WL - The effect of volatile anesthetic agents on the neuromuscular transmission. *Anesthesiology*, 1967;28:128-134.
14. Waud BE, Waud DR - Effects of volatile anesthetics on directly and indirectly stimulated skeleton muscle. *Anesthesiology*, 1979;50: 103-110.
15. Kansanaho M, Olkkola KT, Wierda JM - Dose-response and concentration-response relation of rocuronium infusion during propofol-nitrous oxide and isoflurane-nitrous oxide anesthesia. *Eur J Anaesthesiol*, 1997;14:488-494.
16. England AJ, Wu X, Richards KM et al - The influence of cold on the recovery of three neuromuscular blocking agents in man. *Anaesthesia*, 1996;51:236-240.
17. Heier T, Caldwell JE, Eriksson LI et al - The effect of hypothermia on adductor pollicis twitch tension during continuous infusion of vecuronium in isoflurane- anesthetized humans. *Anesth Analg*, 1994;78:312-317
18. Tardelli MA - Função Neuromuscular: Bloqueio, Antagonismo e Monitorização, em: Yamashita AM et al - *Anestesiologia - SAESP*. São Paulo Editora Atheneu, 2001;217-244
19. Ham J, Stanky DR, Neufield P - Pharmacokinetics and dynamics of D tubocurarine during hypothermia in humans. *Anesthesiology*, 1981;55:631-635.
20. Heier T, Caldwell JE, Sessler DI et al - The effect of local surface and central cooling on adductor pollicis twitch tension during nitrous oxide/ isoflurane and nitrous oxide/fentanyl anesthesia in humans. *Anesthesiology*, 1990;72:807-811.
21. Zipp P - Temperature dependent alteration of the surface-EMG and ECG: an investigation of the electrical transfer characteristics of the human skin. *Eur J Appl Physiol Occup Physiol*, 1977;37:275-288.
22. Ericksson LI, Lennmarken C, Jensen E et al - Twitch tension and train-of-four ratio during prolonged neuromuscular monitoring at different peripheral temperatures. *Acta Anaesthesiol Scand*, 1991;35:247-252.
23. Smith DC, Booth JV - Influence of muscle temperature and forearm position on evoked electromyography in the hand. *Br J Anaesth*, 1994;72:407-410.
24. Eleveld DJ, Kopman AF, Proost JH et al - Model to describe the degree of twich potentiation during neuromuscular monitoring. *Br J Anaesth*, 2004;92:373-380.



25. Gencarelli PJ, Swen J, Koot HW et al - The effects of hypercarbia and hypocarbia on pancuronium and vecuronium neuromuscular blockades in anesthetized humans. *Anesthesiology*, 1983;59: 376-380.
26. Donati F, Bevan DR - Suxamethonium - current status. *Clin Anaesth*, 1985;3:371-385.
27. Magorian T, Flannery KB, Miller RD - Comparison of rocuronium, succinylcholine, and vecuronium for rapid-sequence induction of anesthesia of adult patients. *Anesthesiology*, 1993;79:913-918.
28. Schwarz S, Ilias W, Lackner F et al - Rapid tracheal intubation with vecuronium: the priming principle. *Anesthesiology*, 1985;62: 388-391.
29. Solera Marín J, Amoros Aramo J, Gonzales Miranda F - Formas de Administración, em: Alvarez Gomes JA, Gonzáles Miranda F, Bustamante Bozzo R - Relajantes Musculares em Anestesia y Terapia Intensiva. Madrid. Espanha. Editora Aran, 2000;9:139-146.
30. Katz RL, Gissen AJ - Effects of intravenous and intra-arterial procaine and lidocaine on neuromuscular transmission in man. *Acta Anaesthesiol Scand*, 1969;36:106-113.
31. Telivuo L, Katz RL - The effects of modern intravenous local analgesics on respiration during partial neuromuscular block in man. *Anaesthesia*, 1970;25:30-35.
32. Toft P, Kirkegaard Nielsen H, Severinsen I - Effect of epidurally administered bupivacaine on atracurium-induced neuromuscular blockade. *Acta Anaesthesiol Scand*, 1990;34:649-652.
33. Taivainen T, Meretoja OA, Rosenberg PH - The effect of epidural bupivacaine on vecuronium-induced neuromuscular blockade in children. *Acta Anaesthesiol Scand*, 1994;38:453-456.
34. Usubiaga JE, Standaert F - The effect of local anesthetics on motor nerve terminals. *J Pharmacol Exp Ther*, 1968;159:353-361.
35. Straughan F - The action of procaine at the neuromuscular junction. *J Pharm Pharmacol*, 1961;13:49-52.
36. Cohen JB, Boyd ND, Shera NS - Interactions of Anesthetics with Nicotinic Postsynaptic Membranes Isolated from Torpedo Electric Tissue, em: Fink BR - Molecular Mechanisms of Anesthesia, *Progress in Anesthesiology*. New York: Reaven Press, 1980;165-174.
37. Sine SM, Taylor P - Local anesthetics and histrionicotoxin are allosteric inhibitors of the acetylcholine receptor. *Studies of clonal muscle cells. J Biol Chem*, 1982;257:8106-8114.
38. Neher E, Steinbach JH - Local anesthetics transiently block currents through single acetylcholine-receptor channels. *J Physiol*, 1978;277:153-176. ]
39. Ruff RL - The kinetics of local anesthetic blockade of end-plate channels. *Biophys J*, 1982;37:625-631.
40. Straub R - Effect of local anesthetics on ion-determined resting potential changes of myelinated nerve fibers in frogs. *Arch Int Pharmacodyn Ther*, 1956;107:414-430. ]
41. Maeno T, Edwards C, Hashimura S - Difference in effects and end-plate potentials between procaine and lidocaine as revealed by voltage-clamp experiments. *J Neurophysiol*, 1971;34: 32-46.
42. McCoy EP, Connolly FM, Mirakhur RK et al - Nondepolarizing neuromuscular blocking drugs and train-of-four fade. *Can J Anesth*, 1995;42: 213-216.
43. Nonaka A, Sugawara T, Suzuki S et al - Pretreatment with lidocaine accelerates onset of vecuronium-induced neuromuscular blockade. *Masui*, 2002;51:880-883.

# Pattern of Road Traffic Injuries: One Year Hospital-Based Study in Bareilly District

Kumar Keshav<sup>1</sup>, Joshi H S<sup>2</sup>, Singh Kashmir<sup>3</sup>

<sup>1</sup>Associate Professor, Department of Surgery, <sup>2</sup>Professor & HOD, Department of Community Medicine,

<sup>3</sup>Professor, Department of Surgery, Rohilkhand Medical College and Hospital, Bareilly

## ABSTRACT

Road traffic injuries and deaths caused by motor vehicles is a growing public health problem all over the world. Inter-country or regional differences in the pattern of injury by road users have significant implications in determining prevention policies. The present study was conducted to evaluate the pattern of injuries in 376 hospitalized trauma patients admitted during 1 year, from July 2013 to June 2014. The majority of the injuries (36.97%) involved motorcycles. Majority of injuries (35.37%) were observed in the age group of 16 - 30 years. Head and face injuries and injuries to the lower limbs comprised 56.11% and 56.65% of all injuries respectively. The bones of the lower limbs were most commonly fractured. To conclude, the traffic casualties of motorcyclists and pedestrians are considered a major problem and the preventive measures to reduce these transport related injuries are discussed in this study.

**Keywords:** Trauma, Severity, Traffic Injuries, Prevention

## INTRODUCTION

Injuries are increasingly recognized as a global public health epidemic. Around the world, almost 16,000 people die every day from all types of injuries. Injuries represent 12% of the global burden of disease, the third most important cause of overall mortality and the main cause of death among 1-40 year age groups.(1) The category of injuries worldwide is dominated by those incurred in road crashes. According to WHO data, deaths from road traffic injuries account for around 25% of all deaths from injury.(1)

India has one of the highest road accident rates in the world. There has been a steady rise in the casualties in road accidents in the country and their proportions in total deaths due to all accident have also increased considerably in the past. In India, nearly 80,000 get killed and 340,000 are injured every year in about 300,000 accidents on road network of just 22,00,000 km<sup>2</sup>. There is an accident every minute and death every 8 min. Significant variations also arise between different states of India.(4)

The development of road traffic injuries and deaths is a major 'public health problem' specially in India, requiring counter measures based on science and engineering rather than wishful thinking. Therefore the present study was conducted in the Department of Surgical emergency, Rohilkhand Medical College and Hospital, Bareilly and injuries sustained in road traffic accident cases from July 2013 to June 2014 were studied to:

1. Determine the aetiology of road traffic accidents.
2. Investigate the pattern of injuries in trauma patients due to road traffic accidents.
3. Suggest preventive measures.

## MATERIAL AND METHOD

The present study was conducted in emergency department of Rohilkhand Medical College and Hospital (RMCH), Bareilly, Uttar Pradesh. Approval for conduction of study was taken from the Institutional Ethical committee. Road traffic trauma

patients who were brought to the emergency department, during a period of 1 year, i.e. 1 July 2013 to 30 June 2014, were included in this study. To evaluate the pattern of injuries, 376 patients were examined in the hospital.

**Inclusion criteria**

1. Patients of RTI admitted at Trauma Centre, who were conscious and cooperative.
2. Patients of RTI admitted at Trauma Centre, who were unconscious and had cooperative attendants.

**Exclusion criteria**

1. Non co-operative patient/attendant.
2. Patients who were brought dead.

**Interview schedule:** A pretested semi-structured interview schedule was used to collect necessary information regarding the time, place and the person involved in the accident. Data were collected everyday by the candidate either in the casualty or in the wards of RMCH. A pretested performa specially designed for this purpose was used for interviewing the study subjects. Where condition of victims did not warrant the interview, the relatives or attendants were interviewed. During the interview, purpose of study was explained to each respondent. Case-sheets of the victims were referred for cross-checking. The information collected consisted of personal identification data, history of road traffic injuries, clinical history and examination including the site of injury.

Road Traffic Accident (RTA) is said to occur when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree or utility pole. Any injury occurring as a result of Road Traffic Accident is referred to as Road Traffic Injury by WHO. [1]

**RESULTS**

From 295 incidents of road traffic accidents, 376 victims reported to the emergency department of the Rohilkhand Medical College and Hospital, Bareilly hospital.

Distribution by road user type is given in table 1. Out of 139 victims of motor bike accidents, 99 were drivers and 40 pillion riders. About 75 % of the pillion riders were not wearing a helmet at the time of the accident. Thirteen patients were driving motorcycles under the influence of alcohol. The distribution of vehicles that hit pedestrians and pedal cyclist is given in table 2. Maximum 50.45% pedestrian had accident with motor bikes and maximum 47.92% pedal cyclist with Heavy Motor Vehicles (HMV). Age and sex distribution by type of road user is given in table 3. Of the total cases, maximum 35.37% were in the 16 – 30 year age group and the male to female ratio was 2.55:1. The proportion of male patients was significantly higher in the age group of 16 – 30 years (2.9:1). The distribution of injuries to different body regions is given in table 4. In motorcyclists, lower limb injuries (65.47%) were more common than head injuries (55.4%) because the majority (57.9%) were wearing a helmet. The pillion riders who were not wearing a helmet (37 out of 40 cases) suffered from severe head injuries, including three cases of mandible fracture and another five cases of nasal fracture. Out of total patients 57% had only simple injuries and the rest of the patients (43%) suffered from grievous injury either alone or associated with other simple injuries. Amongst all grievous injuries, the most common in the victims of road traffic accidents were in the form of head injuries (44.08%) and fractures of the lower limbs (31%).

**Table 1: Distribution of road traffic injury cases according to road users.**

Road users	Males (%)	Females (%)	No. of Cases (%)
Motor bike	111(79.86%)	28(20.14%)	139 (36.97)
Pedestrian	74 (65.49%)	39 (34.51%)	113 (30.05)
Pedal cyclist	35 (72.92%)	13 (27.08%)	48 (12.76)
LMV	16 (59.26%)	11(40.74%)	27 (7.18)
HMV	34 (69.39%)	15 (30.61%)	49 (13.04)
Total	270 (71.81%)	106 (28.19%)	376 (100)

HMV = Heavy Motor Vehicles (trucks, buses, tractors, etc); LMV = Light Motor Vehicles (cars, jeeps, vans, etc).

**Table 2: Distribution of pedestrian and bicyclers cases hit by impacting vehicle.**

Hit by	No. of Pedestrian cases	%age	No. of Pedal cyclist	%age
Motor bike	57	50.45	11	22.92
HMV	39	34.51	23	47.92
LMV	17	15.04	14	29.16
Total	113	100	48	100

HMV = Heavy Motor Vehicles (trucks, buses, tractors, etc); LMV = Light Motor Vehicles (cars, jeeps, vans, etc.).

**Table 3: Age and sex distribution by type of road user.**

Age group in years	Motor Bike	Pedestrian	LMV	HMV	Pedal cyclist	Total (%age)
0-15	9 (M-6, F-3)	41(M-27, F-14)	1 (M-0, F-1)	7 (M-5, F-2)	19 (M-11, F-8)	77 (20.48)
16-30	63 (M-49, F-14)	23 (M-17, F-6)	11 (M-7, F-4)	23 (M-17, F-6)	13 (M-9, F-4)	133 (35.37)
31-45	39 (M-33, F-6)	17 (M-9, F-8)	9 (M-8, F-1)	15 (M-11, F-4)	7 (M-6, F-1)	87 (23.14)
46-60	27 (M-22, F-5)	19 (M-17, F-2)	5 (M-1, F-4)	3 (M-1, F-2)	6 (M-6, F-0)	60 (15.96)
>60	1 (M-1, F-0)	13 (M-4, F-9)	1 (M-0, F-1)	1 (M-0, F-1)	3 (M-3, F-0)	19 (05.05)
Total	139	113	27	49	48	376 (100)

HMV = Heavy Motor Vehicles (trucks, buses, tractors, etc); LMV = Light Motor Vehicles (cars, jeeps, vans, etc.); M= Males, F= Females

**Table 4: Distribution of injuries according to site**

Site	Motor Bike (139)	Pedestrian (113)	LMV (27)	HMV (49)	Pedal cyclist (48)	Total (376)
Head and Face	77 (55.4%)	59(52.21%)	17 (62.96%)	37 (75.51%)	21 (43.75%)	211(56.12%)
Neck	1 (0.72%)	-	3 (11.11%)	5 (10.20%)	-	9 (2.39%)
Back	11(7.91%)	1(0.89%)	-	7(14.29%)	3 (6.25%)	22 (5.85%)
Chest	7 (5.04%)	9(7.97%)	3(11.11%)	7 (14.29%)	-	26 (6.91%)
Abdomen	1(0.72%)	3(2.66%)	1 (3.70%)	5 (10.20%)	-	10 (2.66%)
Upper limb	63(45.32%)	29(25.66%)	3 (11.11%)	17 (34.69%)	21 (43.75%)	133 (35.37%)
Lower limb	91(65.47%)	57(50.44%)	11 (40.74%)	21 (42.86%)	33(68.75%)	213(56.65%)

• Multiple responses regarding site of injury

## DISCUSSION

In the present study, the highest number of victims (35.37%) was between the age group of 16-30 years. The people of the third decade are more commonly involved in road traffic injuries. In the present study, 58.51% of the victims were between 15 and 45 years age group. Similar observation was reported by WHO in *The Injury Chartbook*.(1). Maximum 35.37% victims were in age group 16-30 years, similar findings were observed by Chauhan et al. (2) This shows that the people of the most active and productive age groups are involved in road traffic injuries, which add a serious economic loss to the community. The present study shows that above the age of 60 years, the proportion of victims was low. Corresponding findings were reported by Chauhan et al., Jha *et al.* and Patil et al. (2,3, 6) In present study 30.05% victims of accident were pedestrian, similar findings were observed by Chalya PL et al.(7)

The male-to-female ratio was 2.55:1. It was observed that 71.81% of the victims were males, similar findings were observed by Metha et al.(5) The gender difference is probably related to both exposure and risk taking behaviour. In present study 12.76% of victims were pedal cyclist and maximum among them were hit by Heavy Motor Vehicles (HMV), similar findings were reported by Chauhan et al. (2)

In this study, maximum (50.45%) pedestrians were injured by motorized two wheelers. Corresponding results were reported by Jha *et al.* and Patil et al. (3, 6). This could be due to higher speed, which can be achieved over short distance and less stability of the vehicle.

Among injuries, the present study found that lower limbs injuries (56.65%) were the commonest site, followed by injuries on head and face (56.12%), injuries in upper limbs were observed in 35.37% of victims.

Similar findings were reported by Jha *et al.* and Patil *et al.* (3, 6). Studies have reported that the highest numbers of fractures were in upper limbs followed by lower limbs and facial bones. However, their study was confined to only motorcycle accidents, whereas the present study takes into account road traffic injuries due to all types of vehicles. The extremities are commonly involved due to direct trauma of the vehicle or due to fall. The extremities are more vulnerable to injuries especially in motorcyclists because they are unprotected.

Several human and environmental risk factors such as age, alcoholism, without driving license, type of vehicle, etc. were found associated in occurrence of road traffic injuries. If we control these factors appropriately, mortality and morbidity can be prevented.

The effective programme should be a combination of education along with traffic law enforcement. This study is hospital-based; therefore the incidence of road traffic accidents cannot be reported. Conducting a community based research in this field could result in more information regarding accidents.

**Acknowledgement:** I would like to express my profound gratitude to all the participants for their co-operation and for their immense faith they reposed in me.

**Conflict of Interest:** None

**Source of Funding:** Nil

**Ethical Clearance:** Approval for study was passed from the institutional board of study meeting (IEC/IRB No. 26.06.2011).

## REFERENCES

1. Peden M, McGee K, Sharma G. The injury chartbook: A graphical overview of the global burden of injuries. Geneva: World Health Organization; 2002.
2. Chauhan A, Ahmed N, Singh JV, Singh VK, Singh A, Kumar S. Epidemiology of road traffic injuries in a tertiary care centre of Lucknow. *Ind J Comm Health.* 2014; 26 (2): 181-86.
3. Jha N, Srinivasa DK, Roy G, Jagdish S. Injury pattern among road traffic accident cases: A study from south India. *Indian J Community Med.* 2003; 28:85-90.
4. Accidental deaths and suicides in India. National crime records bureau. Ministry of home affairs, Government of India. 2001.
5. Mehta SP. An epidemiological study of road traffic accident cases admitted in Safdarjang Hospital, New Delhi. *Indian J Med Res.* 1968; 56:456-66.
6. Patil SS, Kakade RV, Durgawale PM, and Kakade SV. Pattern of road traffic Injuries: A study from Western Maharashtra. *Indian J Community Med.* Jan 2008; 33(1): 56-57.
7. Chalya PL, Mabula JB, Dass RM, Mbelange N, Ngayomela IH, Chandika AB *et al.* Injury characteristic and outcome of road traffic crash victims at Bugando Medical Centre in North-western Tanzania. *J Trauma Manag Outcome.* 2012; 6:1.



# Alcoholism in Female Sex Workers and Clients, Barrier in Practice of Safe Sex, a Study on FSWS of Red Light Area of Pune City

Manisha N Gore<sup>1</sup>, Sanjay K Juvekar<sup>2</sup>

<sup>1</sup>Doctoral Student, Department of Anthropology, Savitribai Phule University of Pune, Ganeshkhind, Pune,

<sup>2</sup>Ph.D Guide, Department of Anthropology, Savitribai Phule Pune University, KEM Hospital Research Centre, Pune

## ABSTRACT

**Background:** Alcohol use by female sex workers (FSWs), sexual encounters with drunken clients increase risk of unsafe sex. As part of Ph.D study, knowledge, attitudes towards condom use and barriers such as proportion of FSWS drinking alcohol, drunken clients entertained and their association with consistent condom use behavior was analyzed in FSWS of red light area of Pune city.

**Method:** Mixed methods were used. 80 FSWS were selected by 2 stage cluster sampling method, followed by purposive selection 20 FSWS for in depth interviews.

**Results:** (55%) of FSWS were alcohol drinkers, of which (88.63%) were daily drinkers and (47.5%) FSWS entertained drunken clients. There was significant association between percentage of FSWS drinking alcohol and consistent condom use behavior ( $p < 0.036$ ).

**Conclusion:** Alcohol use in FSWS is a barrier in adopting safe sex behavior.

**Keywords:** Alcohol Use, Consistent Condom Use

## INTRODUCTION

Sex work has social characteristics that contour drinking<sup>(1)</sup>. Sexual encounters under influence of alcohol use by (FSWS) or client's are closely associated with risky behavior of unprotected sex than the frequency or quantity<sup>(1,2,3,4)</sup>. Globally, barring variations in drinking patterns in Nairobi Kenya, Guyana, South Africa and North America studies have documented high proportion of FSWS drinking alcohol<sup>(1)</sup>. In China, 50% adolescent sex workers have sexual encounters in drunken state<sup>(5)</sup>. In India a National Behavioral Surveillance Survey conducted in 2001 and 2006 reported overall (20%) of FSWS consuming alcohol everyday during last 4 weeks in 26 states. The proportion was highest in Orissa (59%), followed by Andhra Pradesh (44%), Delhi (36%), Manipur (36%)<sup>(6)</sup>. In Nagaland it was found that (20%) FSWS were regular drinkers<sup>(7)</sup>, whereas in district of Bellary in Karnataka (40 %) of FSWS were alcoholics<sup>(8)</sup>, an NGO

working for FSWS in Karnataka reported that in Karnataka, 60 % of FSWS can be termed as alcoholics and the rest as occasional drinkers<sup>(9)</sup>. A study in Mumbai revealed (11%) alcohol-dependent HIV infected FSWS<sup>(2)</sup>.

In Scotland (60%) FSWS' reported entertaining drunk clients. In Philippines 37% were reported having sex with intoxicated clients and 32% in Beijing reported clients drinking during sex. Among reviewed studies, a high proportion (14–88%, median 66%) of male clients engaged in sexual activity were under the influence of alcohol in India, Netherlands, Northern Ireland and Thailand<sup>(1)</sup> and this was corroborated by another study in India, which reflected that (58%) of clients used alcohol during at least five of their past 10 sexual encounters<sup>(10)</sup>. In National Behavioral Surveillance Survey of 2006, India documented 1/4<sup>th</sup> of clients (25.8%) of total sample reporting

consumption of alcohol daily, while (81%) reported drinking infrequently before sex<sup>(6)</sup>.

Several studies from low- and middle-income countries reported positive associations between alcohol use and 'unprotected sex' (e.g. no use, inconsistent use or incorrect use of condom) in daily FSW drinkers in Nairobi, Kenya, and those having sex with intoxicated clients in Philippines, Singapore, Papua New Guinea and India<sup>(1)</sup>. A study on migrant FSWs and clients from 4 high HIV prevalence states depicted significant association between alcohol consumption prior to sex with inconsistent condom use <sup>(11)</sup>.

Studies have explored reasons of alcohol use in FSWs such as decreased inhibitions prior to sex work, to cope with stigma of being FSW, psychological distress, clients preference for drunk FSWs, coping mechanism in response to stressful working condition, self medication, victimization of sexual violence <sup>(1,2,3,4, 12)</sup>.

As part of this Ph.D study, FSWs knowledge about condom use and attitudes towards condom use were studied. Understanding different barriers in condom use was one of the primary objectives where we determined the proportion of FSWs consuming alcohol, number of drunken clients entertained and its association with consistent condom use behavior.

### METHOD

The study used mixed method; survey followed by in depth interviews with FSWs from red light area of Pune. Sample size was calculated by two-stage cluster sampling method. A detailed list of brothels and FSWs were made by mapping the red light area. Using a statistical formula the sample (N = 80) was calculated. A sampling frame was developed based on listing exercise; first stage included selection of brothels by systematic random sampling, with PPS method (proportion to population size) and second stage included selection of FSWs by simple random sampling method. Qualitative interviews aimed at complementing information collected in survey and elaborate on understandings of patterns of results from the survey. 20 FSWs for in depth interviews were selected purposively from sample (N = 80). The survey data includes proportion of FSWs with habit of alcohol consumption and its frequency. In depth interviews explored reasons for alcohol use in FSWs. Qualitative interviews were audio recorded, which was further translated into English. Using grounded theory,

qualitative data were analyzed using inductive approach. Transcripts were read and re-read to develop an initial coding scheme and emerging themes were consolidated. Statistical package of SPSS 20 was used for quantitative analysis. Quantitative data were analyzed by descriptive statistics; chi square test was applied for significant association between variables. Alcohol consumption by FSWs for the study was considered as ever alcohol use by FSWs in last one month preceding survey. The main outcome indicator for this study was operationally defined as consistent condom use, which is correct and consistent condom use for every sex act with all types of clients by FSWs in last one month preceding survey. (6)

### Ethical Approval

The study protocol and informed consent form were approved by the Ethics Committee of Savitribai Phule, University of Pune. Prior to data collection, written informed consent ) was obtained from FSWs. All necessary steps were followed to maintain confidentiality of FSWs.

## RESULTS

### Socio Demographic Results

(1.1) A total of 80 female sex workers consented and completed the survey. The mean age of FSWs was 29.8 years (SD 7.9). (1.2) Majority of the respondents (78.8%) were illiterates (1.3) (33.3%) FSWs were married, one fourth (25%) were deserted, separated, or divorcees, a small percent (8.8 %), of respondents were widows. (1.4) Out of the N= 80 one third (30%) FSWs were from West Bengal and Karnataka, (22.5%) FSWs were from Andhra Pradesh, others (6.3%) included FSWs from Uttar Pradesh, North East and Madhya Pradesh.

**Table 1 Distribution of respondents by social demographic profile (N= 80)**

1.1 Age mean	29.8yrs	SD 7.9
Variable	N	Percent
<b>1.2 Literacy level</b>		
Illiterate ( cannot read and write)	64	78.8
Literate ( can read and write)	16	20.0
Total	80	100
<b>1.3 Marital status</b>		
Unmarried	15	18.8
Married	27	33.3
Deserted/Separated/Divorcee	20	25
Widow	7	8.8
Devdaasi	11	13.8
Total	80	100

**Table 1 Distribution of respondents by social demographic profile (N= 80) (Contd.)**

1.1 Age mean	29.8yrs	SD 7.9
Variable	N	Percent
<b>1.4 Native background</b>		
Maharashtra	7	8.8
Nepal	2	2.5
West Bengal	24	30
Karnataka	24	30
Andhra Pradesh	18	22.5
Others	5	6.3
Total	80	100

(Devadasi system is a religious practice in parts of southern India, whereby the girl are married to God for worship and service of a deity or a temple for the rest of her life the girl then becomes a prostitute for upper-caste community members.)<sup>(13)</sup>

**Proportion of FSWs consuming alcohol in the study and frequency of drinking**

More than half (55 %) reported alcohol consumption and (46.2 %) reported not drinking. Regarding pattern of drinking, it was found that (86.6%) drink daily, (2.4%) drink weekly, (4.5%) drink once in a month as indicated in Table 2.

**Table 2 Distribution of FSWs by habit of drinking alcohol and frequency (N=80)**

Variable	N	Percent
<b>Proportion of FSWs drinking alcohol</b>		
Yes	44	55
No	36	45
Total	80	100
<b>Frequency of drinking</b>		
Daily	39	88.63
Once in a week	3	6.18
Once in a month	2	4.5
Total	44	100

**Drunken clients entertained by FSWs during day and night**

More than half (47.5%) FSWs reported all clients entertained by them are drunk during day time, (43.8%) reported entertaining during night.(23.8%)entertain 2-3 drunken clients during day as compared to (13.8%) during night. (2.5 %) reported of entertaining 4-5 drunken clients during day (5%) reported entertaining the same number during night.

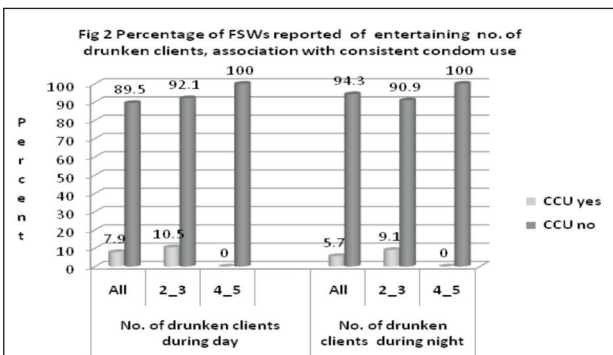
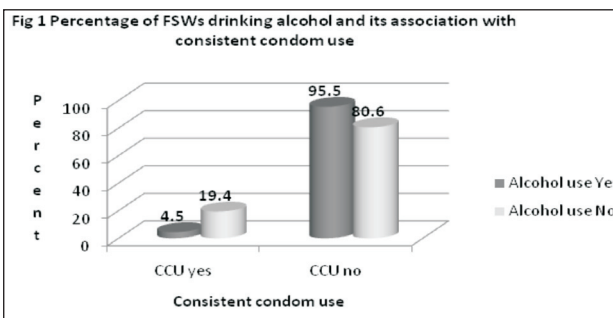
**Table 3 Distribution of FSWs response on number of drunken clients entertained during day and night.**

Drunken clients entertained	Day		Night	
	N	Percent	N	Percent
All	38	47.5	35	43.8
2_3	19	23.8	11	13.8
4_5	2	2.5	4	5
Do not entertain	21	26.3	19	23.8
	80	100	69	100

(11 (13.75%) FSWs do not do sex work at night)

**Association between alcohol consumption, number of drunken clients and consistent condom use behavior**

As depicted in fig 1 and 2, significant association was found between percentage of FSWs drinking alcohol and condom use behavior ( p<0.036). It was found that (95.5%) of FSWs consuming alcohol were not using condoms consistently with clients as compared to a very small percent (4.5%) that consumed alcohol and consistently used condoms with clients. No significant relationship was found between numbers of drunken clients entertained by FSWs with consistent condom use. It was found that (100%) of respondents who were entertaining 4-5 drunken clients during day and night were not using condoms consistently, (89.5%) and (94.3%) of FSWs entertaining 2-3 drunken clients during day and night were inconsistent in using condoms.



### Themes emerged from qualitative data - reasons for alcohol use.

**Personal crisis:** 4 FSWs shared: due to depression because of experience of personal tragedies such as broken relationships/ dejection from regular partners/ boyfriends, disclosure of sero positive status; hence to cope with the circumstances they started drinking alcohol.

*“I used to drink previously, but not so frequently when I lost my 2 yrs daughter, the pain was unbearable , I started drinking regularly”* \_\_\_\_\_  
 \_\_\_\_\_28yrs — FSW)

**Professional reason:**To endure the stress of sex work 5 FSWs voiced out that drinking alcohol ease the pain of entertaining clients, they can take extra clients which bring more money. 3 FSWs reported : use of alcohol before sexual encounters attracts clients, they are happy when FSWs gives them company for drinking alcohol. *“Lifestyles in brothels are frustrating because of lack of basic amenities leading to alcohol use by FSWs”*. \_\_\_\_\_30 yr FSW. 2 FSWs expressed their relatives and native people have abandoned them from the community because they are FSWs, to forget humiliations they started drinking alcohol.

Consuming alcohol and practicing sex work is a big barrier in condom use 8 sex workers confessed that drinking alcohol and entertaining clients during night and at wee hours could lead to unsafe sex (the sex worker would not be in position to apply condom to the clients, clients would refuse to wear a condom), drunk clients tear/pull out condoms and behave violently with FSWs.

### DISCUSSION

Proportion of FSWs drinking alcohol in the study were found to be more than half (55%) from red light area, majority of which (90.9%) are drinking regularly. Studies have revealed that (74.3%) FSWs in Nairobi, Kenya, (20%) in South Africa, (34.5%) in Guyana, (67.8%) in Nigeria were consuming alcohol and these findings corroborates high percentage of alcohol use in FSWs<sup>(1,14,15)</sup>. In India studies from Nagaland, Bellary, Karnataka reflected (20%-40%) alcohol dependency in FSWs. In Andhra Pradesh, Kerala the percentage was (53.8%). In Mumbai (11%) of HIV infected FSWs were alcohol dependent<sup>(7, 8, 2, 11)</sup>.

### Alcohol consumption and its association with practice of safe sexual behavior

Studies have revealed significant association between FSWs drinking habit and practice of safe sex behavior<sup>(1)</sup>. Migrant FSWs from Andhra Pradesh and Kerala, practice of drinking alcohol in context of sexual act is significantly associated with inconsistent condom use<sup>(11)</sup>. Perilous drinkers were prone to higher incidences of unprotected sex, which was associated with symptoms of STIs<sup>(3, 4,16)</sup>. FSWs who were daily drinkers from Nairobi, Kenya and binge drinkers in Mombasa, drinking before sex or having sex with intoxicated clients in the Philippines reported positive associations between alcohol use and “unprotected sex”<sup>(1,3,4)</sup>.

More than half (47.5%), (43.8%) FSWs reported of entertaining drunken clients during day and night time. In a study in Zimbabwe > 50% of FSWs reported that their most recent client was inebriated<sup>(1)</sup>. Significant association was not found with number of drunken clients entertained and consistent condom use by FSWs. On contrary, in India (Mumbai) a study found that men’s heavy alcohol use was significantly associated with in consistent condom use over the last year; a comparable association was not seen in FSWs<sup>(2)</sup>. FSWs in Cambodia identified alcohol intoxication (FSWs and clients), as key barriers in successful negotiation of condom use<sup>(17)</sup>

The qualitative aspect of the study highlighted reasons for drinking alcohol among FSWs: personal and professional. These findings are supported by other studies wherein FSWs consume alcohol for self-medication, to cope with economic problems, deprived life style and stressful work, stigma associated with sex work, fear of abusive client, unwanted pregnancies and STIs, conflicts with colleague sex workers, brothel managers, clients, police, to put aside their negative feelings, reduce anxiety about making contact and overcome physical aversion for their clients<sup>(1,14)</sup>

Overall the above discussion confirms wide spread alcohol use in FSWs and their clients which is positively associated with unprotected sex. The qualitative aspect affirms the findings from the survey. The limitations are; the study have not attempted to view in detail FSWs pattern of drinking alcohol in terms of quantity, context of alcohol use in relation to sexual act. The sample size ( N=80) is calculated as



per the objectives of the Ph.D study which would be insufficient to emphatically justify the results related to alcohol use, drunken clients entertained and its association with consistent condom use. In spite of limitations, the study has underlined alcohol use in FSWs and clients pose a big hurdle in achieving the goal of safe sex in this high risk group. The study findings reveal the necessity of implementation of intervention strategies which would keep FSWs away from habit of alcohol use, and prohibit them from entertaining drunken clients.

Behavioral interventions like counseling and creating awareness to reduce alcohol use among FSWs demonstrated reduced drinking levels in FSWs in Miami and Florida respectively (18,19). Implementation of innovative strategies in intervention programmes would help control alcohol addiction in FSWs.

**Conflict of Interest:** The authors declare that they do not have competing interests.

#### REFERENCES

1. Li Qing, Li Xiaoming, Stanton B. Alcohol Use Among Female Sex Workers and Male Clients: An Integrative Review of Global Literature, Alcohol and Alcoholism 2009, Dec29 Volume 45 Issue 2 Pp. 188-199.
2. Samet JH, Pace CA, Cheng DM, ColemanS, BriddenC, Pradeshi M, Saggurti N, Raj A. Alcohol Use and Sex Risk Behaviors Among HIV-Infected Female Sex Workers (FSWs) and HIV-Infected Male Clients of FSWs in India,2010,Aug, AIDS and Behavior August 2010, Volume 14, Issue 1 Supplement, pp 74-83 (Ref 23)
3. Luchters, W. Bosire, N. Kingola, M. Temmerman, M.F.Chersich:Hazardous and harmful alcohol use among female sex workers in Kenya, associations with risky sexual behavior and HIV incidence: a cohort study S. *Globalization and Health* 2014,
4. Alem A,Kebede D, Mitike G, Lemma W. Unprotected sex, sexually transmitted infections and problem drinking among female sex workers in Ethiopia Ethiopian Journal of Health Development (2006) Vol 20, No 2 > (5)
5. Zhang X D,Temmerman M, Li Y, Luo W, Luchters L. Vulnerabilities, health needs and predictors of high-risk sexual behavior among female adolescent sex workers in Kunming, China *Sex Transm Infect* doi:10.1136/sextrans-2012-0506
6. National Aids Control Organization, National Behavioral Surveillance Survey, Female sex workers (FSWs) and their clients, Ministry of health and family welfare government of India 2006
7. Medhi GK,Mahanta J, Phukan S,Goswami P, Paranjape R.Risk factors of sexually transmitted infections (STI) and theirrelationship with HIV among female sex workers (FSW) in Nagaland, a high HIV prevalence state in India , 7<sup>th</sup> IAS conference on HIV pathogenesis, treatment and prevention – 30<sup>th</sup> June 3 July 2013
8. Rajaram S, Roy A, Gurav K, Ramesh BM, Jaychandran A,Lowndes C, Alary M, Moses S, Bradley J. Programme exposure and sexual behavior in female sex workers, Bellary district Karnataka state, CHARME Working Paper No. 12 May 2010
9. Krittika S, Sex workers abuse alcohol to cope with stigma of their job, Jan 2010
10. Sivaram S, Johnson S, Bentley ME.*Exploring “wine shops” as a venue for HIV prevention interventions in urban India.* J Urban Health 2007;84:563-76.
11. Verma R K, Saggurti N, Singh A K, Swain S N. Alcohol and sexual risk behavior among migrant female sex workers and male workers in districts with high in-migration from four high HIVprevalence states in India. AIDS Behav. 2010 Aug;14Suppl 1:S31-9. doi: 10.1007/s10461-010-9731-y..
12. The World Bank Washington B C. The Global HIV Epidemics among Sex Workers, www.worldbank.org
13. Genesis & Growth <http://iml.jou.ufl.edu/>
14. Nyambura NI. Alcohol use and High risk sexual behavior among female sex workers in Nairobi, Kenya, Board of post graduate studies, [http : bps.uonbi.ac.ke](http://bps.uonbi.ac.ke)
15. Odukoya OO, Sekoni AO, Onajole AT, Upadhyay RP.Alcohol consumption and cigarette smoking pattern among brothel-based female sex workers in two local government areas in Lagos state, Nigeria.. AfrHealth Sci. 2013 Jun;13(2):490-7. doi: 10.4314/ahs.v13i2.41.
16. Heravian A, Solomon R, Krishnan G, Vasudevan C K, Krishnan A K, Osmand T, Ekstrand M L. Alcohol consumption patterns and sexual risk behavior among female sex workers in two South Indian communities. Int J Drug Policy. 2012 Nov; 23(6):498-504. doi: 10.1016/j.drugpo.2012.03.005. Epub 2012 May 18.



17. Maher L, Somers J M, Phlong P, Couture M C, Stein E, Evans J, Cockroft M<sup>5</sup>, Sansothy M<sup>6</sup>, Nemoto T, Kimberly, Selling sex in unsafe spaces: sex work risk environments in Phnom Penh, Cambodia *Harm Reduction Journal* 2011, 8:30 doi:10.1186/1477-7517-8-30
18. Inciardi J A, Surratt H L, Kurtz S P. et al The effect of serostatus on HIV risk behavior change among women sex workers in Miami, Florida. *AIDS Care* 2005;17(Suppl 1):S88-101.
19. Wechsberg WM, Luseno WK, Lam WK. *Substance use, sexual risk, and violence: HIV prevention intervention with sex workers in Pretoria. AIDS Behav* 2006;10:131-7., et al

# A Sonographically Evaluation of Cervical Lymphadenopathy in Rural Population at Peripheral Centre, Western U.P. India

Anil Kumar Kem<sup>1</sup>, Subhash Chand Sylvania<sup>2</sup>, Vandana Singh<sup>3</sup>

<sup>1</sup>Associate Professor, Department of Medicine, <sup>2</sup>Associate Professor, Department of Radiology, <sup>3</sup>Professor, Department of ENT, Saraswathi Institute of Medical Sciences, Hapur, U.P., India

## ABSTRACT

**Objective:** To evaluate the efficacy of sonography in detecting and differentiation between malignant and benign cervical lymph nodes in rural population at peripheral centre in western Uttar Pradesh India.

**Material and Method:** 86 patients of cervical lymphadenopathy were attended in OPD of Medicine department and sonographically evaluation was done in the department of radiology Saraswathi Institute of Medical Sciences Hapur, Ghaziabad, U.P., India, from March 2004 to January 2015 for the present study.

**Results:** In the cross sectional study 86 cases were taken, out of them 12 cases were malignant and 74 cases were benign. The high frequency linear probe (8-10 MHz) was used to evaluate cervical lymphadenopathy. The B-mode contour characteristics and presence of a hilum in malignant and benign lymph nodes were statistically significant, but there was no significant differences between the ratio of longitudinal diameter to the transverse diameter, echogenicity and the diameters of lymph nodes.

**Conclusion:** In the differentiations of benign and malignant cervical lymph nodes, the B-mode sonography is a limited method for evaluation of malignant lymph nodes in the neck and can not replace biopsy. It may be recommended that FNAC/ Biopsy along with sonography are mandatory for diagnosis of benign vs. malignant cervical nodes.

**Keywords:** Benign vs. Malignant, B- Mode Sonography, Cervical Lymph Nodes, Mega Hertz (MH)

## INTRODUCTION

Out of 800 lymph nodes in the body, about 1/3<sup>rd</sup> of them are found in the neck which vary in size from 3 to 25 mm, are embedded within the soft tissues of the neck either partly or completely surrounded by fat. Majority of neck nodes are superficially located and well visualized by the high frequency linear probe. High-resolution ultrasound is an effective method in

evaluation of cervical lymph nodes is well established, and grey-scale ultrasound is widely used for assessment of cervical nodes for their number, site, size, nodal boundary, hilum, matting, adjacent soft tissue oedema and other internal nodal echo patterns<sup>1,2,3</sup>. Gray scale ultrasound is highly sensitive and specific with an accuracy of more than 90%. The ultrasound guided FNAC is more accurate than conventional / blind FNAC to differentiate the benign and malignant lymph nodes<sup>5</sup>. With the use of colour Doppler sonography (CDS), gives additional information that can be obtained during an ultrasound examination of cervical lymph.

The grey scale and Doppler sonographic features in the assessment of malignant and benign cervical lymph nodes. In the sonographic assessment of

---

### Corresponding author:

Anil Kumar Kem

Associate Professor

Department of Medicine, Saraswathi Institute of Medical Sciences, Hapur, U.P. India

Tel: 0091 9837172870

E-mail: bhartiya47@gmail.com

cervical lymph nodes, grey scale ultrasound assesses the nodal site, size, shape, border, internal architecture ( echogenicity, echogenic hilum, calcification and necrosis), matting and adjacent soft tissue oedema<sup>6</sup>. The vascular pattern of lymph nodes is evaluated with colour or power Doppler ultrasound, whilst the blood flow velocity and vascular resistance are measured using spectral Doppler ultrasound<sup>7</sup>. The radiologist should has good experience regarding anatomy of neck and the sonographic appearances of these neck nodes, assessing them is not difficult.

### MATERIAL AND METHOD

86 patients of cervical lymph nodes were attended in OPD of Medicine department and sonographically evaluation was done in the department of radiology Saraswathi Institute of Medical Sciences Hapur, Ghaziabad ,U.P ,India, from, March 20014 to January 2015 for the present study. Permission to carry out this study was granted by the Radiology Department and Research Committee of the institution .The ultrasound examinations was done in the presence of a radiologist. Before the examination, an explanation was given to the patient about how the examination was to be done and informed consent was obtained. On the basis of the above features, an impression about diagnosis was made from ultrasound.

#### Technical considerations

Linear array, high frequency transducers should be used for the assessment of superficial lymph nodes.

Small footprint, large bandwidth transducers with central frequency 8- 10 MHz are ideal. In these circumstances, standoff pads are not necessary. The highest available Doppler frequency should be used, with low wall filter settings and color gain adjusted immediately below the level of nonvascular flickering within tissues for additional information to detection the nature of cervical lymph nodes .

#### Clinical criteria

On clinical examination of neck nodes if they are tender and soft in consistency on palpation than possibility of inflammatory or benign in nature, but the non tender and hard nodes are usually malignant in nature.

#### Diagnostic criteria

Normal superficial lymph nodes are not palpable and, quite often, they are not seen with ultrasonography. On ultrasound inflammatory or “reactive” nodes may become apparent, still the nodes may be benign or malignant. The ultrasonography diagnostic criteria used to separate benign from malignant lymph nodes are: size, shape, presence or absence of the hilum, echogenicity, margins, internal architecture changes such as focal cortical nodules, intranodal necrosis, reticulation, calcification, matting with adjacent soft tissue edema. Doppler criteria include presence of flow, central or peripheral distribution, number of vascular pedicles, vascular pattern, and impedance values (RI, PI). The classic signs used to differentiate between benign and malignant are summarized in table I.

## RESULT & DISCUSSION

Table Sonographically differentiation of cases in Benign and Malignant neck nodes

Criterion	Benign (No of cases= 74)	Malignant (No of cases= 12)
B scan criteria	Size small	Large
shape	Oval	Rounded
hilum	Present	Absent
echogenicity	Moderate or low	Marked hypoechoic
margins	Sharp	Irregular & blurred
Structural changes - focal cortical nodules - intranodal necrosis - reticulation - calcification - matting	Absent	Present
Soft tissue edema	May be present	Absent
Doppler criteria Flow	Absent	Present
Vessel location	Central	Peripheral
Vascular pedicles	Single	Multiple
Vascular pattern	Regular	Chaotic
Impedance values	Low	High

**Sonographic criteria for identification of abnormal cervical nodes**

**Site**

Malignant lymph nodes in the neck are site-specific and helps to identify malignant nodes and assists tumour staging. if the primary tumour is not identified, the pattern of distribution of metastatic nodes may suggest a primary location <sup>8,9,10,11</sup>. the distribution of metastatic nodes from different primary tumours and the distribution of non-Hodgkin’s lymphomatous and tuberculous nodes <sup>12,13,14</sup>. In majority of cases the infraclavicular malignancies that metastasize to the neck included lung, breast, cervix and oesophagus in decreasing order <sup>15</sup>.

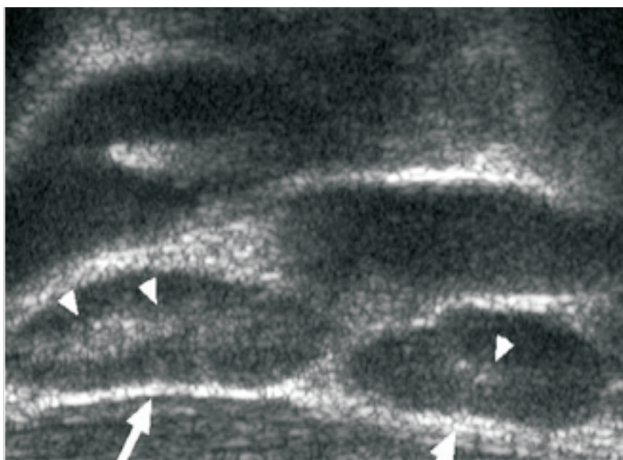


Fig. 1. Typical reactive node: Sonographic appearance of lymph nodes benign oval shape lymph node with hypo-echoic cortex peripherally (black)

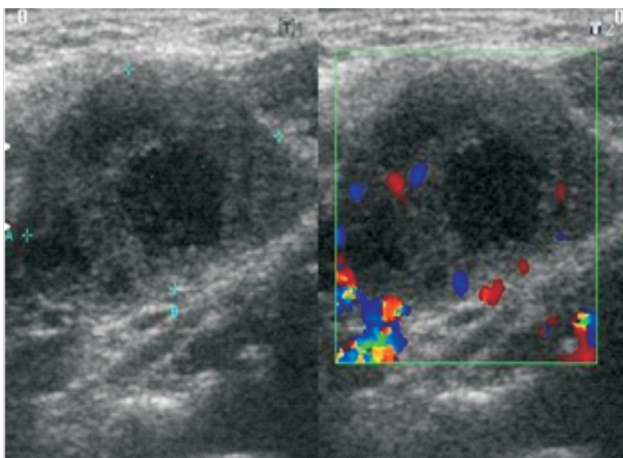


Fig. 2. Typical reactive node: Sonographic appearance of lymph nodes the enlarged lymph node is elongated, oval, with center necrotic area and shows the peripheral vascularity

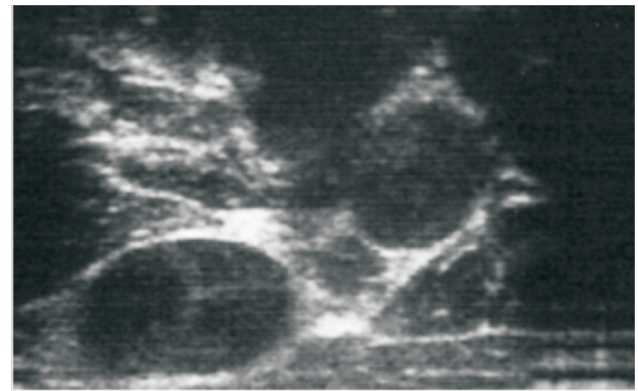


Fig. 3. Typical malignant node: rounded/ oval , hypo-echoic and inhomogeneous, with no visible hilum and indenting the neighboring jugular vein

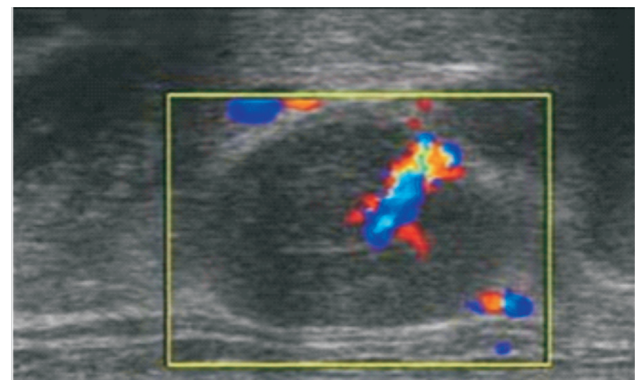


Fig. 4. Malignant node: Enlarged inhomogeneous predominately hypo-echoic lymph nodes and shows peripheral and central vascularity

**Size**

Size of lymph nodes were used previously as an indicator of malignancy <sup>16</sup>. The cut-off points of nodal size (maximum short axis axial diameter) to differentiate malignant from benign nodes have been reported 5, 8 and 10 mm <sup>17,18,19</sup>. Van den Brekel et al. suggested that the optimal size criterion for ultrasound assessment of cervical metastatic nodes varies with the patient population, and the most acceptable size criterion in minimal axial diameter for the patient population selected randomly is 9 mm for subdigastric nodes, and 8 mm for other cervical nodes<sup>20</sup>. In their subsequent study, they reported that a minimum axial diameter of 7 mm for level II (upper internal jugular chain nodes) and 6 mm for the rest of the neck revealed the optimal compromise between sensitivity and specificity in necks without palpable metastases.

A higher cut-off point yields higher specificity and lower sensitivity In patients with a known primary



tumour, an increase in nodal size on serial examinations may suggest metastatic involvement. Also, serial change in size of malignant nodes is useful in monitoring patient response to treatment. Size cannot be used as an absolute criterion, as inflammatory nodes can be as large as malignant nodes, whilst malignancy can be found in small nodes. It has been reported also that lymph nodes in the upper neck, including those in the submandibular and subdiaphragmatic region, tend to be larger than those in the lower neck<sup>21</sup>.

### Shape

Malignant lymphomatous (Hodgkin's or nonHodgkin's) and tuberculous nodes commonly appear as rounded, whereas normal or reactive nodes are usually oval, or flat<sup>22,23</sup>. Eccentric cortical hypertrophy is another useful sign to identify malignant nodes, and it indicates focal intranodal tumour infiltration<sup>24</sup>.

### CONCLUSION

Gray scale ultrasonography is a highly sensitive, specific and cost-effective modality for detection of the cervical lymph nodes to differentiate benign and malignant. Ultrasound is a useful examination in the evaluation of malignant nodes in the neck. It helps in identifying the abnormal nodes, confirms the nature (with guided FNAC) and objectively assesses the response to treatment. It may be recommended that the FNAC/ Biopsy along with sonography are mandatory for diagnosis of benign vs. malignant cervical nodes.

**Acknowledgment:** Authors are thankful to Dr. D.D.Gupta Professor & head, Department of Radiology and Dr. K. Prasad, Professor & head, Department of Medicine, Saraswathi Institute of Medical Sciences, Hapur, U.P. India for the guidance, providing facilities necessary for this study.

**Conflict of Interest:** None

**Source of Funding:** Nil

**Ethical Clearance:** Taken

### REFERENCES

1. Ishii JI, Amagasa T, Tachibana T, Shinozuka K, Shioda S. US and CT evaluation of cervical lymph node metastasis from oral cancer. *J Cranio-Max-Fac Surg.* 1991;19:123.
2. Van Overhagen H, Lameris JS, Zonderland HM, Tilanus HW, van Pel R, Schutte HE. Ultrasound and ultrasound-guided fine needle aspiration biopsy of supraclavicular lymph nodes in patients with esophageal carcinoma. *Cancer.* 1991;67:585.
3. Yao ZH, Wu AR. Supraclavicular lymph node metastasis from carcinoma of the uterine cervix after radiotherapy - analysis of 219 patients. *Chung Hua Chung Liu Tsa Chih.* 1988;10:230.
4. Ying M, Ahuja A, Metreweli C. Diagnostic accuracy of sonographic criteria for evaluation of cervical lymphadenopathy. *J Ultrasound Med.* 1998;17:437- 445.
5. Vassallo P, Wernecke K, Roos N, Peters PE. Differentiation of benign from malignant superficial lymphadenopathy: the role of high-resolution US. *Radiology.* 1992;183:215.
6. Ahuja A, Ying M, Yang WT, Evans R, King W, Metreweli C. The use of sonography in differentiating cervical lymphomatous lymph nodes from cervical metastatic lymph nodes. *Clin Radiol.* 1996;51:186.[
7. Dragoni F, Cartoni C, Pescarmona E, et al. The role of high resolution pulsed and color Doppler ultrasound in the differential diagnosis of benign and malignant lymphadenopathy: results of multivariate analysis. *Cancer.* 1999;85:2485.
8. Som PM, Brandwein M, Lidov M, Lawson W, Biller HF. The varied presentations of papillary thyroid carcinoma cervical nodal disease: CT and MR findings. *Am J Neuroradiol.* 1994;15:1123.
9. Jeong HS, Baek CH, Son YI, et al. Use of integrated <sup>18</sup>F-FDG PET/CT to improve the accuracy of initial cervical nodal evaluation in patients with head and neck squamous cell carcinoma. *Head Neck.* 2007;29:203.
10. Shozushima M, Suzuki M, Nakasima T, Yanagisawa Y, Sakamaki K, Takeda Y. Ultrasound diagnosis of lymph node metastasis in head and neck cancer. *Dentomaxillofac Radiol.* 1990;19:165.
11. Solbiati L, Rizzato G, Bellotti E, Montali G, Cioffi V, Croce F. High-resolution sonography of cervical lymph nodes in head and neck cancer: criteria for differentiation of reactive versus malignant nodes. *Radiology.* 1988;169(P):113.
12. Ying M, Ahuja A, Metreweli C. Diagnostic accuracy of sonographic criteria for evaluation of cervical lymphadenopathy. *J Ultrasound Med.* 1998;17:437.



13. Ahuja A, Leung SF, Ying M, Metreweli C. Echography of metastatic nodes treated by radiotherapy. *J Laryngol Otol.* 1999;113:993.
14. Tohnosu N, Onoda S, Isono K. Ultrasonographic evaluation of cervical lymph node metastases in esophageal cancer with special reference to the relationship between the short to long axis ratio (S/L) and the cancer content. *J Clin Ultrasound.* 1989;17:101.
15. Ying M, Ahuja A, Brook F. Repeatability of power Doppler sonography of cervical lymph nodes. *Ultrasound Med Biol.* 2002;28:737.
16. Steinkamp HJ, Maurer J, Cornehl M, Knobber D, Hettwer H, Felix R. Recurrent cervical lymphadenopathy: differential diagnosis with color- duplex sonography. *Eur Arch Otorhinolaryngol.* 1994;251:404.
17. Ahuja AT, Ying M, Ho SS, Metreweli C. Distribution of intranodal vessels in differentiating benign from metastatic neck nodes. *Clin Radiol.* 2001;56:197.
18. Maurer J, Willam C, Schroeder R, et al. Evaluation of metastases and reactive lymph nodes in Doppler sonography using an ultrasound contrast enhancer. *Invest Radiol.* 1997;32:441.
19. Dragoni F, Cartoni C, Pescarmona E, et al. The role of high resolution pulsed and color Doppler ultrasound in the differential diagnosis of benign and malignant lymphadenopathy: results of multivariate analysis. *Cancer.* 1999;85:2485.
20. Van den Brekel MW, Castelijns JA, Stel HV, et al. Modern imaging techniques and ultrasound-guided aspiration cytology for the assessment of neck node metastases: a prospective comparative study. *Eur Arch Otorhinolaryngol,* 1993;250: 11–17.
21. Chang DB, Yuan A, Yu CJ, Luh KT, Kuo SH, Yang PC. Differentiation of benign and malignant cervical lymph nodes with color Doppler sonography. *Am Roentgenol.* 1994;162:965.
22. Som PM. Lymph nodes of the neck. *Radiology.* 1987;165:593.
23. DePena CA, Van Tassel P, Lee YY. Lymphoma of the head and neck. *Radiol Clin North Am.* 1990;28:723.
24. Bruneton JN, Normand F. Cervical lymph nodes. In: Bruneton JN, editor. *Ultrasonography of the neck.* Berlin: Springer-Verlag. 1987;p. 81

## Call for Papers / Article Submission

The editor invites scholarly articles that contribute to the development and understanding of all aspects of Public Health and all medical specialities. All manuscripts are double blind peer reviewed. If there is a requirement, medical statistician review statistical content. Invitation to submit paper: A general invitation is extended to authors to submit papers papers for publication in IJPHRD.

**The following guidelines should be noted:**

- The article must be submitted by e-mail only. Hard copy not needed. Send article as attachment in e-mail.
- The article should be accompanied by a declaration from all authors that it is an original work and has not been sent to any other journal for publication.
- As a policy matter, journal encourages articles regarding new concepts and new information.
- Article should have a Title
- Names of authors
- Your Affiliation (designations with college address)
- Abstract
- Key words
- Introduction or back ground
- Material and Methods
- Findings
- Conclusion
- Acknowledgements
- Interest of conflict
- References in Vancouver style.
- Please quote references in text by superscripting
- Word limit 2500-3000 words, MSWORD Format, single file

All articles should be sent to: **editor.ijphrd@gmail.com**

*Our Contact Info:*

### **Indian Journal of Public Health Research & Development**

#### **Institute of Medico-Legal Publications**

4<sup>th</sup> Floor, Statesman House Building, Barakhamba Road,  
Connaught Place, New Delhi-110 001

Mobile: 91-9971888542, Fax No: +91 11 3044 6500

Email: editor.ijphrd@gmail.com • Website: www.ijphrd.com



# Indian Journal of Public Health Research & Development

## CALL FOR SUBSCRIPTIONS

About the Journal

**Print-ISSN:** 0976-0245 **Electronic - ISSN:** 0976-5506, **Frequency:** Quaterly

**Indian Journal of Public Health Research & Development** is a double blind peer reviewed international Journal. The frequency is half yearly. It deals with all aspects of Public Health including Community Medicine, Public Health, Epidemiology, Occupational Health, Environmental Hazards, Clinical Research, Public Health Laws and covers all medical specialities concerned with research and development for the masses. The journal strongly encourages reports of research carried out within Indian continent and south east Asia.

The journal has been assigned international standards (ISSN) serial number and is indexed with Index Copernicus (Poland). It is also brought to notice that the journal is being covered by many international databases.

### Subscription Information

Journal Title	Pricing of Journals		
IJPHRD	Print Only	Print+Online	Online Only
Indian	INR 7000	INR 9000	INR 5500
Foreign	USD 450	USD 550	USD 350

### Note for Subscribers

Advance payment required by cheque/demand draft in the name of " **Institute of Medico-Legal Publications** payable at New Delhi.

Cancellation not allowed except for duplicate payment.

Claim must be made within six months from issue date.

A free copy can be forwarded on request.

**Send all payment to:**  
**Prof. (Dr.) R.K. Sharma, Editor**

**Indian Journal of Public Health Research & Development**

**Institute of Medico-Legal Publications**

4<sup>th</sup> Floor, Statesman House Building, Barakhamba Road,  
Connaught Place, New Delhi-110 001

Mobile: 91-9971888542, Fax No: +91 11 3044 6500

E-mail: editor.ijphrd@gmail.com • www.ijphrd.com



