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## Kuppuswamy's Socio-economic Status Scale-Updating Income Ranges for the Year 2013

Vijaya K<sup>1</sup>, Ravikiran E<sup>2</sup>

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### Authors:

1&2- Professor of Community Medicine, Narayana Medical College, Nellore, A.P.

### Corresponding Author:

Dr. Vijaya K, Professor of Community Medicine, Narayana Medical College, Nellore, A.P. Pin. 524002  
E-mail: dreravikiran@yahoo.co.uk

Several studies namely hospital and community based require assessment of socio-economic status of an individual/family. This reflects the affordability of health services, necessities and purchasing power of the same. Several methods or scales have been proposed for classifying different populations by socioeconomic status: Rahudkar scale 1960, Udai Parikh scale 1964, Jalota Scale 1970, Kulshrestha scale 1972, Kuppuswamy scale 1976, Shrivastava scale 1978, Bharadwaj scale 2001.<sup>1-7</sup> However, social transformation and fast growing economy have rendered these scales ineffective in measuring the SES over the years.

Kuppuswamy's socio-economic status scale is an important tool to measure socioeconomic status of families in urban areas. It was first proposed by Kuppuswamy in the year 1976.<sup>8</sup> (Table-1). This scale takes into account education, occupation and income of the family to categorise families into upper, middle and low socioeconomic status. It is used by students and researchers alike in India for hospital and community based research. Mishra D and Singh HP<sup>9</sup> in their article on revision of Kuppuswamy's Socio-economic status scale have pointed that an income scale usually has relevance only for the period under study. They further clarified that due to the steady inflation and consequent fall in the value of the rupee, the income criteria in the scale lose their relevance. There is an unprecedented demand from researchers for the updated version of this

because changes in inflation rate effects monthly income range scores. The year wise reference indices are shown in **Table -2**. It tells us how index and base year have seen changes for reference index and has been used to calculate inflation based conversion factor.

Mishra D therefore worked on this issue of revision of family's monthly income in rupees for the year 1976, when the price index was 296 according to base year 1960=100. Then he revised it for the year 1998 using base year 1982=100. The base year has been changed from 2001.

Kumar N et,al,<sup>10</sup> took into account the new base year 2001= 100 for revision of family's monthly income in rupees for the year 2007. Conversion factor for 1982, base year has changed with considering 2001 as base year. To get the updated conversion factor the following exercise is adopted as follows.

*Price index by old base for 2001 = 458*

*Price index by old base for 2001 = 100*

*Price index by old base for 1998 = 405*

*Price index by new base for 1998 =  $100/458 \times 405 = 88.428$*

For calculating the conversion factor for the year 2007, the All India Average Consumer Price Index for Industrial Workers (CPI-IW) has to be divided by 88.428.

**Table 1. Original Kuppaswamy's socio-economic status scale**

Category	Score
<b>A. Education</b>	
Professors or honours	7
Graduate or post graduate	6
Intermediate or post high school diploma	5
High school certificate	4
Middle school certificate	3
Primary school certificate	2
Illiterate	1
<b>B. Occupation</b>	
Profession	10
Semi-profession	6
Clerical, shop-owner, farmer	5
Skilled worker	4
Semi-skilled worker	3
Unskilled worker	2
Unemployed	1
<b>C. Family income per month in Rs.(1976)</b>	
>2000	12
1000 – 999	10
750 – 999	6
500 - 749	4
300 - 499	3
101 – 299	2
<100	1
<b>Socio-economic class</b>	<b>Total Score</b>
Upper (I)	26-29
Middle Upper middle (II)	16-25
Lower middle (III)	11-15
Lower Upper lower (IV)	5-10
Lower (V)	<5

All India Average Consumer Price Index Numbers for Industrial Workers (Base 2001=100) shows general index as 128 on April 2007 ([http : // labourbureau.nic.in/indexes.htm](http://labourbureau.nic.in/indexes.htm) – Labour Bureau Government of India, as per survey done in 1999-2000) .

The conversion factor for year 2007= 128/88.428=1.45. The income ranges for the year 2007 was obtained by multiplying 1998 income ranges by the conversion factor 1.45 to get the revised Kuppaswamy Socioeconomic status scale for the year 2007.

**Table 2. Year –wise reference indices**

Year	Reference index
1960	100 (base)
1976	296
1982	490 – 100 (new base, applied by Mishra D et al., <sup>2</sup> for updating in 1998)
1998	405
2001	458 – 100 (new base applied by Kumar N et al., <sup>3</sup> for updating in 2007)
<i>Price index by old base for 2001 = 458</i>	
<i>Assuming price index by new base for 2001 = 100</i>	
<i>Price index by old base for 1998 was 405</i>	
<i>Price index by new base for 1998 = 100/458 x 405 = 88.42</i>	

Kumar N et, al,<sup>11</sup> again revised the socioeconomic status in the year 2012 taking the base year 2001= 100 for revision of monthly income in rupees for the year 2012.

Conversion factor takes into account of hike in original price index as well as its change of base value as 100. Therefore conversion factor needs to be calculated every year using the All India Average Consumer Price Index Numbers for Industrial Workers (CPI-IW). It can be done by the exercise done below for a few years in serial.

Year	CPI-IW	Conversion factor
2008	147	147/88.428=1.66
2009	169	169/88.428=1.91
2010	181	181/88.428=2.05
2011	185	185/88.428=2.09
2012	198	198/88.428=2.24

The revised income criteria for the year 2012 was obtained by multiplying 1998 income criteria by the conversion factor 2.24 to get the revised Kuppaswamy Socioeconomic status scale for the year 2012.

For the needs of present research it has become the need of the hour to provide an updated version of the Kuppaswamy Socioeconomic

**Table 3. Kuppuswamy's socioeconomic scale : update of income range**

<b>Score</b>	<b>1998</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>12</b>	<b>13500</b>	<b>19575</b>	<b>22410</b>	<b>25785</b>	<b>27675</b>	<b>28215</b>	<b>30375</b>	<b>34830</b>
<b>10</b>	<b>6750-13499</b>	<b>9788-19574</b>	<b>11205-22409</b>	<b>2892-25784</b>	<b>13837-27674</b>	<b>14107-28214</b>	<b>15188-30374</b>	<b>17415-34829</b>
<b>6</b>	<b>5050-6749</b>	<b>7323-9787</b>	<b>8383-11204</b>	<b>9645-12891</b>	<b>10352-13836</b>	<b>10555-14106</b>	<b>11362-15187</b>	<b>13029-17414</b>
<b>4</b>	<b>3375-5049</b>	<b>4894-7322</b>	<b>5602-8382</b>	<b>6446-9644</b>	<b>6919-10351</b>	<b>7053-10554</b>	<b>7594-11361</b>	<b>8707-13028</b>
<b>3</b>	<b>2025-3374</b>	<b>2936-4893</b>	<b>3361-5601</b>	<b>3867-6445</b>	<b>4151-6918</b>	<b>4233-7052</b>	<b>4556-7593</b>	<b>5224-8706</b>
<b>2</b>	<b>676-2024</b>	<b>980-2935</b>	<b>1122-3360</b>	<b>1291-3866</b>	<b>1386-4150</b>	<b>1413-4232</b>	<b>1521-4555</b>	<b>1744-5223</b>
<b>1</b>	<b>675</b>	<b>979</b>	<b>1121</b>	<b>1290</b>	<b>1384</b>	<b>1412</b>	<b>1520</b>	<b>1743</b>

status scale. We therefore attempted to revise the income groups for the year 2013 to redefine Kuppuswamy's socioeconomic status scale for the year 2013 taking the All India Average Consumer Price Index Numbers for Industrial Workers (CPI-IW) in the month of May<sup>12</sup>. It is calculated as  $228/88.428=2.58$ . This conversion factor obtained was multiplied to the income criteria of the year 1998 for getting the new income criteria for the year 2013 and therefore the new socioeconomic status scale for the year 2013. (**Table-3**)

Figures were rounded where applicable. The shortcomings however remain as with the income, the educational and occupational scales also need to be revised regularly. With the increasing prices or inflation the income grading needs to be updated on a regular basis for current research.

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Original Research Article

Organ Donation: Awareness, attitudes and beliefs among undergraduate medical students in South India

Sree T. Sucharitha<sup>1</sup>, Ravi Siriki<sup>2</sup>, Rajeshwara Rao Dugyal<sup>2</sup>, Mullai<sup>3</sup>, Priyadarshini<sup>3</sup>, Kaavya<sup>3</sup>, Roshini<sup>3</sup>

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Abstract

**Introduction:** Organ transplantation is firmly established in medicine as a procedure that saves or prolongs lives of people with organ failure. Health care providers play a critical role in educating and motivating the public to pledge their organs for donation. **Objectives:** The objectives of this study were 1. to understand the awareness and knowledge about organ donation 2. to assess the attitudes toward organ donation 3. to recommend the college authorities for planning sensitization programs targeting undergraduates to create awareness and improve knowledge and positive attitudes. **Methodology:** A cross-sectional study was conducted among undergraduate medical students of a private medical college in South India. A pre-tested, structured questionnaire, which was self-administered, was used to assess the knowledge, attitudes and beliefs towards organ donation. **Results:** The mean age of the study participants was 20.34 years, 64.3% were female students, 90.1% belonged to Hindu religion. Interestingly, 6.6% of the participants had a history of organ donation in the family. Ninety-seven percentage of participants ever heard of the term 'organ donation', 90.6% felt that organ donation should be promoted among whom 74.2% felt that there is a 'great need' for it. Thirty-two percentage participants responded that they would definitely donate organs after death and 53% participants responded positively to pledge their organs for donation after death. Reasons mentioned for not pledging were perceived parental and family refusal, fear for personal safety, disapproval of mutilation of body and religion. There was no statistically significant correlation between attitudes, beliefs and demographics. **Conclusion:** The study revealed low levels of awareness on organ donation and gaps in the knowledge among undergraduate medical students.

**Key Words:** Organ transplantation, Organ donation, Per Million Population, International Legislation

Authors:

1. Asst. Professor, Dept. Of Community Medicine, Tagore Medical College and Hospital, Chennai
2. Data Management Consultants, Hyderabad
3. MBBS third year students, Tagore Medical College and Hospital, Chennai

Corresponding Author:

Dr. Sree T. Sucharitha, M.D, Fellow in HIV Medicine, Assistant Professor of Community Medicine, Tagore Medical College Hospital, Rathinamangalam, Kancheepuram Dt TamilNadu – 600127  
Email:sucharithat2@gmail.com

Introduction:

Organ transplantation is considered one of the greatest advances of modern science that has given many patients a renewed lease of life. The evolutions of advanced technologies in the scientific world have made organ harvesting for organ transplantation a safe and viable procedure for prolonging the lives of people suffering with organ failure. Organ donation is defined as the removal of tissues from the human body, from a living or dead person, for the purpose of transplantation as a treatment<sup>1</sup>. A

living person can donate organs, or after natural death or after declared as 'brain death'. The legal aspects of the procedure have been constantly subjected to revisions so as to make the environment "pro-donation" or "donation-friendly" in the country. State governments are being aided by the NGO's to establish safety systems to facilitate organ donation so as to meet the demands of the huge requirement in the country. In spite of the above the reality speaks a different language.

Statistics show that Australia has 11 organ donors per million, Britain has 27, Canada has 14, Spain has 35.1 donors, USA has 26 donors per million whereas India has only 0.08 donors per million population (PMP)<sup>2</sup>. Annual deaths are approximately 500,000 because of non-availability of organs of whom 200,000 people die of liver disease, 50,000 people die from heart disease<sup>2</sup>. At least 150,000 people await a kidney transplant but only 5,000 get organs and almost 1,000,000 lakh people suffer from corneal blindness and await transplant<sup>2</sup>. According to a 2009 study<sup>3</sup>, India ranked second in the world in live related kidney transplants but only 40 in the total number of transplants.

The state of TamilNadu<sup>2</sup> has the pride of being the role model for the country in promoting organ donation. The Central Registry for Organ Donation, formed in October 2008, has recorded more than 2000 transplants in Tamil Nadu till 2013, the highest in the country so far. It is reported that in 2011, 1.42 lakh deaths were due to road traffic accidents in India. It is estimated that by 2020, RTA will occupy sixth position in the list of cause of death. (Asian Development Bank Report) These are the huge number of potential donors, who if motivated in the right manner, can fill the big gap between the requirement of organs for transplantation and supply of organs<sup>4</sup>.

In India, there is a great need for human organs as there is critical shortage of the same for transplantation. The shortage in organ supply is due to lack of awareness<sup>5</sup> and correct knowledge among public, myths and misconceptions surrounding organ donation due to religious and cultural barriers leading to hesitancy in donation of human organs. It has also been identified as due to the reluctance of family members to donate due to fear of the surgery causing loss to their health, smaller nuclear families with unmatchable donors and a deceased donor program that is still evolving<sup>6</sup>. Studies identified that health care providers

including medical students lack adequate knowledge about organ donation<sup>7</sup>. Little is known about factors that influence attitudes and beliefs about organ donation among health professionals<sup>8</sup>. According to a study by the U.S. Agency for Healthcare Research and Quality (AHRQ), people often do not have all the information they need to make decisions about donating a family member's organs nor do they have a clear understanding of the donation process<sup>9</sup>. Health care providers play a key role in educating the public and act as critical link to engage the community members in spreading the awareness to the public. Thus understanding their knowledge and attitudes regarding organ donation will help to identify the gaps and provide training on organ donation. In turn they will act as 'champions' of the cause in spreading the awareness and motivating the public regarding organ donation.

In this cross-sectional study, we assessed the knowledge, attitudes and beliefs of undergraduate medical students in Tagore Medical College and Hospital, Kancheepuram District, TamilNadu.

The objectives of this study were: 1.to understand the awareness and knowledge about organ donation; 2.to assess the attitudes toward organ donation; 3.to recommend the college authorities for planning sensitization programs targeting undergraduates to create awareness and improve knowledge and positive attitudes

### **Methodology:**

The Institutional Review Board (IRB) of Tagore Medical College and Hospital, (TMCH) granted the ethics approval for conducting this study.

**Study Design:** It was a cross-sectional study of descriptive nature, conducted during October to December 2012.

**Study Population:** The study participants were undergraduate medical students of Tagore Medical College and Hospital.

**Study Sampling:** A convenient sampling method was employed and all students who consented orally and were willing to participate by filling the questionnaire were enrolled into the study.

A survey questionnaire adapted to the study requirements from the published research<sup>5</sup> was designed to capture the knowledge, attitudes and beliefs towards organ donation. The questionnaires were pre-tested on a sample of ten undergraduate students and finalized. These questionnaires were not included in the final analysis. The questionnaire consists of structured questions with two sections: Section A: This section included demographic information such as age, gender, education, religion, type of family, monthly family income, history of organ donation in the family etc. Section B: This section assessed the level of knowledge, attitudes, and beliefs towards organ donation among study participants.

The questionnaires were issued to the study participants during their leisure time in hostels, canteens and were filled on the spot. Knowledge on different aspects of organ donation, attitudes towards organ donation was assessed. Statistical analysis was done using Microsoft Excel and SPSS statistical package student version. P values less than 0.05 were considered statistically significant.

### Results:

The mean age of the study participants was 20.34 years. The socio-demographic profile of the study participants was shown in [Table 1](#). Interestingly 6.6% of the participants claimed to have had a history of organ donation in the family. About 97.2% of participants ever heard of the term “organ donation”, 77% participants responded that they ‘strongly approve’ (Likert Scale) organ donation, whereas 22.1% mentioned they ‘somewhat approve’ organ donation. Around 74.2% responded that there is

a ‘great need’ for promoting organ donation as against 16.4% who mentioned there is ‘some need’ and 9.4% mentioned they were not aware about the need for organ donation.

**Table 1. Socio-demographic profile of the participants**

Particulars		Male	Female	Total
<b>Marital Status</b>	Single (never married)	73	133	206
	Married	2	3	5
	Others	1	1	2
	Total	76	137	213
<b>Religion</b>	Hinduism	67	125	192
	Christianity	7	7	14
	Islam	2	5	7
	Total	76	137	213
<b>Type of Family</b>	Nuclear Family	59	119	178
	Joint Family	15	18	33
	Others (Specify)	2	0	2
	Total	76	137	213
<b>Monthly Family Income (in Rupees)</b>	0-10000	40	57	97
	10001-25000	10	24	34
	25001-50000	17	33	50
	50001-100000	7	15	22
	>100001	2	8	10
	Total	76	137	213

Thirty –two percentage participants responded that they would definitely want to donate organs after death irrespective of circumstances as against 28.4% who would donate only under special circumstances like when involved in road traffic accidents or when the recipients were battling with pathological diseases or organ failure (83.6%). 31% participants mentioned they would think about it whereas 8.5% mentioned that they would never consider donating organs after death. Sixty-four percentage participants responded that their religion allows organ donation as against 28.6% who expressed that they are unaware about their religion permitting organ donation. Around 26.3% participants had ever donated blood.

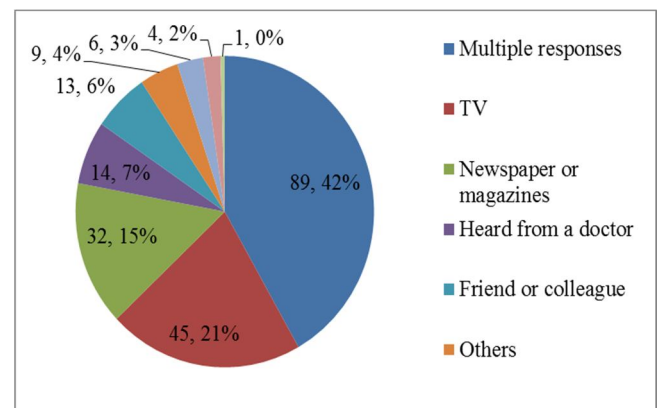
**Table 2. Summary Findings of the study**

Particulars		Male	Female	Total
<b>Your attitude towards the possibility of your own organs being used for donation after death</b>	a. Would never consider donating an organ	13	5	18
	b. Will think about it	21	45	66
	c. Would only like to donate under special circumstances	27	33	60
	d. Would definitely want to donate irrespective of circumstances	15	54	69
	Total	76	137	213
<b>Should organ donation after death be promoted</b>	a. Yes	68	125	193
	b. No	5	5	10
	c. Don't Know	3	7	10
	Total	76	137	213
<b>Will you pledge your organs for donation after death</b>	a. Yes	38	76	114
	b. No	12	8	20
	c. Don't Know	26	53	79
	Total	76	137	213
<b>Is there a need for having effective laws to govern the process of organ donation</b>	a. Yes	51	111	162
	b. No	10	5	15
	c. Don't Know	15	21	36
	Total	76	137	213
<b>Does your religion allow organ donation</b>	a. Not mentioned	3	0	3
	b. Yes	43	94	137
	c. No	3	9	12
	d. Don't Know	27	34	61
Total	76	137	213	
<b>How do you feel about organ and tissue donation</b>	a. Strongly approve	56	108	164
	b. Somewhat approve	19	28	47
	c. Strongly Disapprove	0	1	1
	d. Somewhat Disapprove	1	0	1
	Total	76	137	213
<b>Do you believe that there is a danger that donated organs could be misused, abused or misappropriated</b>	a. Never	7	10	17
	b. Sometimes	45	103	148
	c. Often	16	12	28
	d. Most of the time	5	4	9
	e. All the time	2	1	3
	f. Don't Know	1	7	8
Total	76	137	213	

Ninety percentage participants responded that organ donation should be promoted. The reasons mentioned for not promoting organ donation (4.7%) were fear of organs being wasted or mistreated, would not want to be cut open or mutilated, religious beliefs and that it can lead to organ trade or violation of human rights.

Only 60.6% participants identified the definition of organ donation as removal of tissues/organs from the human body for purpose of transplantation whereas 11.3% responded that donation can be done when alive or when dead or brain dead. Sources of information for study participants regarding organ donation was depicted in figure 1.

**Figure 1. Sources from which heard about Organ Donation**



About the age of the donor, 19.2% mentioned donor could be of any age, 76.5% mentioned it to be unethical for donating organs as a source of obtaining money. In the study, 18.3% participants believed that there could be risk for the cadaver donor as against 68.5% for a living donor. Seventy three percentage participants were unaware of international or national legislation regulating the process of organ donation and 76.1% participants agreed for the need to have a regulatory body to oversee the procedures related to organ donation in the country. Only 16.4% participants were aware of NGOs working on organ donation in the region. Although 53.5% participants responded positively to pledge their organs for donation after death still 37.1% were not sure about their

position. Reasons mentioned for not pledging for organ donation were perceived parental and family refusal; fear for personal safety and against mutilation of body citing religion. The important findings were summarized in Table 2.

### **Discussion:**

This cross-sectional study conducted among 213 undergraduate medical students of Tagore Medical College and Hospital, Kancheepuram district, TamilNadu assessed their knowledge, attitudes and beliefs towards organ donation.

Seventy seven percentage of participants responded that they 'strongly approve' organ donation, whereas 22.1% mentioned they 'somewhat approve' organ donation. A majority of participants-90.6% responded that organ donation should be promoted. Similar findings regarding positive attitudes represented by undergraduates were mentioned in studies<sup>10, 11, 12, 13</sup>. This study found the discrepancy between higher rates of approval for organ donation (90.6%) and actually pledging organs (53.5%) for donation. This matches with the study findings reported by authors in similar studies<sup>10, 13</sup>. About 8.5% students mentioned they would never consider donating organs whereas 31% revealed hesitancy about organ donation. This is similar to a study conducted in Turkey<sup>18</sup>, where 9% were unwilling and 25.5% were hesitant.

This study revealed only 60.6% participants identified the definition of organ donation as removal of tissues/organs from the human body for purpose of transplantation whereas only 11.3% responded that donation can be done when alive or when dead or brain dead. Also 18.3% participants believed that there could be risk for the cadaver donor as against 68.5% for a living donor. This reveals poor levels of knowledge about organ donation among study participants as was identified in studies<sup>10,11,12,13,14,15</sup>. In this study as against 16.4% who mentioned there is 'some need', 9.4% mentioned they are not aware about the need for organ donation. This shows low levels

of awareness about the potential need for promoting organ donation in the country among medical undergraduates<sup>10, 11,12,13,14, 15</sup>.

This study identified the reasons mentioned for not pledging for organ donation as perceived parental and family refusal; fear for personal safety and disapproval mutilation of body and religion. This is in conjunction with similar findings in other studies<sup>12, 13,15</sup>. Though many religions are not against organ donation there seems to be a wide prevalence of myths and misconceptions even among medical students as is revealed by only 64.3% mentioning that they believe their religion allows organ donation.

Seventy three percentage participants claimed lack of awareness about international or national legislation regulating the process of organ donation and 76.1% participants agreed for the need to have a regulatory body to oversee the procedures related to organ donation in the country. Authors also reported similar levels of poor awareness about legislation, 78.9% and 47.3% from studies conducted in Greece<sup>16</sup> and Brazil<sup>15</sup> respectively. This highlights the urgent need to educate medical students regarding the laws and regulation procedures embedded in the country for promoting organ donation.

In this study as to the willingness to pledge their organs after death 53.5% participants responded positively and 32.4% mentioned they would donate organs irrespective of the circumstances. This is very less compared to the findings from Brazil<sup>15</sup>, French<sup>17</sup> and Turkish studies<sup>18</sup> where 69.2%, 81.1%, 65.5% reported their willingness to donate organs after death categorically. In this study, 76.5% mentioned it to be unethical for donating organs as a source of obtaining money. This is in favour of WHO's standing to ban compensated organ transplanting<sup>19</sup>.

### **Conclusions:**

We found that awareness on organ donation among undergraduate medical students is lacking and there exists significant gaps in their

knowledge on the same. The results of the study revealed the urgent need for addressing this knowledge gap by conducting awareness sessions in medical schools and also engage them in discussions during clinical postings. This will contribute to the improvements in their knowledge levels. Educated health care providers will play critical role in motivating the public for the cause of promotion of organ donation.

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Original Research Article

Adolescent girls of a Slum of Puducherry: A reflection on their food habits

Lopamudra<sup>1</sup>, Premarajan KC<sup>2</sup>

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Abstract

**Background:** Unhealthy food choices in adolescence make them nutritionally vulnerable, particularly in girls, which might perpetuate the vicious cycle of intergenerational malnutrition. **Objective:** To study the food habits and its relationship with the nutritional status of adolescent girls. **Methodology:** A Community based Study was carried out in two phases (Descriptive Cross Sectional, Qualitative) among the adolescent girls in the service area of JIPMER, Pondicherry. A proportionate sampling method was adopted to draw a sample of 250 from the total list (n=507) by simple random technique. Their food intake pattern was assessed by an interview administered structured pretested questionnaire. Anthropometry and hemoglobin estimation was done using standardized methods. BMI was classified (WHO- Asian standards) and wasting and stunting (WHO Anthropac) was determined. Hemoglobin estimation was done by Sahali's hemoglobinometer. **Statistical analysis:** Done using SPSS (version 13) and N-Vivo-8 (Demo version). **Results:** Missing meal was observed in 64.8%, snacking in 100%, eating out in 94% along with certain specific health beliefs and misconceptions. Perception of health effects of snacking significantly determined snacking behavior and perception of healthy body shape significantly determined how many missed their meals. Prevalence of anemia was 66% and was significantly associated with missing meals. Prevalence of underweight, normal and overweight or obese was 63.2%, 26% and 10.8% respectively. **Conclusion:** Deviant food behaviors and their influence on nutritional status of adolescent girls were observed. Food habits in adolescents should be shaped with sustained motivation to protect their health for the future.

**Key words:** Adolescence, missing meal, snacking, anemia, wasting, stunting

**Authors:** 1. Assistant Professor, Department of Community Medicine, Indira Gandhi Medical College & Research Institute Pondicherry. 2. Professor, Jawaharlal Institute of Post Graduate Medical Education and Research (JIPMER), Pondicherry.

**Corresponding Author:**

Dr Lopamudra, Assistant Professor, Department of Community Medicine, Indira Gandhi Medical College & Research Institute (Govt. of Puducherry Institution), Vazhudavur Road, Kathirkamam, Pondicherry – 605009  
**E mail :** miss.lopmudra@gmail.com

**Introduction**

In adolescence, there are dramatic physical, psychological, social and behavioural changes. These transitions affect their life style which influences their eating patterns.<sup>1</sup> Erratic dietary patterns appear common in them; snacking, skipping meal, irregular meal timings, wide use of fast food and low consumption of healthy foods etc.<sup>2,3</sup> Adolescents are vulnerable and deserve special attention, particularly the girls, who are more vulnerable to poor nutritional status because of their gender and social conditioning.<sup>4</sup> However, a majority of adolescents tend to have little motivation to protect their health capital for the future.<sup>5</sup> Increased nutritional needs but improper consumption results in increased proportion of wasting, stunting, anemia and micronutrient deficiencies. Adolescents are tomorrow's adults and

improving adolescents' nutrition behaviour is an investment in adult health.<sup>6</sup> **Aims and Objectives:** i) The food habits in adolescent girls of an urban slum of Puducherry and ii) to find out, if it affects their nutritional status.

**Subjects and Methods**

**Study setting and Sampling methods:** A Community based Study was carried out in two phases (Mixed Method Design; Descriptive Quantitative in phase 1, Qualitative in phase 2) among the adolescent girls of the service area (Urban Slum) of JIPMER, Pondicherry during Oct'07 - Jan'09. A proportionate sampling method was adopted to draw a sample of 250 adolescent (10-19 years) girls (p=34%,<sup>3</sup>  $\alpha=5\%$ , Precision=20%, Non response rate=25%) from the total list (n=507) by simple random technique. From the total sampled

list, equal proportions from each of early (10 -13), mid (14 - 16) and late (17 - 19) adolescent girls were chosen from the service area.

#### **Technical Details of Food Habits and Procedure:**

In Phase I (Quantitative- Cross Sectional), food intake pattern was assessed by an interview administered structured pretested questionnaire by the principal investigator after taking consent from the participants or their parents/guardians in case of minor age groups. Information was obtained about 'missing meals', 'snacking habits', 'snacking without taking regular meals' (snacking leading to missing a meal) and its frequency per week, 'eating out' (eating outside foods for a major meal instead of home cooked foods). Estimation of anthropometric parameters and hemoglobin level was done using standardized methods. The 'Z' scores for BMI and ht/age was calculated using the WHO 'AnthroPlus' software (version 1.0.2). Z score for BMI less than 2 (median - 2 SD) and less than 3 (median - 3 SD) were classified as 'wasting' and 'severe wasting' respectively. The Z score for 'height/age' less than 2 (median - 2 SD) and less than 3 (median - 3 SD) were classified as 'stunting' and 'severe stunting' respectively.<sup>7</sup> was graded as) and severe anemia (< 7 gm/dl). (BMI) was graded as (23 - 25) and obese (>25) In phase II (Qualitative), six focus group discussions (FGD) were conducted in a subsample to have an in depth perception of food habits. At the end of each FGD, health education was conducted for creating awareness on healthy dietary habits, low cost culturally acceptable healthy foods (**Figure 2**). The adolescent girls identified as anemic were given free iron folic acid tablets. The study was approved by the Institute Ethical committee.

**Analysis:** Statistical analysis was done for significance of difference between parameters in each category of adolescent girls using 'SPSS' (version 13) and 'Epi info' (version 3.5.1) and 'Standard error of difference between two proportions' (SEP). For the FGD, the process of the content analysis began as soon as each of the FGD was finished. The text was de-contextualized and the data was coded and was converted into 'free' and 'tree' nodes using 'N VIVO 8' (QSR Internationals' Research Software Product).

**Results:** There were 83 (33.2%), 83 (33.2%) and 84 (33.6%) girls in early, mid and late adolescent age groups respectively. Majority (51.6%) of adolescent girls ate four times a day; breakfast, lunch, evening snacks and dinner.

#### **1. Missing Meals**

About 162 (64.8%) missed any meal. Frequency of missing meal was not different across age groups of adolescence. Missing breakfast (71%) was significantly higher ( $p = 0.010$ ) than missing lunch (9.3%) or dinner (19.8%). The difference of missing different meals was not significant across the age groups (**Table 1**).

The frequency of missing any meal varied from once (17%), twice (23.8%), thrice (28.6%), four times (16.3%), five times (5.4%), six times (4.1%) to seven times (4.8%) a week. Frequency of missing for  $\geq 3$  times a week (59.2%) across the age groups was significantly more ( $p = 0.016$ ). The reasons for missing a meal were 'lack of time to eat' (43.8%), 'not feeling hungry' (24.1%), 'emotionally upset' e.g. anger (14.2%), 'dieting' (6.8%) and 'others' ['feeling sleepy' (4.3%), 'bad taste' (2.5%), 'stress/tension' (1.9%), indigestion (1.2%) and food not cooked at house (1.2%) ] (**Table 1, Figure 1**).

**Qualitatively, the following themes were generated;**

i) **Frequency of missing meals:** The respondents missed important meals once to several times in a week. As said by a respondent, 'skipping breakfast has become my habit. I do not feel hungry at all.'

ii) **Reasons for missing a meal:**

**Value of taste:** Importance of taste was so much for the girls that they rejected the food at first instance if it was not tasty. They even got bored of eating the same food and missed.

**Self respect:** If they were angry at home; they were afraid that they might lose their 'self respect' if they took food. As told by a respondent, 'if I am scolded, it is impossible for me to eat. I don't even feel hungry; in tension ridden mind one does not think of hunger'.

**Body Image:** Those who had a poor body image often missed meals being influenced by peer groups or of their surroundings.

**Health belief:** If food was taken at night, it gave a sense of fullness and hindered sleep. Some also believed that by eating dinner, they would have loss of memory.

**Miscellaneous:** They had hardly any time for breakfast because they had to report to school early for attending extra classes. Sometimes, food was not cooked in house if it was a fasting day, or if parents had to go to work early. At times of exams, due to stress or to avoid wastage of time they missed meals. If they snacked or ate out, they too missed meals.

iii) **Perception of health consequences:** They also felt that after night's fast, breakfast must be taken. Else, it would cause dizziness, headache and low concentration and ulcer in stomach or anemia or would even cause shrinking of stomach size.

**Table 1 ‘Missing Meals’ Reported in the Adolescent Girls (n = 250)**

Attributes	Responses	Early		Mid		Late		Total	
		n	%	n	%	n	%	n	%
Missing any Meal	Yes	47	56.6	54	65.1	61	72.6	162	64.8
	No	36	43.4	29	34.9	23	27.4	88	35.2
	Total	83	100	83	100	84	100	250	100
<b>Chi sq = 4.685, df = 2, p = 0.096</b>									
Meals Missed	Breakfast	26	55.3	39	72.2	50	82	115	71
	Lunch	7	14.9	5	9.3	3	4.9	15	9.3
	Dinner	14	29.8	10	18.5	8	13.1	32	19.8
	Total	83	100	83	100	84	100	250	100
<b>Chi sq = 9.324, df = 4, p = 0.05 (overall), # p = 0.010 (breakfast versus lunch and dinner)</b>									
Missing Meal (Per week)	≥ 3 times	25	78.1	33	61.1	29	47.5	87	59.2
	< 3 times	7	21.9	21	38.9	32	52.5	60	40.8
	Total	32	100	54	100	61	100	147*	100
<b>Chi sq = 8.242, df = 8, p = 0.41</b>									

\* Frequency of missing meal was available for 147 adolescent girls

# ‘p’ represents ‘missing breakfast’ versus ‘missing lunch’ or ‘dinner’ in all age groups

**Table 2 ‘Snacking Habits’ of the Adolescent Girls of the Study Area (n = 250)**

Category	Responses	Early		Mid		Late		Total	
		n	(%)	N	(%)	n	(%)	n	(%)
Snacking frequency	≥ 3 times	43	51.8	33	39.8	26	31	102	40.8
	< 3 times	40	48.2	50	60.2	58	69	148	59.2
	Total	83	100	83	100	84	100	250	100
<b>Chi sq = 7.573, df = 2, p = 0.023</b>									
Snacking without regular meal	Yes	27	32.5	27	32.5	24	28.6	78	31.2
	No	56	67.5	56	67.5	60	71.4	172	68.8
	Total	83	100	83	100	84	100	250	100
<b>Chi sq = 0.407, df = 2, p = 0.81</b>									
Snacking without regular meal (Per week)	≥ 3 times	8	29.6	6	22.2	4	16.7	18	23.1
	< 3 times	19	70.4	21	77.8	20	83.3	60	76.9
	Total	27	100	27	100	24	100	78	100
<b>Chi sq = 1.22, df = 2, p = 0.543</b>									
Health effects of snacking	Bad	63	75.9	72	86.7	77	91.7	212	84.8
	Good	14	16.9	10	12	4	4.8	28	11.2
	No effect	6	7.2	1	1.2	3	3.6	10	4
	Total	83	100	83	100	84	100	250	100
<b>Chi sq = 10.644, df = 4, p = 0.031</b>									

**Table 3 Perception and Practice of ‘Eating Out’ in Adolescent girls (n=250)**

Practice of Eating out	Responses	Perception of Eating out (as good)					
		Agree		Disagree		Total	
		n	%	n	%	n	%
Yes	49	100.0	186	92.5	235	94.0	
No	0	0.0	15	7.4	15	6.0	
Total	49	100.0	201	100.0	250	100.0	
<b>Chi square = 3.89, df = 1, p = 0.047</b>							

**Table 4 ‘Perceptions of Health Effects’ (of junk foods) on ‘Frequency of Snacking’ in the Study Participants (n = 250)**

Perception of Health effects	Snacking frequency ≥ 3 times		Snacking frequency < 3 times		Total	
	n	%	n	%	n	%
Bad	81	38.2	131	61.8	212	100.0
Good	16	57.1	12	42.9	28	100.0
No effect	5	50.0	5	50.0	10	100.0
Total	97	40.4	143	59.6	250	100.0
<b>(Overall Chi square = 4.037, df = 2, p = 0.133) (Only between ‘Bad’ and ‘good’ Chi square = 3.682, df = 1, p = 0.04)</b>						
Perception of Health effects	Snacking instead of regular meal ≥ 3 times		Snacking instead of regular meal < 3 times		Total	
	n	%	n	%	n	%
Bad	61	28.8	151	71.2	212	100.0
Good	15	53.6	13	46.4	28	100.0
No effect	2	20.0	8	80.0	10	100.0
Total	78	31.2	172	68.8	250	100.0
<b>Chi square = 7.694, df = 2, p = 0.021</b>						

**Table 4** represents the perception of negative health consequences of snacking that affected execution of snacking frequency as well as the frequency of snacking instead of taking regular meals. Those who said that it was bad for health, majority (62%) were snacking for < 3 times a day and even snacked instead of regular meals for < 3 times a day (71%). On the contrary, those who said as good were snacking more frequently.

**Table 5 Nutritional Status of study Participants (Early-Mid-Late Adolescents) (n = 250)**

Anemia	Early		Mid		Late		Total	
	n	%	n	%	n	%	n	%
No anemia	33	39.8	24	28.9	28	33.3	85	34
Mild								
Moderate	40	48.2	49	59	39	46.4	128	51.2
	10	12	10	12	17	20.2	37	14.8
Total	83	100	83	100	84	100	250	100
Chi square = 5.495, df = 4, p=0.24								
<b>BMI</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Normal	9	10.8	16	19.3	40	47.6	65	26
Underweight	71	85.5	58	69.9	29	34.5	158	63.2
Overweight, Obese	3	3.6	9	10.8	15	17.9	27	10.8
Total	83	100	83	100	84	100	250	100
Chi square = 49.789, df = 4, p= 0.000								
<b>Wasting</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
No wasting	65	78.3	60	72.3	70	83.3	195	78
Wasting	12	14.5	13	15.7	11	13.1	36	14.4
Severe wasting	6	7.2	10	12	3	3.6	19	7.6
Total	83	100	83	100	84	100	250	100
Chi square = 4.816, df = 4, p= 0.307								
<b>Stunting</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
No stunting	68	81.9	58	69.9	53	63.1	179	71.6
Stunting	9	10.8	12	14.5	21	25	42	16.8
Severe stunting	6	7.2	13	15.7	10	11.9	29	11.6
Total	83	100	83	100	84	100	250	100
Chi square = 10.06, df = 4, p= 0.039								

**Table 6 Relationship of ‘Missing Meal’ with ‘Anemia’ and Body Mass Index (BMI, Asian Standards) of the Study Participants (n = 250)**

Missing Meal	Anemia		No Anemia		Total			
	n	%	N	%	n	%		
Yes	115	71	47	29	162	100		
No	50	56.9	38	43.1	88	100		
Total	165	66	85	34	250	100		
Chi square = 5.102, df = 1, p = 0.024								
Missing Meal	Underweight		Normal		Overweight, Obese		Total	
	n	%	n	%	N	%	n	%
Yes	90	55.6	52	32.1	20	12.3	162	100
No	68	77.3	13	14.8	7	7.9	88	100
Total	158	63.2	65	26	27	10.8	250	100
Chi square = 11.857, df = 2, p = 0.003								
Frequency of Missing Meal	*Underweight		Normal		Overweight, Obese		Total	
	n	%	n	%	N	%	n	%
≥ 3 times	54	62.1	18	20.7	15	17.2	87	100
< 3 times	25	41.7	30	50	5	8.3	60	100
Total	79	53.7	48	32.7	20	13.6	147	100
Chi square = 14.164, df = 2, p = 0.001								

\*Frequency of ‘missing meal’ was significantly different (p<0.05) among the underweight. \$ ‘Frequency of missing meal’ per week was available for 147 subjects

Table 6 denotes that significantly higher proportions of anemic adolescents (71%) were noted among those who missed meals.

**Table 7 Relationship of ‘Snacking’ and Body Mass Index (BMI, Asian Standards)**

Frequency of Snacking g/day	Underweight		Normal		Overweight, Obese		Total	
	n	%	n	%	N	%	n	%
≥ 3 times	75	73.5	20	19.6	7	6.9	102	100
< 3 times	83	56.1	45	30.4	20	13.5	148	100
Total	158	63.2	65	26	27	10.8	250	100
Chi square = 8.09, df = 2, p = 0.018								
Snacking instead of Regular meal	Underweight		Normal		Overweight, Obese		Total	
	n	%	n	%	N	%	n	%
Yes	53	68	15	19.2	10	12.8	78	100
No	105	61	50	29.1	17	9.9	172	100
Total	158	63.2	65	26	27	10.8	250	100
Chi square = 2.831, df = 2, p = 0.243								
Snacking instead of Regular meal	Underweight		Normal		Overweight, Obese		Total	
	n	%	n	%	N	%	n	%
≥ 3 times	13	72.2	3	16.7	2	11.1	18	100
< 3 times	40	66.7	12	20	8	13.3	60	100
Total	53	68	15	19.2	10	12.8	78	100
Chi square = 0.196, df = 2, p = 0.907								

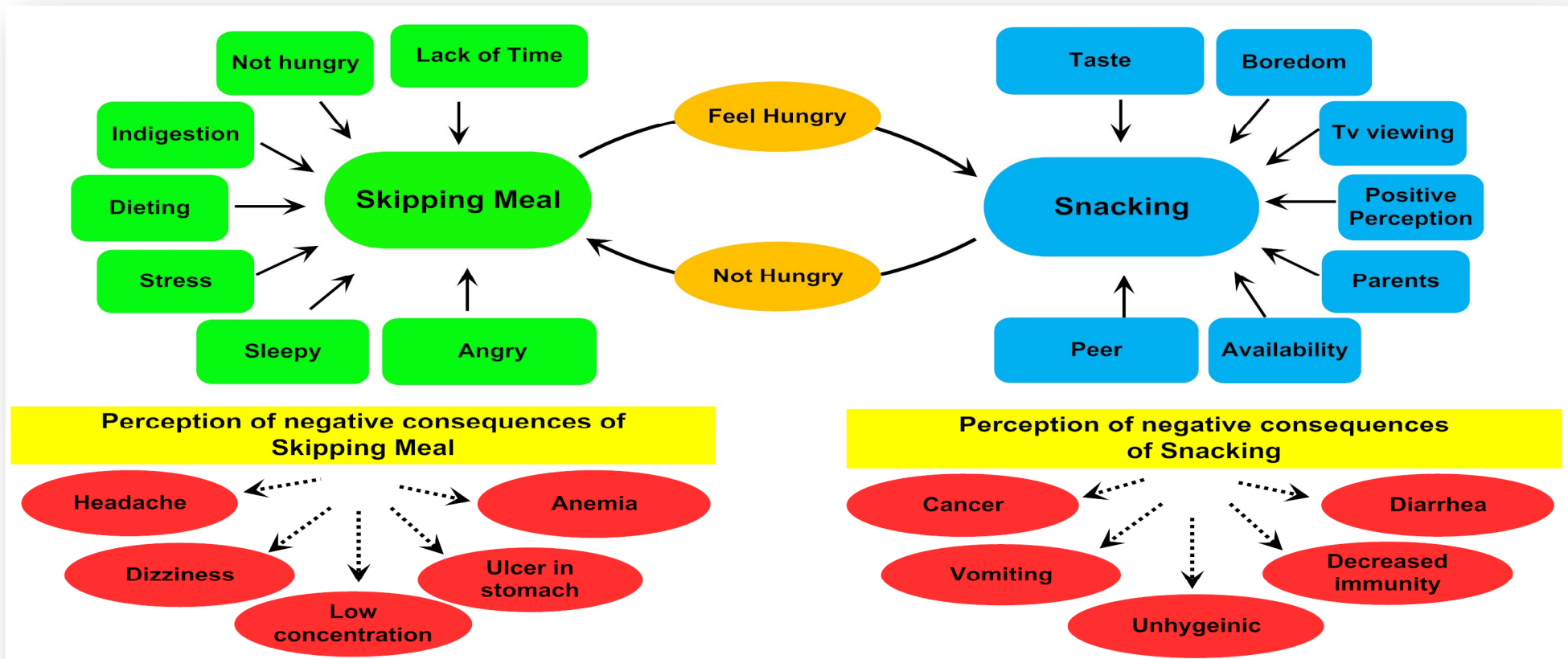
Table 7 denotes that snacking frequency and even snacking with taking regular meals in adolescence were not related to their body mass indices

Figure 1 Represents the list of factors affecting ‘skipping meals’ of ‘snacking behaviour’ in adolescent girls of our study. The said behaviour is executed as resultant of the facilitating influences (eg: stress, sleepy etc. for skipping a meal and peer groups, availability etc. for snacking) and perception of negative consequences (marked in red colour and dotted arrows). Additionally, skipping a meal and snacking were related.

### 3. Snacking Habits

The commonly consumed snacks were either fried foods (chips, magic snacks) (93.2%), sweets and ice creams (47.2%), soft drinks (12%), noodles (20%), fruits and nuts (18.4%) or miscellaneous food items (bread, biscuit) (10%) (Table 2).

Figure 1 Factors Influencing 'Missing Meal' and Snacking

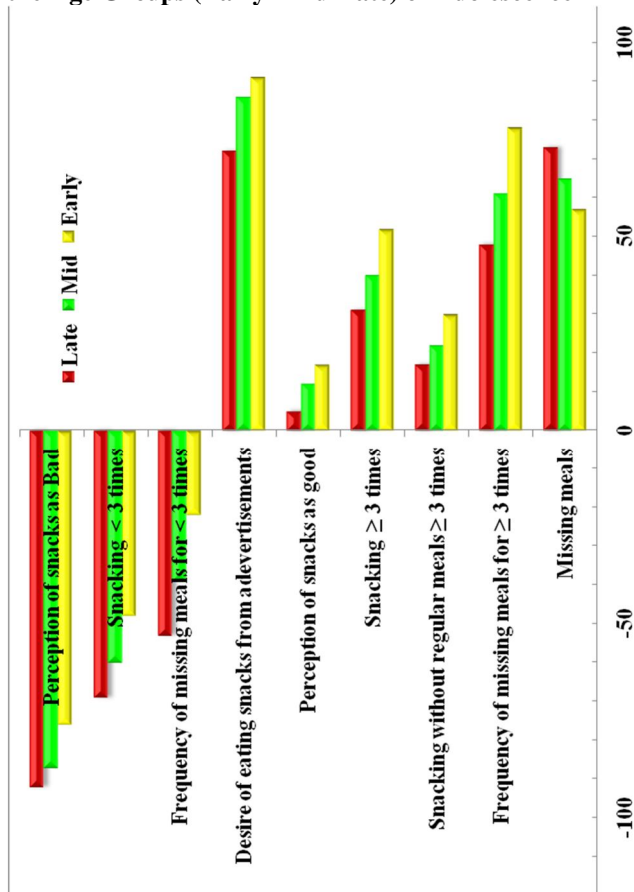


**Figure 2 Focus group discussions (FGD) and Health Education to the study Participants**



**Figure 2** Represents the photographs taken during the focus group discussions. At the end, refreshments given were the locally available and acceptable low cost nutritious foods and health education was delivered based on these

**Figure 3 Summary of Food Habits Executed Across the Age Groups (Early- Mid-Late) of Adolescence**



**Figure 3** Represents the summary of food behaviours across the various age groups of adolescence. We noted a trend in behavioural change process; positive behaviours improve towards late adolescence and negative behaviours are more marked in early and mid - adolescence.

All the adolescent girls (100%) snacked at least once a day. The frequency of snacking ranged from once to more than three times a day. Snacking  $\geq 3$  times a day significantly decreased ( $p = 0.02$ ) from early

(51.8%) to late adolescence (31%). ‘Snacking without taking regular meal’ was observed in 31.2% and was similar across age groups (Table 6). The frequencies were; once (41%), twice (35.9%), thrice (14.1%), four times (5.1%), five times (2.6%) or even six times (1.3%) a week. The frequency for  $\geq 3$  times a week was not significant across age groups of adolescence (Table 2).

About 88.4% watched advertisements of junk foods (ice cream, chocolates, pizza etc.) in TV. The difference across the age groups were statistically significant ( $p = 0.02$ ). The desire to eat snacks from advertisements was prevailing ‘almost always’ in 63.8% of early, 50% of mid and 36.6% of the late adolescents. However, 28.2% of late adolescents seldom had desire to eat snacks and the difference was statistically significant ( $p = 0.004$ ). Among each category of adolescents, significantly higher proportion ( $p < 0.05$ ) had desire to eat snacks (almost always and occasionally) by watching advertisements.

About 96% girls were aware of some health effects of consuming junk food. About 84.8% (75.9% in early, 86.7% in the mid and 91.7% in the late) perceived these as ‘bad for health’. On the contrary, 16.9% of the early adolescents felt that junk food intake was ‘good for health’ and the perception significantly ( $p = 0.031$ ) decreased towards the mid (12%) and late adolescence (4.8%) (Table 2). The difference of frequency of snacking ( $p = 0.04$ ) and snacking instead of regular meal ( $p = 0.02$ ) was statistically significant for those who perceived snacks as either bad or good (Table 4).

**Qualitatively, the following themes were obtained;**

**i) Knowledge of snacks/junk foods:** If a new junk food was introduced in the market, it was usually discussed in their friend circle. They were attracted by the colourful snacks in shops. They also liked the TV advertisements of junk foods and expressed desire to parents to bring those or got those from their pocket money.

**ii) Reasons for snacking:** Taste and easy availability of junk foods made the respondents snack often. Snacks were available nearby schools and they got those by telling lies to teachers. They also snacked because of hunger having missed important meals. Snacking while chatting with friends or during watching TV was enjoyable and also to ward off boredom or to break the monotony of routine foods they snacked. Eating snacks was preferred as it made them feel lighter than major solid foods. Parents too brought junk foods and they ate together with family (Figure 1).

**iii) Frequency and intent of snacking:** They snacked in the interval hours of school or after returning from school or in the evening or with

major meals. On holidays, snacking was as many times as wished. Those who preferred to eat fruits to junk foods were either aware of their health effects or were not allowed by the parents to eat those. Some ate without the knowledge of parents. As told, 'I go to shops when all sleep and eat and come back as if nothing has happened'.

**iv) Perception of health consequences:** They believed that snacks were cooked in bad oil and it caused cancer because it contained preservatives. The snacks kept open in shops were exposed to contamination and were believed to decrease immunity and should be avoided. They even felt bad for eating snacks just for taste at the spur of the moment. However, for a few, snacks were good for health and they consumed continuously.

#### 4. Eating Out

Eating home cooked food was perceived as healthy by 80.4% compared to eating out and the perception across the age groups of adolescence was similar. Even though, only 19.6% considered foods 'cooked away from home' healthier, in practice, a significant proportion (94%) ( $p = 0.04$ ) ate out (**Table 3**). The frequency of 'eating out' among the girls ranged from one to three times or more per month (59.1%) and frequency of  $\geq 3$  times a month was significantly different across the age groups.

Qualitatively, the respondents questioned the hygiene, freshness or the method of cooking of 'foods cooked away from home'. However, it was 'tastier' and sometimes to get rid of the 'monotony' of home cooked food, they ate out.

#### 5. Nutritional Status of Adolescent Girls

The prevalence of underweight, normal and overweight or obese was 63.2%, 26% and 10.8% respectively and the difference in BMI was significant ( $p=0.000$ ) across the age groups. The prevalence of 'wasting' was 22%, of which 7.6% had severe wasting. The difference of prevalence of wasting across the age groups was not significant. The proportion of stunting was 28.4%, among whom 11.6% were severely stunted and it was significantly different ( $p=0.039$ ) across the age groups. The prevalence of anemia was 66% but the difference across the age groups was not significant. However, in each of the individual age groups, significantly higher proportion ( $p<0.05$ ) of anaemic adolescents were noted (**Table 5**).

#### 6. Food Habits and Nutritional Status

##### 6.1. Missing meals and Snacking - BMI

Of those who missed any meal, 55.6% were underweight, 32.1% normal and 12.3% overweight. About 74% ( $n = 20$ ) among the overweight and obese category ( $n = 27$ ) were missing meals. The overall association of missing meal with different categories of BMI was significant ( $p = 0.003$ ). There were 62.1% underweight who missed meal for  $\geq 3$  times per week and the frequency of missing meal among those

who were underweight was significant ( $p < 0.05$ ). Among those who missed meal for  $\geq 3$  times per week, about 17.2% were overweight and the frequency of missing meal among those who were overweight & obese was not significant. About 75% of the overweight and obese ( $n=15$ ) were missing meal for  $\geq 3$  times per week. The association of frequency of missing meal with BMI was significant ( $p = 0.001$ ) (**Table 6**).

Among those who snacked for  $\geq 3$  times a day, 73.5% were underweight, 19.6% were normal and 6.9% overweight or obese. The proportions of overweight or obese among those who snacked were not statistically significant (**Table 6**).

##### 6.2. Missing meals and Snacking - Anemia

Of the girls who missed any meal, about 71% had anemia and the relationship was significant ( $p = 0.024$ ) (**Table 6**). The proportion of anemia was 72.4% among those who missed meal for three times or more and 66.7% among those who missed meal for less than three times per week. However no statistical difference was observed between frequency of missing meal and anemia (**Table 6**).

#### Discussion

Human behaviour registers a gradual change and usually, the fluidity and immaturity evolves into fixity and maturity as a child grows.<sup>8</sup> This behavioral trend from early through mid and late adolescence was observed in our study. Positive behaviours decreased from late to early adolescence and negative behaviours decreased from early to late ages (Figure3).

High proportion of adolescents missed meals in our study and missing breakfast (71%) was almost twice to those reported in other studies.<sup>9, 10, 11</sup> Our Qualitative discussions further highlighted the behavioural correlates of it. Similar to our findings, Story *et al*<sup>12</sup> too reported sense of 'lack of time' or 'lack of urgency' in choice of foods in adolescence. Further, it was unacceptable that majority of the mid adolescents were missing meals; considering the increased requirements due to major growth spurt at this age. Nutrient intake during the rest of the day did not compensate for skipping breakfast.<sup>13</sup> We also noted some typical behavioural pattern of adolescence; their temper tantrums and fear of loss of self respect determined missing meals. Whatever might have been the compulsion for skipping meals, we noted that it made them nutritionally vulnerable because, missing meals was significantly associated with anemia. Nicklas TA *et al*<sup>14</sup> mentioned that breakfast skippers had deficiency in iron and had poorer grades in class.

High proportion of underweight in our study signified the extent of poor nutrition or chronic energy deficiency. However, significant association of missing meal and BMI was not found; could be due to higher prevalence of underweight adolescents in our study. Underweight status was also supposed to be determined by socio economic status, hereditary factors or poor nutrition which was not measured in the present study. It was found that those who missed any meal were more overweight or obese than who did not. Similarly, those who missed meal for  $\geq 3$  times were more overweight and obese. This could be either due to snacking as a result of missing meals leading to overweight or obesity or increased proportion of missing meals among the obese or overweight. However, the temporality was not shown in the study.

The reasons for snacking in the present study were also similar to the findings by Sylvis et al.<sup>15</sup> The desire for snacking was also so strong that they tried to fulfil it by all means. Additionally, they had a desire to enjoy snacks on the spur of the moment (early adolescents) but the same was conspicuous by its absence in a matured age (late adolescents). 'Perceived susceptibility' (Health Belief Model) refers to the probability that an individual assigns to personal vulnerability and is predictive of various health protective behaviors.<sup>16</sup> In our study too, those who perceived junk foods as bad for health, majority of them consumed snacks less frequently (Table 4). Studies in the Minnesota adolescents<sup>12</sup> also showed that snacks were eaten despite the awareness of their health consequences which was also noted in qualitative results of our study.

We also noted that, snacking was not related to overweight and obesity. The adolescents in our study belonged to an urban slum (Kuppuswamy-class IV) and consumed snacks available in road side stalls or the petty shops and quality of snacks consumed was in striking contrast to that of the affluent society. In the urban slum of our study, 'eating out' was eating from local idli shops, from road side shops and hotels. Similar to the comments by Shepherd et al,<sup>1</sup> eating out in our study was due to 'taste', 'convenience' and 'time' and had no relation with their nutritional status.

Anemia among the adolescent girls as reported by Saibaba et al<sup>17</sup> was 88%. Similarly, The high proportion anemia (66%) reported in our study might pose a severe public health problem (anemia of  $> 40\%$  in the whole population).<sup>18</sup> Additionally, wasting and severe wasting was highest in mid adolescence. As an indicator of acute malnutrition, it could be said that additional requirements during puberty (mid adolescence) could not be

compensated due to poor intake. High severe stunting in mid adolescence was alarming and indicated that chronic malnutrition could not be corrected with the onset of growth spurt at this age. High proportion of stunting in the late adolescence could be due to the carry over effect of maternal malnutrition.

At the end of each FGD, we conducted health education sessions (in Anganwadi centres) among the adolescent girls on healthy foods which were affordable and culturally acceptable (figure 2). The nutritive values were discussed with special emphasis on iron rich foods and their bioavailability. The anganwadi worker was advised to reinforce the health messages to the adolescent girls and their mothers.

### Conclusion and Recommendation

We evidenced behavioural transitions across the age groups of adolescence in our study. There were higher proportions of girls missing meals and it was significantly associated with anemia. A high prevalence of underweight status was noted and acute malnutrition was observed more in mid adolescence. We recommend that the adolescents need to be counselled and sustained motivation is required to produce a behaviour change. Design of menu for theme should consider the 'taste' of the food without compromising its nutritive value. It is appropriate to intervene in adolescence because behavioural changes once develop persist into adulthood and adult dietary habits are extremely resistant to change.

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## A Study on Efficiency of Referral and Compliance of Tuberculosis Patients in Existing Network Under DOTS - Cuddalore District, Tamilnadu

Muhammad GM<sup>1</sup>, Ethirajan N<sup>2</sup>

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### Abstract

**Introduction:** Tuberculosis (TB) remains a major infectious killer today. There were an estimated 8.7 million new cases of TB, 1.4 million people died from TB in the World. India continue to be the number one country with largest number of new cases the world and also holds highest number of MDR-TB cases in Southeast Asia region. Poor patient adherence leads to higher relapse rates and increased drug resistance. This study on compliance and efficiency of referral was conducted among the cohort of TB patients in 2004. **Objectives:** To study the level of compliance among patients registered and transferred out from RMMCH TB cell to five Tuberculosis units within the district. **Study design:** Descriptive study. Study Population: 92 patients registered in TB cell from March 2004 to June 2004 transferred out within the district. **Methodology:** Three separate visits were paid to assess the efficiency of referral and compliance. The first visit to check time of transferred in to the PHI to which patient was transferred out from RMMCH TB cell, second visit to assess the completion of Intensive phase and third visit to patients home to interview about treatment completion and outcome. Data were obtained through interview of PHI staff and Patients. **Statistical Analysis:** Using Proportions, chi-square and Pearson correlation co efficient. **Results:** 56% completed treatment, 12% initially defaulted, 16% defaulted and 9% died. Distance was significantly associated with delay in treatment initiation but not with treatment completion. **Conclusion:** This study listed factors influence the compliance in initiation of treatment, completion intensive and continuation phase and the overall outcome of study cohort. This study reiterates that the patient related factors to be addressed and programme to be flexible in order to achieve compliance even today. **Key words:** Compliance, DOTS, default, TB referral.

### Authors:

1. Associate professor in Community Medicine, PSG & IMSR, Coimbatore,
2. Prof. & HOD of Community Medicine, RMMC, Chidambaram

### Corresponding Author:

Dr. Muhammad GM, Associate professor in Community Medicine, PSG&IMSR, Coimbatore-04.  
E-Mail: gmmuhammad@gmail.com

### Introduction

WHO Global tuberculosis report 2012 confirms that TB remains a major infectious killer today in the world. In 2011, there were an estimated 8.7 million new cases of TB (13% co-infected with HIV) and 1.4 million people died from TB, including almost one million deaths among HIV-negative individuals and 430 000 among people who were HIV-positive.<sup>1</sup> In India, there were an estimated 2.3 million new cases of TB and 0.32 million people died (Excluding HIV+TB) from TB.<sup>2</sup> WHO estimates that there were about 0.5 million new MDR-TB cases in the world in 2011. About 60% of these cases occurred in Brazil, China, India, the Russian

Federation and South Africa alone ("BRICS" countries).<sup>3</sup> There were 73000 estimated MDR TB among notified cases in India in 2011.<sup>4</sup>

As of 2010, India's treatment success rate was 88% in new smear/culture positive cases, 90% in smear negative Extra-pulmonary cases and 74% in re-treatment cases.<sup>2</sup> A decade ago in India, the overall treatment success rate was 76 % in 2003<sup>1</sup> which was less than the target level of 85% and presently it is 89% for 2010.

Medical colleges play a central role in training and shaping the attitudes of the future generations of medical practitioners. As care providers at tertiary level and as referral facility, medical colleges treat a significant number of

TB cases in the country. They also provide specialized services for seriously ill TB patients or complicated cases. Majority of TB suspects attend the various OPDs in the medical college hospital. If proper and sincere attempt is made to identify the sputum positive cases at all the departments of medical college, it will improve the efficiency and effectiveness of DOTS programme.

Although the adoption of DOTS has given impressive results with higher treatment success, default continues to occur in certain situation and is a matter of concern. Therefore, an efficient network of health infrastructure with committed treatment organization is most essential for the success of DOTS<sup>5</sup>. Muralimadhav et al, also reported in his randomized controlled trial to compare the Efficacy of DOTS and non-DOTS in District TB centre in Mangalore reported cure rate of 91% with DOTS group as compared to non-DOTS group (53%)<sup>10</sup>. Balasubramanian et al, documented that ineffective implementation of DOTS can result either no improvement or decrease in treatment success<sup>11</sup>. John D walley et al, tested the effectiveness of direct observation component of DOTS in a randomized control trial in Pakistan and reported negatively on cure rate and treatment completion rate<sup>12</sup>.

Furthermore, various factors such as patients' age, gender, alcohol and drug dependence, absence of symptoms after initial therapy, adverse effects of drugs, travel time, and expenses have been shown to be associated with non-compliance<sup>6</sup>. Cuneo and snider et al, mentioned difficult access to health –care facilities, Delay between referrals and appointments and Duration of treatment are the factors associated with non-adherence in the treatment of tuberculosis<sup>13</sup>. OnerBalbay et al, reported older patients were more non- adherent in a rural area in Turkey<sup>14</sup>. Furthermore, in New York City, S.Gupta et al, reported older age was one of the factors statistically associated with

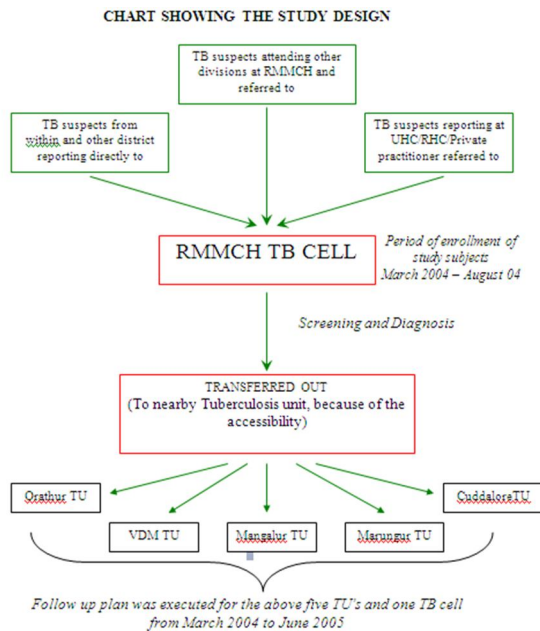
refusal of DOT<sup>15</sup>. In India, V.K.Arora et al, reported higher default rates among geriatric age group in Delhi<sup>16</sup>.

Adherence to therapy among patients with TB is a major determinant of treatment outcome. Poor patient adherence leads to higher relapse rates and increased drug resistance. Therefore, non-adherence to TB treatment has many consequences, not only for patients, but also from a public health perspective. To overcome this, WHO adopted the successful strategy of the International Union against Tuberculosis and Lung Diseases' (IUATLD), Tuberculosis mutual assistance program to develop a new tuberculosis control and research strategy in 1991.<sup>7</sup>

In this context, this study was intended to find out how efficiently the referral system from RMMCH TB cell to PHIs within district works and the factors affecting the compliance at peripheral health institutions (PHI) where patients are referred. Referral system starts with patient reaching the PHI in time, initiation of the treatment at respective PHIs and completion of Intensive phase (IP) and continuation phase (CP) and proper monitoring of patients for their clinical improvement and sputum status. The present study tried to explore the lacunae in each step and factors affecting the overall compliance.

## **Materials and Methods**

Study design: Descriptive study. Study population: DOTS Treatment Cohort who were diagnosed and registered and transferred out to various Tuberculosis Units within Cuddalore district between 1<sup>st</sup> March 2004 - 31<sup>st</sup> June 2005. Methodology: After obtaining proper approval from the institution as well as State Tuberculosis Officer through proper channel, the list of TB patients registered and transferred out during the specific period (i.e 133 cases) was collected.



Three visits were planned to assess the efficiency of referral and compliance. First visit, to respective PHI's within 2 weeks from the date of transfer, second visit, a week after the expected date of completion of Intensive Phase (IP) in PHI, third visit, to the respective home of the patient after the completion of maintenance therapy, which ranges between 6 to 8 months for Category I and III, 8 to 10 months for Category II from the date of starting Intensive phase. Statistical analysis was done using proportions, Chi-square, Pearson's correlation coefficient and t-test.

## Results

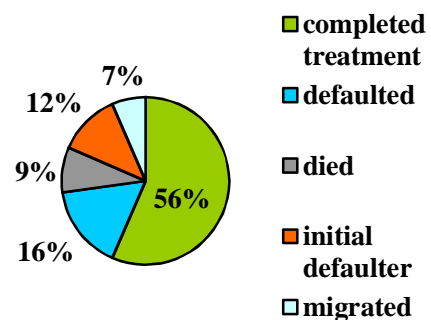
The study cohort referred from RMMCH TB cell to five Tuberculosis units within Cuddalore district was carried out namely Orathur, Vridhachalam, Mangalur, Marungur and Cuddalore. 47.8% of study cohort was transferred out to Orathur TU, which is relatively closer to RMMCH TB cell. Total numbers of patients registered from March 2004 to August 2004 were 133 cases. Out of 133 cases, only 92 patients were transferred out within the district.

Out of 92 patients, there were 10 patients in 0-14 yrs, 44 patients in 15-44 years, 25 patients 45-59 years and 18 patients above 60 yrs. initial defaulters were in the age group of 45-54 years,

especially in males were belong to Cat I. And 71% this cohort was male and 29 were female. The percentage of defaulters is high among females. The proportion of patients in each category in this study is as follows: cat I - 60%, Cat II - 10.8% and in cat III - 28.2%.

Distance from patients' Home to PHI: 50% of cohort travelled less than 5 kms to collect drugs Time interval between the date of transfer and initiation of treatment: 73% of patients register within 2 weeks to PHI after Diagnosis. 79% of cat I patients initiated treatment within 14 days as compared to 66% in cat II and 69.5% in cat III. The expected time to register and initiate treatment will normally vary between 24hrs-48hrs, Delay in initiating treatment is statistically significant with the distance between patient Home to PHI Pearson correlation co-efficient ( $r = 0.2$ ), ( $t = 1.67$ ,  $p < 0.05$ ). Out of 75 patients who were initiated treatment only 52 patients (69%) completed treatment (Figure 1).

**Fig.1. Overall outcome of referral and compliance pattern among the DOTS cohort studied. (n=92)**



The factors, which are found to influence initiation, are distance, categorization of patients, age, and gender. The factors which influence for treatment outcome are age, sex, categorization of patients, distance and the respective TUs to which the patients had been referred. In the current study, there is a significant relationship between distance to DOTS facility and the initiation of treatment,

but not with treatment outcome (Table 1). Distance is significantly associated with delay in treatment initiation but not with treatment completion and age, sex, and categorization of patients are not significantly associated with treatment completion.

**Table 1. Factors for initial default, and default in intensive and continuations phase in this treatment cohort.**

Initial default	Intensive phase	Continuation phase
1.Preference to non – DOTS	1.Side effects of drugs	1.Free of symptoms
2.Like to have In-patient care	2.Wish to have injections	2.Smoking
3.Fear of adverse reactions	3.Poor drug accessibility ( children)	3.Non availability of full meal
4.Wrong advice by general practitioners		4.Drug accessibility
5.Refusal of PHI staff to register without copy of transfer form		5.Preferring traditional medicine
6.Insisting on submission of residential identity for registering		

## Discussion

The present descriptive study on efficiency of referral to peripheral health institution and compliance pattern among the cohort of patients diagnosed at TB cell attached to RMMCH, was carried out, with the objective of ascertaining the level of compliance and exploring the various socio demographic factors responsible for default.

Many studies, both community based and hospital centered studies explored patient related delay and provider related delay in the diagnosis of Tuberculosis. After the diagnosis, delay can occur when the patients are referred to

treatment facilities nearer to their residence i.e initiation delay. Further, during the course, many factors affect the compliance.

In the present study, out of 92 patients, there are 65 males and 27 female subjects. Several studies documented the higher prevalence of disease in males as compared to females<sup>34,35</sup>. In the present study, out of 92 patients 25 % of the patients are in the age group of 30-44 years as compared to other age groups. All patients in the age group of 0-14 are under cat III in the present study and there are 8 TBHA, 1 pleural effusion and 1 cervical lymphadenitis. In children, sputum negative pulmonary and extra pulmonary cases are the commonest form of Tuberculosis<sup>33</sup>. Cat I cases are more in all other age groups.

Out of 5 tuberculosis units to which patients are referred, 2 TUs have got more number of cases. i.e. 44 cases to Orathur and 29 cases to VDM. Because, geographically the above two TUs are closer to RMMCH. In Orathur TU, there are more patients in the age group of 15- 29 (29.5%) years as compared to 30-44 years age group at VDM (27.5%). It was found out during the third visit that 6 patients from the original cohort were not available at their stated address and hence the denominator has been reduced to 86. Out of 86 patients, 80% of the TB patients travelled less than 10 km to get the drugs. Many studies addressed distance to DOTS facility as one of the independent variable, which influence compliance<sup>5,8,17,25</sup>.

After referral, patients are expected to visit the PHI and get the treatment initiated within 24 to 48 hrs. In our study, only 82% of patients (75 out of 92) were initiated treatment in respective TUs. Out of 75 patients who were initiated treatment, 73.6% of them were initiated within 14 days. Initiation delay is found to be correlated with distance to DOTS facility. It is also statistically significant (p value > 0.05). In this study initiation delay is less in Cat I as compared to Cat II and Cat III. Similarly,

S.Paynter et al, documented the initiation delay is less with sputum smear positive cases<sup>19</sup>. The numbers of initial defaulters were relatively higher among males in the age group of 45-54 years. P.G.Gopi et al, reported initial defaulters are more in males (24%) as compared to females (18%), in Tiruvallur district of Tamilnadu<sup>20</sup>. However, among smear positive patients the rate of initial default did not differ by age and sex<sup>21</sup>.

Out of 75 patients who were initiated treatment, 69 patients completed intensive phase with some delay but not exceeding 2 months. In the remaining 6, 2 patients died during IP and 4 patients defaulted. Dropout rate in IP is only 5.9%. However, the difference in treatment completion between Cat I & II and Cat III is not statistically significant (p value >0.05).

Out of 69 patients in continuation phase 52 patients completed CP with some delay but not exceeding 2 months. In the remaining 17 patients 6 patients died during CP and 11 patients defaulted. The drop out in CP is 15.9%. However, the difference in treatment completion between CatI&II and CatIII is not statistically significant (p value >0.05).

Treatment completion rate among patients who were initiated treatment in all PHIs put together is 69%. The defaulter rate is 20%.

In this study, the defaulter rate is higher in the age group of 30-44 (33%) years, which is followed by 26.6% in 60+ age group. Similarly, Mahesh kumar et al, reported the defaulter rate maximum in the age group of 35-44 years in Lucknow<sup>9</sup>. The reason for this may be that, patients in this age group economically active person hence could not spare time to visit DOTS clinic on a regular basis. Tara singh et al, reported compliance behaviour is closely associated with social support from family and friends<sup>31</sup>. Betty susan et al, reported that intra familial stigma found to be significantly associated with non-compliance<sup>32</sup>.

In the present study, 73 % of males completed treatment as compared to 60.8% in females and the difference is not statistically significant. The default rate in the present study is almost twice in the females (30.4%) as compared to males (15.3%). Fredrick AD et al, reported defaulters were more in females as compared to males (39.1% Vs 33.9%) in Zambia<sup>26</sup>. But, Sophia vijay et al, reported 89.6% of males were defaulters in Bangalore city<sup>5</sup>, similar finding reported by K.C.Chang et al, in Hong kong<sup>24</sup>. A report from a rural DOTS programme in South India that despite facing greater stigma and inconvenience associated with DOTS women were more likely to be notified to RNTCP and adhere to TB treatment than men<sup>21</sup>. A..Sanou et al, reported the barriers to access and adhering to Tuberculosis treatment further complicated by gender, at Barkina Faso in Belgium.<sup>22</sup>

In the present study, 6 males and 2 females died among 75 cases treated in PHI. P.K Dewan et al, reported the similar finding in Orel, Russia<sup>23</sup>. In this study, the difference in treatment outcome according to gender is not statistically significant.

The present study shows the treatment completion rate is 66.6% in Cat I, 80% in Cat II and 69% in Cat III. But the defaulter rate is similar in Cat I & Cat III. Sophia vijay et al, reported defaulter rate of 25% in Cat I, 45% in Cat II<sup>5</sup>. Conversely, the defaulter rate of 48.6% in Cat I, 38.6% in cat II and 12.6% in cat III are reported by Mayank vats et al, in Ajmer, India<sup>17</sup>. However, in the present study the difference in each category is not statistically significant (p value > 0.05).

Many studies analyzed the influence of distance to treatment outcome. A.M.Morsy et al, reported 29.6% of cases shown treatment failure, located farther more than 10 km<sup>25</sup>. In the present study, the relationship between distance travelled < 5km or more with the treatment outcome is not statistically significant.

In the present study, 20 % cases discontinued treatment due to reasons related to drugs (side effects like giddiness, itching) as expressed by the patients, 46% discontinued treatment because of the misconceptions ( reasons stated and included under this heading are free from symptoms interpreted as cure, smoking, non- availability of full meal, ambitious to have injections and pregnancy), and 33% discontinued because of other reasons related to drug accessibility (denied by TB staff / negligence and rude behaviour of the DOT provider) and preferring traditional medicine/treatment from private practitioners. Sophia vijay et al, observed reasons like going out of station for short spells, side effects to anti- TB drugs and unsuitable DOT timings as common reasons for default in Bangalore city<sup>5</sup>. Tara singh et al, reported non-compliant patients were more likely to stop treatment once they are free of symptoms<sup>27</sup>. Similarly, Tara singh et al, from Nepal, and O Boyle et al, at kotakinabalu in Malaysia reported non-compliant patients were more likely to think that treatment could be stopped once they were free of symptoms<sup>27,28</sup>. Mayank vats et al, reported symptomatic benefit as one of the patient related causes of default in Ajmer<sup>17</sup>. Sukumaran et al, reported fatigue and weakness as reasons for default but it is not common to interfere with DOTS<sup>29</sup>.

Diabetes appears to have both an induction and aggravating effect on TB. In contrast, Elaine C. Cunnan et al, reported treatment completion rate is similar in diabetics and non- diabetics rather treatment failure in diabetics in University of Santo Tomas Hospital, Phillippines<sup>30</sup>.

A couple of studies attempted to find out the reasons for initial default. In the current study, the reason for initial default as stated by patients are preference to non – DOTS, In-patient care, fear of adverse reactions, wrong advice by general practitioners/local doctors, missing of referral slips and refusal of PHI staff to register without referral slip and insisting on submission

of residential identity for registering. Some of the patients in Cat I initially defaulted, because of they were not provided with In-patient facilities as expected by them. P.G.Gopi et al, reported common reason for initial default were unwillingness (refusal or not interested) for initiation of treatment, symptoms too mild to warrant treatment, too sick/old and work related problems in the community facility. In the health facility, the reasons for initial default were personal problems like loss of wages, social engagements, dissatisfaction with health services and disease related problems like felt better or too sick.

The overall outcome of referral and compliance pattern of cohort of 92 patients is 56% of them completed treatment, 16% defaulted, 9% died, 12% initial defaulters and 7% migrated. In the present study 73.6% of the patients initiated treatment within 14 days. The delay in initiation for others ranged from 15 to 84 days. The duration for completion of treatment ranged from 26 weeks to 42 weeks in Cat I, 33 weeks to 52 weeks and for cat III 26 weeks to 34 weeks.

The study results could not be generalized to a large group of patients because of small sample size. Sputum conversion status was not available for all sputum positive patients at the end of Intensive phase and at the completion of Continuation phase. Hence, cure rate after Continuation phase and response rate after Intensive phase could not be ascertained from the study results. There was discrepancy between the information recorded in TB card of individual patients and the information obtained through personal interview. Referral system should be strengthened by sending copy of transfer form to PHIs. Severely ill patients should be given (Cat I) In-patient treatment.

## **Conclusion**

This study revealed and listed the factors affecting the compliance which influence the treatment outcome of patients in Private

Medical colleges. What we see today as MDR TB is the result of past actions such as poor adherence to treatment due to patient and programme related factors. Hence this study reiterates that the patient related factors to be addressed and programme to be flexible in order to achieve compliance even today. So, the recent advances in case finding categorization, Diagnosis and treatment of MDR TB/XDR TB to be viewed in the limelight of timely referral, proper follow up and improving compliance of every patient.

**Conflict of Interest: nil**

**Source of funding: nil**

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Original Research Article

## A study on knowledge and vaccination status of Hepatitis B among medical students

Chaitanya Gujjarlupudi <sup>1</sup>, A Ravinder <sup>2</sup>, Dheeraj A K <sup>3</sup>

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### Abstract

**Introduction:** Hepatitis B is an acute systemic infection caused by Hepatitis B Virus (HBV), affecting the liver and transmitted usually by parenteral route. Health Care Professionals, particularly surgeons, laboratory personnel, medical students are at high risk of exposure to HBV by virtue of their contact with patients, contaminated instruments and body fluids. Since proper vaccination can prevent this infection, complete vaccination against HBV is necessary for medical and paramedical students. This study was conducted to assess the knowledge and Hepatitis B vaccination status among medical students of Katuri Medical College, Guntur, Andhra Pradesh. **Methods:** A cross sectional study was conducted among medical students belonging to III – IX semesters using a pre tested questionnaire. Data was analysed using SPSS version 16.0. **Results:** Among the study participants 95.5% are having awareness that HBV affects liver, but only 46.5% know all the possible modes of transmission of the disease. Only 63% of the participants are vaccinated against HBV; of which only 67.5% are fully vaccinated. **Conclusion:** Awareness regarding modes of transmission of HBV is low. Periodical sensitization programmes and vaccination are essential for protecting medical students from HBV infection.

**Keywords:** Awareness, Hepatitis B, Vaccination,

**Authors:** <sup>1</sup> Assistant Professor, Department of Community Medicine & <sup>2</sup> Lecturer in Statistics, Department of Community Medicine, Katuri Medical College & Hospital, Guntur-19.<sup>3</sup> UG student, Katuri Medical College & Hospital, Guntur-19.

### Corresponding Author:

Dr Chaitanya Gujjarlupudi, Assistant Professor, Department of Community Medicine, Katuri Medical College & Hospital, Guntur – 522019.  
Email: [chaitanya28@gmail.com](mailto:chaitanya28@gmail.com)

### Introduction

Hepatitis is an inflammatory disease of the liver which may be caused by the Hepatitis B virus (HBV). Hepatitis B is a global problem, with 66% of all the world population living in areas where there are high levels of infection<sup>1</sup>. In South East Asian Region, there are estimated 80 million HBV carriers (about 6% of the total population).<sup>2</sup> India has the intermediate endemicity of hepatitis B, with hepatitis B surface antigen prevalence between 2% and 10% among the population studied. The total number of HBV carriers in India has been estimated to be over 40 million which constitutes nearly 12-15% of entire HBV carrier pool in the world. HBV is also the second most common cause for acute hepatitis in India (after hepatitis E), being responsible for

nearly one-third of acute viral hepatitis patients.<sup>3</sup>

The practice of modern medicine has “contributed” a lot in the increase of the cases and spreading the disease in the society. Hepatitis B infections are common due to lapse in the sterilization technique of instruments or due to the improper hospital waste management as 10 to 20% health care waste is regarded hazardous and it may create variety of health risk.<sup>4</sup> Healthcare workers, particularly surgeons, pathologists, dentists and physicians working in hemodialysis and oncology units, are at a higher risk of contracting HBV infection via minor skin cuts and accidental needle punctures.<sup>5</sup>

Healthcare personnel represent a high risk population for HBV infection. Hepatitis B is the

most important infectious occupational hazard which Indian medical students and healthcare workers (HCWs) encounter. The factors responsible for the high risk of being infected by HBV are the high prevalence of HBV carriers in the population and the high contagiousness of HBV. In fact, HBV infection is more dangerous compared to HIV infection vis-a-vis occupational exposure is due to the fact that its transmission rate after percutaneous exposure to blood is much higher (about 30%) than that of HIV (0.3%).<sup>6</sup>

Knowledge regarding the Hepatitis B virus and safety precautions is needed to minimize the health care settings acquired infections among health personnel. They should have complete knowledge of Hepatitis B infections, importance of vaccinations and practice of simple hygienic measures apart from that of specific protective measures. Medical students being part of the health care delivery system are exposed to the risk when they come in contact with patients and contaminated instruments. They are the first level of contact between patients and medical care. They are expected to undertake activities related to patient care with the beginning of their clinical years.<sup>7</sup>

Since proper vaccination can prevent HBV infection, complete hepatitis B vaccination is necessary for medical and paramedical students.<sup>8</sup> The present study was carried out to find the knowledge, attitude and practice of medical students towards hepatitis B infection and vaccination.

### Material and methods

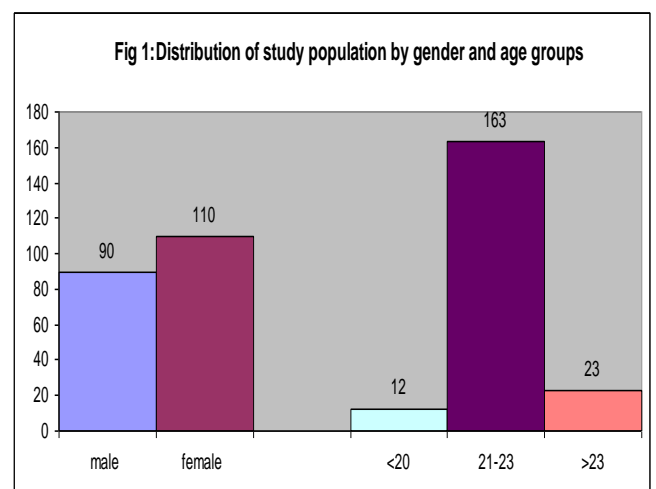
The present study was conducted to assess the knowledge, attitude, awareness and practices regarding HBV infection and vaccination. This is a cross sectional institution based study carried out among 200 medical students of III to IX semesters in Katuri Medical College and Hospital, Guntur. Students in their 1st year of medical course were not included in the study.

Permission was taken from the Institutional Ethics Committee for conducting the study.

Students were approached in their lecture halls and verbal consent was taken. A pre tested and pre designed questionnaire was distributed which was collected after it had been completed. Information was collected regarding epidemiology of HBV infection, modes of spread, attitude towards HBV infected patients, immunization status etc. The questionnaires were distributed in a single day in order to avoid sharing of information. Data was analysed using SPSS version 16.

### Results

The information was collected from a total of 200 medical students belonging to III to IX semesters. Out of these 55% were females and 45% males. The median age of study participants was  $21 \pm 1.3$  years. Majority of them (82.5%) were in the age group of 20- 22 years. (Fig1)



In the present study 89% of the students knew that HBV infection was more contagious than HIV infection through blood borne route.

Among the medical students who participated in the study, only 46.5% were aware of all the modes of transmission of HBV infection (Table 1) and 33.5% felt that health care personnel were high risk group for acquiring HBV infection. Availability of Post Exposure

Prophylaxis for HBV infection was known to 63.3% of males and 65.4% of females among the study participants.

Table-2 describes the attitude of the medical students towards the hepatitis B patients. Nearly two-thirds (73.5%) of the students believed that a hepatitis patient should be allowed to work routinely and 82.5% of the students correctly indicated that the hepatitis patients should not be isolated. In the present study, 36% of the respondents were not aware of the fact that hepatitis patients should not be allowed sexual contact.

**Table 1. Knowledge regarding modes of transmission of HBV infection**

Modes of transmission known	Number (%)
Three	93 (46.5)
Two	31 (15.5)
Only 1	51(25.5)

**Table 2. Attitude of medical students regarding Hepatitis B infection**

Question	Male (%)	Female (%)	Total (%)	p value
Should Hepatitis patients be allowed to work routinely? YES	59 (65.6)	88 (80.0)	147 (73.5)	0.02
Should Hepatitis patients be isolated? NO	69 (76.7)	96 (87.3)	165 (82.5)	0.05
Should Hepatitis patients abandon sexual contact? YES	59 (65.6)	69 (62.7)	128 (64.0)	0.67

To answer the question, 'How can students be encouraged to get vaccinated?' multiple responses were given, out of which 59% of the respondents advocated organizing periodic campaigns, and 44.5% media awareness programmes. Majority of the students, i.e 89.5%

had not participated in any awareness programme for Hepatitis B and 76 % said that they have not been for screened for HBV infection.

Regarding vaccination status 63% of the students reported that they were vaccinated for hepatitis B and out of these only 67.5% were completely vaccinated (3 doses). The proportion of male and female students completely vaccinated with three doses of hepatitis B vaccine was 41.1% and 43.6% respectively. Only 24% of the students in the present study reported that they were screened for HBV infection.

## Discussion

Hepatitis B is a worldwide public health problem. The disease is transmitted by parenteral / blood borne, vertical and sexual routes. In the present study 46.5% of the medical students were aware of all the three modes of transmission of HBV infection. The most common route of transmission of HBV infection known was blood borne (80.5%), followed by sexual route (61%) and vertical transmission (54.5%). The knowledge levels reported in the present study are lesser than that reported in studies done elsewhere in India.<sup>7,9</sup> In a study<sup>10</sup> done among medical students of Karachi, Pakistan only 57.1% of the participants showed excellent knowledge regarding the route of transmission of HBV infection.

Hepatitis B is an important infectious occupational disease for medical students and health care workers.<sup>11</sup> In the present study only 33.5% of the medical students perceived health care personnel to be high risk group for HBV infection.

Lack of awareness about disease transmission and its consequences, high chances of being exposed to blood and body fluids due to their inexperience in doing invasive procedures and handling patients, lack of perception to be at high risk for contracting HBV infection and not

adhering to universal precautions can result in the risk of being exposed to blood borne pathogens like HBV to be higher among medical students than an average health care worker.<sup>6</sup>

In the present study, availability of Post Exposure Prophylaxis for HBV infection was known to 64.5% of the medical students. This is higher than that reported in a study<sup>10</sup> done in Karachi, Pakistan where 76% of participants did not have any knowledge regarding Post Exposure Prophylaxis for HBV infection.

About 73.5% of the respondents correctly indicated that the patients should be allowed to work routinely and 82.5% indicated that HBV infected individuals should not be isolated. Similar findings have been reported in a study<sup>10</sup> done in Karachi, Pakistan and these attitudes are encouraging as compared to Omani medical students who showed only 58%.<sup>12</sup>

However, the attitude is distressing regarding avoidance of sexual contact in HBV infected individuals as 36% of the students were unaware of this fact in the present study.

### **Vaccination Status among medical students**

Immunization with hepatitis B vaccine plays a very important role in controlling occurrence of HBV infection. Among the study participants only 42.5% are fully vaccinated with all the three doses against HBV infection. Similar findings were reported among medical students of Lahore and in a study conducted in Bombay.<sup>13</sup> However in the present study, vaccination status of medical students was much lower than the vaccination rate of 80% in medical students, highlighted by a similar study conducted in Orissa, India<sup>14</sup> and in a study<sup>10</sup> conducted in Karachi, Pakistan where the fully vaccinated rate was 70.6%.

### **Conclusions**

The present study concludes that there is lack of awareness among the medical students about

Hepatitis B, and its mode of transmission and regarding high risk groups for HBV infection. Moreover, many of the students were not vaccinated against Hepatitis B, which made them more vulnerable to the disease.

Since medical students are at increased risk of acquiring needle stick injury, and increased prevalence rate of Hepatitis B in India, medical students should be routinely vaccinated upon entry into the medical college. Complete vaccination and health education of all medical students upon entry into medical colleges followed by periodical sensitization campaigns and seminars would go a long way in protecting them from the disease.

**Conflict of Interest: nil**

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Original Research Article

A Study on Awareness of Risk Factors of Carcinoma Cervix among Rural Women of Nalgonda District, Andhra Pradesh

Ravikiran E<sup>1</sup>, Vijaya K<sup>2</sup>

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Abstract

**Introduction:** Cancer Cervix happens to be the third most commonly diagnosed cancer and fourth leading cause of death among females in the globe. Most of the cases and deaths are seen in developing countries and India attributes to about 15% of the cancer deaths in the world mostly in rural areas. **Objectives :** To study the awareness of risk factors of carcinoma cervix among rural women of Cherlapally village of Nalgonda district & the misconceptions among them about carcinoma cervix. **Methods:** A cross-sectional study was carried out among 345 village women of age group 15 years and above using systematic random sampling technique by a predesigned and a pretested questionnaire. Data was analyzed using SPSS version 17 for windows. **Results:** The risk factors of carcinoma cervix like multiple sexual partners, smoking tobacco and prolonged use of Oral Contraceptive Pills (OCPs) for a period of 5 or more years for family planning were known to majority of the rural women. Misconceptions about carcinoma cervix like screening for carcinoma cervix, Intra Uterine Devices (IUDs) usage, Use of tampons and herbs was seen in a maximum proportion of the village women. **Conclusion:** Major proportions of the rural women were not aware of the risk factors of cervical cancer, the screening process and its importance as well as good hygienic practices. A comprehensive cancer awareness and screening programme should be started in the district by the Department of Health and involve medical college staff, school teachers, government officials etc. to create awareness about carcinoma cervix and to dispel misconceptions. Efforts should be made to prevent the disease and avert untimely deaths in young women.

**Key words:** Carcinoma cervix, Misconceptions, Rural women

Authors:

1&2- Professor of Community Medicine, Narayana Medical College, Nellore, A.P.

Corresponding Author:

Dr.Ravikiran Epari, Professor of Community Medicine, Narayana Medical College, Nellore, A.P. Pin524002  
E-mail:dreravikiran@yahoo.co.uk

Introduction

Cervical cancer is the third most commonly diagnosed cancer and the fourth leading cause of cancer deaths in females worldwide, accounting for 8.8%,(530,232) of the total cancer cases and 8.2% (275,008) of the total new cancer deaths among females in 2008. More than 85% of these cases and deaths occur in developing countries. India, the second most populous country in the world, accounts for 15.2% (72,825) of the total cervical cancer deaths.<sup>1</sup> Cancer of the cervix has been the most important cancer in women in India over the past two decades. All the urban population based cancer registries (PBCR) at Bangalore, Bhopal, Chennai, Delhi and Mumbai have

shown a statistically significant decrease in Age Adjusted Incidence Rates (AAR) of this site of cancer. Since over 70% of the Indian population resides in the rural area, cancer cervix still constitutes the number one cancer in either sex.<sup>2</sup> The usual 10-20 years natural history of progression from mild dysplasia to carcinoma makes cervical cancer a relatively easily preventable disease and provide the rationale for screening.<sup>3</sup> Majority of the women who develop cervical cancer tend to have one or more identifiable factors that increase their risk factors are mutable like smoking, diet while others are immutable like age, race. There are also several misconceptions about cervical cancer and its screening programmes.

Attitudes and beliefs about cervical cancer among the general population and health care providers can also present barriers to its control. Studies on awareness of cervical cancer amongst rural women in Nalgonda district have not been done till date. Taking these facts into consideration a study was conducted to assess the knowledge of risk factors and misconceptions about cervical cancer cases among rural women of Nalgonda district.

### Materials and methods

A cross-sectional study was conducted among the rural women of Cherlapally village of Nalgonda district from November to December 2008.

Sampling universe constituted 1045 households in the village. All the houses were enumerated and every tenth house was selected by systematic random sampling technique. All the available women of the age group 15 years and above were interviewed after incorporating the necessary inclusion and exclusion criteria. In this process 345 women were available for interview that formed the study population.

Females 15 years or more in age; who are permanent residents of the village; who are ambulatory, not sick and can answer the questionnaire were included. And Females less than 15 years of age; who are not permanent residents of the village; bed ridden and cannot answer the questionnaire were excluded.

The predesigned structured close-ended survey questionnaire was pilot tested among the rural women and after making necessary changes was applied for the study population. The Questionnaire was translated into the local vernacular language for the benefit of the rural women. It dealt with socio-demographic details, awareness of risk factors and misconceptions (modified for local conditions)<sup>3</sup> about cervical cancer.

### Results

A sample of 345 rural women participated in the study. Women in the age group of 45-60 years constituted the maximum 161(46.7%) proportion of the study sample. About 195 (56.5%) of the rural women were illiterate. Majority 317(91.9%) of the study subjects were Hindus. As per modified B.G.Prasad's classification of Socio-economic status most 124(35.9%) of the rural women belonged to Class III or Lower middle class. 289(83.8%) of the women were married with the rest being unmarried or widows. Maximum proportion 219 (63.5%) of the rural women were having 1-4 children. (Table-1)

**Table 1 : Socio-demographic profile of the study population (n = 345)**

Variables	Number	%
<b>Age in years</b>		
15-30	59	17.1
30-45	102	29.6
45-60	161	46.7
≥60	23	6.6
<b>Literacy status</b>		
Illiterate	195	56.5
Upto 10 <sup>th</sup> standard	113	32.8
Above 10 <sup>th</sup> standard	37	10.7
<b>Religion</b>		
Hindu	317	91.9
Christians	22	6.4
Muslim	6	1.7
<b>Socio-economic status</b>		
Class I	42	12.2
Class II	73	21.2
Class III	124	35.9
Class IV	85	24.6
Class V	21	6.1
<b>Marital status</b>		
Unmarried	45	13.0
Married	289	83.8
Widow	11	3.2
<b>Parity</b>		
0	25	7.2
1-4	219	63.5
≥5	101	29.3

**Table 2 Knowledge of risk factors of Carcinoma cervix (n = 345)**

Risk Factors	Age groups					%	p value
	15-30	30-45	45-60	≥ 60	Total		
<b>Increasing age</b>							
Yes	19	34	53	8	114	33.0	<0.05
No	31	55	81	12	179	51.9	
Don't know	9	13	27	3	52	15.1	
<b>Infection with HPV</b>							
Yes	21	37	58	9	125	36.2	<0.001
No	9	17	26	11	63	18.3	
Don't know	29	48	17	3	157	45.5	
<b>Early sexual activity (&lt; 18yrs)</b>							
Yes	6	11	17	2	36	10.4	>0.05
No	41	72	113	16	242	70.2	
Don't know	12	19	31	5	67	19.4	
<b>Multiparty (≥5)</b>							
Yes	13	23	34	7	77	22.3	<0.01
No	43	74	123	11	251	72.8	
Don't know	3	5	4	5	17	4.9	
<b>Multiple sexual partners</b>							
Yes	27	91	128	18	273	79.1	<0.001
No	26	3	22	3	45	13.0	
Don't know	6	8	11	2	27	7.8	
<b>Smoking</b>							
Yes	47	84	145	11	287	83.2	<0.001
No	7	14	10	7	38	11.0	
Don't know	5	4	6	5	20	5.8	
<b>Prolonged use of OCPs (≥ 5 yrs)</b>							
Yes	46	92	141	12	291	84.3	<0.01
No	10	4	13	6	33	9.6	
Don't know	3	6	7	5	21	6.1	

**Table 3 Misconceptions about Carcinoma cervix (n = 345 )**

Misconceptions	Number	%
Intrauterine device causes cervical cancer	129	37.4
In screening part of your body is removed	213	61.7
Screening is like a vaccine, once you had it , you will not get cervical cancer.	156	45.2
There is no point in going for cancer screening, because it tells a woman that she has a fatal condition and nothing can be done for it.	227	65.8
Cancer cervix is seen in women with poor hygienic practices	71	20.6
Use of sanitary napkins and herbs can cause cancer of cervix.	117	33.9

Increasing age as a risk factor of carcinoma cervix was not known to 179 (51.9%) of the rural women. Only 125 (36.2%) of the women were aware that Human Papilloma Virus (HPV) as a risk factor for carcinoma cervix. Majority

242( 70.2%) of the rural women negated that initiation of sexual activity at an early age i.e. less than 18 years either by marriage or otherwise can be a risk factor of carcinoma cervix. 77 ( 22.3%) of women were aware that

begetting more number of children i.e.5 or more constitutes risk for a woman getting cervical cancer.

A major proportion 287(83.2%) of the rural women were aware that smoking tobacco can cause cervical cancer. Prolonged use of oral contraceptive pills (OCPs) for a period of 5 years or more was known as a risk factor to majority 291(84.3%) of the rural women.

The association of age with the risk factors of carcinoma cervix like Increasing age ( $p<0.05$ ), Infection with Human Papilloma Virus ( $p<0.001$ ), Multiparity ( $p<0.01$ ), Multiple sexual partners ( $p<0.001$ ), Smoking tobacco ( $p<0.001$ ) and Prolonged use of OCPs ( $\geq 5$  years) was found to be statistically significant. ( $p<0.01$ ) (Table-2)

Majority of the rural women who were interviewed had misconceptions about cervical cancer. Misconceptions regarding screening for carcinoma cervix, regarding Intrauterine devices (IUDs) causing cervical cancer and concerning usage of sanitary napkins and herbs resulting cervical cancer were seen in majority of the rural women. (Table-3)

## **Discussion**

It was seen in the present study that the rural women were aware that multiple sexual partners, smoking tobacco and prolonged use of Oral Contraceptive Pills (OCPs) for duration of 5 years or more for family planning would pose a risk for development of cervical carcinoma in women. Similar observations were noted in a study done by Ushadevi G et al among rural women of Kancheepuram district, Tamil Nadu where the smoking and multiple sexual partners were considered as risk factors.<sup>4</sup> A study done by Uysal Aynur and Birsal Aylin on knowledge of cervical cancer risk factors among Turkish women also identified that these women were aware that multiple sexual partners, multiparity and smoking were risk factors for carcinoma cervix.<sup>5</sup> Yaren A et al in their study that

awareness of more number of risk factors of cervical cancer in their study subjects in contrast to the findings of the present study.<sup>6</sup> A study done in Karachi, Pakistan showed that the knowledge of risk factors of cervical cancer was less in the study population compared to the present study.<sup>7</sup> Cancer of the cervix is now thought to be a sexually transmitted disease.<sup>8</sup> Its association with early sexual activity and sexual promiscuity in particular, has been well established in a number of epidemiological studies in the west<sup>9,10</sup> and in Asian populations<sup>11</sup>. Regarding misconceptions about cancer cervix, most of the rural women in the present study related them to screening process which was similar to the observations made in the study done among rural women in Kancheepuram district.<sup>4</sup>

**Conclusion:** The present study serves to highlight that a major proportion of the rural women were not aware of the risk factors of cervical cancer, the screening process and its importance as well as good hygienic practices. A comprehensive cancer cervix awareness and screening programme should be started in the district with a special focus on villages by the department of health with the help of other stake holders like staff of medical college, school and college teachers and government officials. Awareness regarding menstrual hygiene and use of sanitary napkins, regular screening by Pap smear and clearing misconceptions about carcinoma cervix will go a long way in preventing cervical carcinoma and also untimely deaths of the young women.

## **Acknowledgement**

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**Conflict of Interest: nil**

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Original Research Article

## Sputum grading as a predictor of treatment outcome of new sputum smear positive tuberculosis patients in Khammam Tuberculosis Unit

Shankar Reddy Dudala<sup>1</sup>, Raghotham Reddy K<sup>2</sup>, Chandrasekhar Reddy Bolla<sup>3</sup>, Rao AR<sup>4</sup>, Ravi Prabhu G<sup>5</sup>

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### Abstract

**Introduction:** The diagnosis of pulmonary tuberculosis under Revised National Tuberculosis Control Program (RNTCP) is primarily based on sputum examination, in accordance with the guidelines of World Health Organisation. All chest symptomatics are required to get two specimens of sputum examined for establishing the diagnosis at Microscopy Centre. **Aim:** To assess the importance of initial sputum grading as a predictor of treatment outcome of New Sputum Smear Positive Tuberculosis patients in Tuberculosis Unit (TU) Khammam. **Material and methods:** All the new sputum smear positive patients registered in Khammam TU during the second and third quarters of 2009 were enrolled as study subjects. A total of 413 patients were registered as per the inclusion criteria under six Designated Microscopic Centres (DMCs). The patients under each DMC area were listed. These patients were followed up till the completion of their treatment. **Results:** Among the enrolled patient's (413), 1.69% (7) were found to be scanty grading, 20.34% (84) were found to be 1+ grading on sputum examination, 33.66% (139) were found to be 2+ grading on sputum examination and 44.31% (183) were found to be 3+ grading on sputum examination. The cure rate for patients with sputum 3+ grading was 80.33% and the defaulter rate was 4.92%. Cure rate for patients with sputum 1+ grading was 94.05% and the defaulter rate was 4.76%. **Conclusion:** The norms of RNTCP regarding sputum smear conversion rate during the intensive phase was achieved in Khammam TU.

**Key words:** Grading, Predictor, RNTCP, Sputum, Tuberculosis

### Authors:

1. Assistant Professor, Department of Community Medicine, S.V. Medical College, Tirupati. 2. Assistant Professor, Department of Community Medicine, Mamata Medical College, Khammam. 3. Assistant Professor, Department of Community Medicine, Mamata Medical College, Khammam 4. Assistant Professor, Department of Community Medicine, Apollo Medical College, Hyderabad. 5. Professor & HOD, Department of Community Medicine, S.V. Medical College, Tirupati, Andhra Pradesh, India.

### Corresponding Author:

Dr. Shankar Reddy Dudala  
Assistant Professor,  
Department of Community Medicine,  
S.V. Medical College, Tirupati,  
Andhra Pradesh, India.

**E-Mail:** [drshankarreddy1979@gmail.com](mailto:drshankarreddy1979@gmail.com)

### Introduction:

Sputum Smear Positive [SSP] pulmonary tuberculosis patients are the main source of infection for tuberculosis because when they cough or sneeze they expel droplet nuclei which carry infectious bacilli.<sup>1</sup> One untreated infectious tuberculosis patient is likely to infect 10 to 15 persons annually.<sup>2</sup> It is expected that 80 to 90% of patients will undergo smear conversion within two to three months of treatment.<sup>3</sup> Several factors have been identified that may delay the time to smear and culture

conversion. These include high initial sputum smear acid fast bacilli [AFB] grade, cavitory lesion, uncontrolled hyperglycaemia / diabetes mellitus, old age, multi-drug resistant tuberculosis, initial treatment with less than four anti-tubercular drugs.<sup>4-8</sup>

Patients diagnosed with tuberculosis are treated under Directly Observed Treatment Short course chemotherapy (DOTS) in accordance with the Revised National Tuberculosis Control Program (RNTCP) guidelines.<sup>9</sup> On April 1<sup>st</sup> 2009 the RNTCP guidelines were revised. The

number of sputum specimens collected was two, with one of them being a morning sputum specimen. Diagnosis of smear positive tuberculosis amongst tuberculosis suspects - One specimen positive out of the two is enough to declare a patient as smear positive tuberculosis and a pulmonary tuberculosis suspect is any person with cough for 2 weeks, or more.<sup>10</sup>

Early diagnosis of TB and initiating treatment under DOTS would not only enable the patients to get cured but also reduce the transmission of infection and disease to others. In RNTCP, the sputum smears are graded and reported based on the bacillary load. The present study was carried out on new smear positive pulmonary tuberculosis cases treated with category I regimen under RNTCP in Khammam TU, to find the association of conversion and cure related to smear grading at the start of treatment. Very few studies are done in tribal areas; hence the present study was done to know whether the norms of RNTCP are being achieved.

**Material and methods:**

Descriptive study involving review of existing records maintained under the RNTCP. Study was undertaken following permission from institutional ethics committee. All the new sputum smear positive patients registered in Khammam Tuberculosis Unit (TU) during the second and third quarters of 2009 were enrolled as study subjects. All eligible cases of sputum smear-positive TB registered during the study period were included in the study. A total of 413 patients were registered as per the inclusion criteria. There are six Designated Microscopic Centre (DMC) in Khammam TU. The patients under each DMC area were listed. These patients were followed up till the completion of their treatment.

**Laboratory Procedures:** Sputum specimens submitted to the laboratory were processed for AFB microscopy. Direct smears were stained by

Ziehl-Neelsen technique and graded as per RNTCP guidelines.<sup>11</sup>

**Table 1: Sputum smears are examined and interpreted as indicated in the table<sup>11</sup>**

If the slide has:	No. of fields to be examined	Grading	Result
No AFB in 100 oil immersion fields	100	0	Negative
1-9 AFB per 100 oil immersion fields	100	Scanty*	Positive
10-99 AFB per 100 oil immersion fields	100	1+	Positive
1-10 AFB per oil immersion field	50	2+	Positive
More than 10 AFB per oil immersion field	20	3+	Positive

**Smear Conversion:** It is expected that at least 80% of new smear-positive patients will convert (become sputum smear-negative) by the end of two months of treatment. At the end of three months, more than 90% of such patients could be expected to have converted.<sup>11</sup>

Data were analyzed by using the EPI-INFO Version 7 package and MS Excel 2007 for simple proportions was calculated and statistical tests of significance were applied wherever necessary

**Results:**

Total of 413 new sputum positive patients were registered in a six Designated Microscopic Centres (DMC). Of them 44.31% patients had 3+ sputum grading, followed by 2+, 1+ and scanty. As per the revised guidelines even a single bacilli found is taken as positive.

**Table 2: Distribution of New Sputum Smear Positive Tuberculosis patients according to their grading of sputum (n=413)**

Sputum grading	Number of cases	Percentage
Scanty	7	1.69%
1+	84	20.34%
2+	139	33.66%
3+	183	44.31%
<b>Total</b>	<b>413</b>	<b>100%</b>

Among the patients, 1.69% was found to be scanty grading and 44.31% were found to be 3+ grading on sputum examination. Even a single bacilli present in the smear is take as smear positive.

**Table 3: Distribution of New Sputum Smear Positive Tuberculosis patients according to their grading of sputum and sputum conversion (n=413)**

Sputum grading	Sputum conversion		Number of cases converted to sputum negative	Number of cases enrolled
	At the end of 2 <sup>nd</sup> month	At the end of 3 <sup>rd</sup> month		
Scanty	6 (85.7%)	1 (14.3%)	7 (100%)	7 (100%)
1+	75 (89.3%)	2 (2.4%)	77 (91.7%)	84 (100%)
2+	128 (92.1%)	3 (2.2%)	131 (94.3%)	139 (100%)
3+	151 (82.5%)	6 (3.3%)	157 (85.8%)	183 (100%)
<b>Total</b>	<b>360 (87.2%)</b>	<b>12 (2.9%)</b>	<b>372 (90.1%)</b>	<b>413 (100%)</b>

Chi-square = 3.386 with 3 degree of freedom; p = 0.454

In the present study of the total enrolled patients (413), 360 (87.2%) were sputum negative by the end of 2<sup>nd</sup> month and at the end of 3<sup>rd</sup> month, 372 (90.1%) patients were sputum negative. There is no significant association between initial sputum grading and sputum conversion at the end of 2<sup>nd</sup> and 3<sup>rd</sup> month after initiation of treatment.

**Table 4: Distribution of New Sputum Smear Positive Tuberculosis patients according to their grading of sputum and treatment outcome (n=413)**

Initial Sputum Grading	Cured	Others*	Total cases
Scanty	6 (85.7%)	1(14.3%)	7(100%)
1+	79(94%)	5(6%)	84(100%)
2+	123(88.5%)	16(11.5%)	139(100%)
3+	147(80.3%)	36(19.7%)	183(100%)
<b>Total</b>	<b>355(95.4%)</b>	<b>58(4.6%)</b>	<b>372(100%)</b>

\* Note others include treatment failure, default, treatment completed, death

Chi-square = 10.097 with 3 degree of freedom; p= 0.023

The cure rate for 3+, 2+, 1+ and scanty initial sputum grading is 80.3%, 88.5%, 94% and 85.7% respectively. There is a significant association between initial sputum grading and their treatment outcome. As the bacillary load increases cure rate decreases.

### Discussion:

Sputum positive patients are capable of transmitting infection. In RNTCP all new smear positive pulmonary tuberculosis patients, irrespective of bacillary load, should be given the same treatment regimen with same number of drugs and dosages. Absence of sputum conversion at two to three months of treatment has been found to be one of the strongest predictor for poor treatment outcome in various studies.<sup>4-8</sup>

In the present study, 90.07% of enrolled patients were sputum negative at the end of 3<sup>rd</sup> month of treatment. As per RNTCP norm the sputum conversion rate should be >90% and in the present study it is 90.07%. So RNTCP norm of sputum conversion rate has been achieved by Khammam TU of total enrolled cases (2<sup>nd</sup>

quarter and 3<sup>rd</sup> quarter 2009). Our findings are similar with other studies, Kumaresan JA et al found that sputum smear conversion was 85% at the end of 2 month,<sup>12</sup> Singla R et al also reported that sputum was negative in 81.1% of patients at the end of the 2nd month and 91.6% at the end of the 3<sup>rd</sup> month.<sup>13</sup> In a study done by Banu Rekha VV et al 60.43% of the cases was sputum negative by the end of Intensive phase.<sup>14</sup> A study done by Moharana PR et al stated that the sputum conversion rate among NSP was 82.6% at the end of Intensive phase.<sup>15</sup> Kaur G et al in their study stated that sputum conversion rate among NSP cases at three months was 93.8%.<sup>16</sup>

Among the enrolled patients, 44.31% were found to be 3+ sputum grading on examination and 1.69% were found to be scanty grading. In this study, the cure rate for patients with 3+ sputum grading was 80.33% versus 90.43% for the rest of the patients (combined graded sputum scanty, 1+ and 2+). In a study done by Bawri S et al 42% were found to be 3+ sputum grading and 11% were found to be scanty grading.<sup>17</sup> In a study done by Banu Rekha VV et al there was an equal number of patients being registered with 1+ and 2+ sputum grading (43.5%).<sup>14</sup> Rajpal Sanjay et al in their study stated that 47.9% were registered with 3+ sputum grading, 5.2% were found to be scanty grading, and new sputum smear positive patients showed 85% cure rate for 3+ sputum grading and 97.7% for the rest of the patients (combined graded sputum scanty, 1+ and 2+).<sup>18</sup> The study by Singla R et al showed a cure rate of 76.6% for 3+ sputum grading and 85.1% for scanty, 1+, 2+ sputum grading. The failure rates were 7.7% for 3+ sputum grading and 4.5% for scanty, 1+, 2+ sputum grading.<sup>13</sup> A study done by Gopi PG et al stated that cure rate of 3+ sputum grading was 71.7% , 2+ sputum grading it was 78.1%, 1+ sputum grading it was 76.8% and for scanty sputum grading it was 88.4%.<sup>6</sup>

**Conclusion:** The norms of RNTCP regarding sputum smear conversion rate during the intensive phase was achieved in Khammam TU.

**Limitation of Study:** Status of smear was relied completely on lab technician. We did not cross check the quality of reporting of sputum smear slides.

#### **Recommendations:**

1. Service providers should be able to initiate treatment on the same day of consultation.
2. Laboratory operations and procedures should be realigned with sputum collection and reporting of results on the same day, within the constraints of existing human resources and laboratory workload.
3. The contact time between infectious patients and vulnerable groups attending the same facility should be minimized, especially in settings with a high HIV prevalence or a high burden of drug-resistant TB. Separation and rapid triage of coughing patients is especially important to reduce the risk for TB transmission in health-care settings.
4. Monitoring of patient drop-out between laboratory and patient registers and of trends in case detection and treatment outcomes is essential.

**Conflict of Interest: nil**

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Original Research Article

## Investigation of Acute Diarrheal Disease Outbreak during the Post Cyclone Phase in Pondicherry

Lakshminarayanan Subitha<sup>1</sup>, Kar Sitanshu S<sup>2</sup>, Premarajan KC<sup>3</sup>, Roy Gautam<sup>4</sup>, Sarkar Sonali<sup>5</sup>

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### Abstract

**Introduction:** Cases of acute diarrheal disease admitted in a tertiary hospital in South India, during the post cyclone phase were confirmed as cases of cholera. An investigation was carried out in Mudaliarpet, Puducherry in January 2012, by a team of epidemiologists to conduct a rapid situation assessment of the outbreak and provide guidance for prevention and control measures. **Methods:** Spot map of the affected area was made. Rapid house to house survey was done using the epidemiological case sheet and cases of acute diarrheal disease were line listed. **Results:** Rapid survey of 968 households in the affected area was conducted covering a population of 4643. It was found that there were 566 cases of diarrhoea in the affected area with attack rate of 12.2%. The findings of the investigation and the response measures undertaken are summarized here, in addition to prevention and control measures to be considered by public health professionals. **Conclusions:** Provision of safe drinking water, improving sanitation and strengthening of disease surveillance is necessary for control of cholera and other diarrhoeal diseases post cyclones and other disaster situations.

**Keywords:** Acute diarrheal disease, outbreak investigation, post disaster, surveillance

### Authors:

1. Senior Resident, 2. Assistant Professor, 3. Professor, 4. Professor & 5. Assistant Professor, Department of Preventive and Social Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry, India

### Corresponding Author:

Dr. Lakshminarayanan Subitha, Senior Resident, Department of Preventive and Social Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry, India.  
Email: [subitha.l@gmail.com](mailto:subitha.l@gmail.com)

### Introduction:

The potential impact of communicable diseases is often presumed to be very high in the chaos that follows natural disasters. Infectious diseases epidemics or outbreaks may occur several days, weeks or months in the post-impact or recovery phases after major disasters strike. Increases in endemic diseases and the risk of outbreaks, however, are dependent upon many factors that must be systematically evaluated with a comprehensive risk assessment.<sup>1</sup> There are clear research needs to improve understanding of the health risks in different settings and of the social and cultural modifiers of those risks. The public health after-

effects of tropical cyclones (hurricanes and typhoons) disasters and tornadoes, especially infectious diseases outbreaks, have been less documented compared with flood disasters.<sup>2</sup>

Cyclone Thane made landfall on 30 December 2011, on the north Tamil Nadu coast, between Cuddalore and Puducherry. The cyclone Thane left at least 47 dead in Tamilnadu and Puducherry. Coastal district of Tamilnadu and Puducherry were worst affected by Thane. The storm damaged houses, communication infrastructure, agricultural land and fishing equipments.<sup>3</sup> Following Thane, an increasing number of diarrhoea cases were reported from certain areas in Puducherry. A team of

epidemiologists from a tertiary care hospital in Pondicherry were mobilized to conduct a rapid situation assessment of the outbreak and provide guidance for prevention and control measures. We report here the findings of the epidemiological investigation of a localized outbreak of acute diarrheal disease caused by *V. cholera*, which occurred amongst the residents of an urban area in Puducherry, following cyclone 'Thane' during January 2012.

## Materials and methods:

### Outbreak recognition

Fourteen patients presented to the Emergency services department of JIPMER, a tertiary care hospital in Pondicherry between 6<sup>th</sup> to 9<sup>th</sup> of January, with complaints of vomiting and diarrhea and severe dehydration, of whom five people belonged to the same area of Mudaliarpet in Puducherry. They were admitted as cases of Acute Gastroenteritis with severe dehydration and were managed as per standard protocol. Stool culture was positive for *Vibrio cholera* in five patients. Three of these patients were from Mudaliarpet area, with history of similar symptoms being reported in the family and neighborhood. On behalf of the Integrated Disease Surveillance Project (IDSP) of JIPMER a team was mobilized to investigate the cause of outbreak. An investigation of the outbreak was planned in coordination with government health services. The objectives of the investigation was to quantify the magnitude of outbreak, to describe the time - place distribution and persons affected, identify the source and cause of outbreak, and formulate practical recommendations for prevention and control.

### Outbreak investigation

The investigation team consisted of epidemiologists, trainees in public health and sanitary inspector. Case definition for acute diarrheal disease was described as 'acute watery diarrhea with or without vomiting in the last one week'. Forms were developed for rapid

household survey and linelisting of cases of acute gastroenteritis. Spot map of the affected area was prepared by the investigators, health workers and volunteers to mark the extent of area affected by diarrheal cases. Rapid house to house survey was done using the epidemiological case sheet and cases of acute diarrheal disease were linelisted. Information on source of water, health facilities availed and treatment history was collected. Community members were also mobilized in the process, through support of local community leaders. Rapid sanitary survey of the affected area was undertaken.

## Results of the epidemiological investigation:

Mudaliarpet covers a total population of 56,000 with 13,400 households and referral centre being General hospital, Puducherry. Most cases of diarrheal disease were reported from area adjoining Rodiar Mill Street in Mudaliarpet. A total of 968 households were surveyed in the affected area. Out of 4643 individuals enumerated, 566 cases of Acute diarrheal disease (ADD) were linelisted, giving an attack rate of 12.2%.

**Fig. 1. Distribution of cases of Acute Diarrheal Diseases in Mudaliarpet by time of onset**

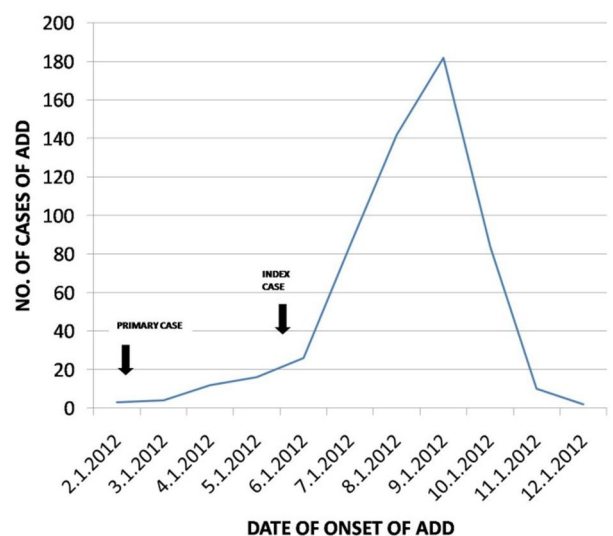


Fig. 1 shows the distribution of diarrhoea cases in the locality throughout the surveillance period. The index case that presented to the

health facility and confirmed as a case of cholera was on 6<sup>th</sup> January 2012. An epidemic curve was plotted, and it was observed that there was a rise in ADD cases starting from the fourth day of the outbreak, peaking around seventh day. Reported ADD cases reached a plateau around the tenth day. The area wise attack rates are given in figure 2. The attack rates of ADD ranged from 20% in Pattamal Nagar first and second cross streets. Makaliamman Koil Street and Swaminathanpillai street had attack rates of 14% each.

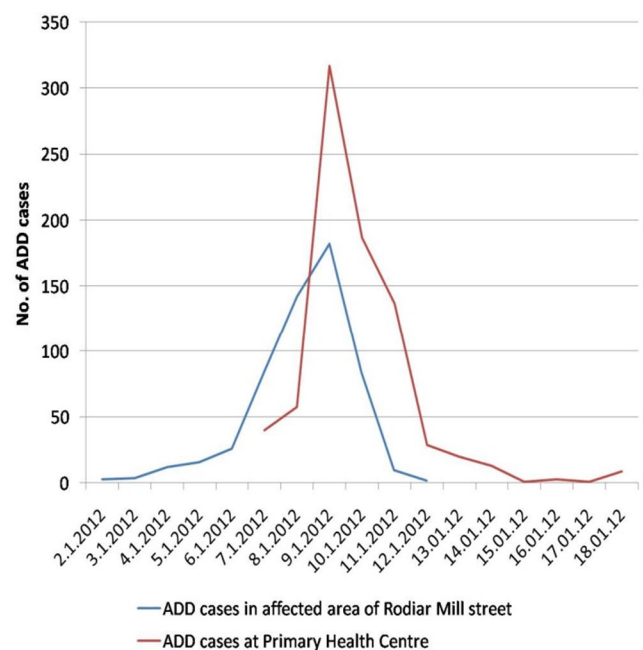
**Table 1: Age gender distribution of cases of Acute Diarrheal diseases in Rodiar Mill street area of Mudaliarpet, Pondicherry**

Age in years	Male	Female	Total (n)	%
≤ 5	31	30	61	10.8
6-10	31	24	55	9.7
11 to 20	56	51	107	18.9
21 - 30	38	65	103	18.2
31 - 40	36	47	83	14.6
41 - 50	26	41	67	11.8
51 - 60	22	38	60	10.6
>60	11	19	30	5.4
Total	251	315	566	100.0

Table 1 shows the proportion of affected people in different age groups in the affected area. Out of a total of 566 cases around 10.8% belonged to the under-five age group. People in the age group of 11 to 30 years constituted around 37% of the total cases of ADD. Majority (51%) of ADD cases presented with diarrhea as the only symptom, while 36% of them presented with diarrhea and vomiting. Majority (90%) of the population used Municipality water as the source of water before the outbreak. Only 0.8% of the households used boiled water or water

purifier. Following the outbreak almost all the households used water cans or used boiling method for purification of water. One third of ADD cases availed treatment at the health camp, while another third approached various private health care facilities. Almost two thirds of ADD cases received Oral rehydration, while 3% were admitted in various hospitals. Less than 5% of cases with ADD did not take any form of treatment.

**Figure 2: Comparison of cases of Acute Diarrheal Disease listed during the survey and patients presenting to Mudaliarpet Primary Health Centre**



Course of the outbreak

In order to determine the course of the outbreak, data on ADD cases from the Mudaliarpet PHC was considered as proxy to complete the epidemic curve (Fig. 2). The peak occurrence of ADD cases roughly corresponds in both the cases (data from the field survey and from ADD cases reported from PHC and camp site). The course of the ADD cases is in the downward trend since 12<sup>th</sup> January, the outbreak has almost reached the baseline occurrence by 15<sup>th</sup> January. Comparison with frequency of ADD cases during the same time period of last year for Mudaliarpet area (weekly 25 cases on an

average during January 2011) showed that the outbreak had reached the baseline. Surveillance for ADD in that area was continued for a few more weeks after the outbreak.

### Sanitary survey

Water supply for the entire area is by two overhead tanks. Regular daily chlorination and monthly cleaning of the tank by Pump operator was being performed and supervised by health inspector. Water supply in this area was intermittent, twice a day through individual household pipes as well as street pipes. Construction of new water pipelines left them exposed in many places. Water stagnation was also seen following the rains. Old pipelines with blind ends were accessible to the households. Almost all the houses had household toilets. At the household level, water was boiled before consumption only in a few households. Majority of them used water from Municipality supply. Few houses in the affected area had water purifiers installed in their houses or used canned water for drinking water purposes.

On personal interviews the people described their water shortage problems in their areas post Thane cyclone. After the cyclone, there was disruption in electricity supply in these areas leading to water shortage. As no alternate arrangements were made of provision of water in the community, the people resorted to unauthorized water connections from old pipelines following interruption in water supply. However, after the outbreak of diarrheal disease was reported, purified water cans was supplied through Lorries, by organized community efforts.

### Generation of hypothesis

This outbreak of ADD/ Cholera was probably due to mixing of sewage with drinking water supply caused by unauthorized water connections drawn by the people post "Thane cyclone".

## **Discussion**

Cholera outbreaks that occur worldwide are associated with certain facilitating factors. In many countries cholera transmission is primarily associated with poor sanitation. In sub-Saharan Africa, cholera outbreaks are often associated with flood events and faecal contamination of the water supplies. The marked seasonality of cholera outbreaks in the Amazon is associated with low river flow in the dry season, probably due to pathogen concentrations in pools.<sup>3</sup> The effect of sea-surface temperatures in cholera transmission has been most studied in the Bay of Bengal.<sup>4</sup> Here, we describe an outbreak of cholera that occurred post cyclone in Pondicherry, South India.

### Communication of results and Recommendations by the investigating team

This outbreak investigation in Pondicherry showed a high attack rate of ADD in the community as compared to that which was being reported to the health system. Further the factors that probably led to this situation have also been highlighted by this study. The investigating team put forth a set of recommendations to the state government, based upon the results of the investigation.

- Water and electricity are seen as intertwined. Electricity has to be restored at the earliest, so that water can be pumped to overhead tanks for supplying to people. Provision of protected water source to the community during and after disasters may avoid such outbreak situations in future. Unauthorized connections for water during periods of water scarcity need to be discouraged.
- At the community level, better awareness regarding the outbreak has to be ensured to improve care seeking behavior.
- Hygienic practices like purification of water at the household level (by boiling or filtration) and hand washing need to be promoted. Chlorine is widely available,

inexpensive, easily used and effective against nearly all waterborne pathogens.

- Repair of old water pipelines by the Public Works Department, training and supervision of the pump operator to ensure regular chlorination of drinking water source and regular checking of water from the tank and pipelines for bacteriological quality were other recommendations put forth.
- Communication of disaster preparedness plans to all health facilities in the region and mechanisms for surveillance for communicable diseases post disasters is vital.
- Public health issues like disease surveillance, Rapid Response Teams for outbreak management are essential in post-disaster situations. At the administrative level reporting of ADD cases at the PHCs and General Hospital need to be stressed so that Early Warning Signals of an outbreak can be picked up and early action can be initiated.

#### Control measures initiated by the State Health department

Following the outbreak, the Health department of the Government of Pondicherry initiated prompt control measures. The local PHC was put on high alert state with drugs and stocks to manage the outbreak. A medical team consisting of Medical Officer, Health Inspector & Staff Nurses, was mobilized to the affected site to set up a camp for five days. Adequate chlorination of the tanks in the region by the Pump operator was ensured. The Public Health Division of the Public Works Department was alerted and repair works on replacing and strengthening the pipeline was commenced. Bacteriological water analysis was conducted in the affected area after the control measures were initiated. It showed satisfactory quality of water tested at four sites from the affected areas. Information education and communication activities to create awareness among people regarding sanitation and hygienic practices (safe drinking water)

were carried out by means of pamphlets and media.

Health problems post - cyclones could be due to defective functioning of available facilities i.e. Water supply, power supply and sanitation facilities, forcing the community to consume unsafe water and stay in unsanitary conditions, leading to water borne diseases.<sup>5</sup> Power cuts related to disasters may disrupt water treatment and supply plants, thereby increasing the risk of water-borne diseases.<sup>6</sup> Cyclone AILA hit Indian States on eastern coast on May 25, 2009. An investigation was conducted to examine if AILA was responsible for increased reporting of diarrhoea cases from the district of East-Medinipur in West Bengal. Post-AILA risk of diarrhoea in June, 2009 compared to June 2007 (baseline) was estimated to be 1.6 (95% CI 1.52 to 1.65) and 1.3 (95% CI 1.21 to 1.32) times higher in two sub-divisions.<sup>7</sup>

With the scientific development of forecasting system advance forecasting of flood and heavy rains for precise area has become possible. Public Health measures can be planned well in advance, in the systematic and scientific manner based on forecast. There is much that can be done to reduce health and other impacts through public education, emergency service planning, and the implementation of early warning systems. Objectives of any disaster management plan would be immediate provision of essential medical care, epidemiological surveillance of selected epidemic prone communicable diseases to generate early warning signals of potential outbreaks, to undertake epidemiological investigation of potential outbreak, if any, and to take rapid appropriate action for the containment of impending outbreak.

The state of Gujarat in India has its action plan in place for floods, cyclones and heavy rains. Public health interventions to prevent disease outbreaks after disaster should focus on post disaster sanitation measures for safe water supply, food hygiene, proper sewage

systems/disposal of excreta, public health education. Strengthening epidemiological surveillance system for early detection of outbreak is vital. Protocols for identification of source of contamination of water and remedial measures, chlorination of water and case management of ADD should be communicated to medical officers, as part of disaster management and preparedness.<sup>5</sup> Similar guidelines for control of epidemic-prone diseases in disaster settings need to be formulated as per the state's feasibility and available resources. It is important to ensure an open flow of information from the beginning of the outbreak, to prevent the spread of misleading rumours. In this case, involvement of the media (radio, press, television) was optimal in providing the right type of information to people within and outside the affected area. A single spokesperson was the focal point for dealing with the media through regular press releases and conferences.<sup>8</sup>

The local community must be encouraged to participate in activities for the prevention and control of outbreaks including taking appropriate action for storage of water at household level and personal hygiene. Engagement of the local stakeholders including district administration and key public health officials at every stage of investigation starting from planning through execution may play a pivotal role.<sup>7</sup>

#### Additional benefits of field epidemiology activities

Apart from benefitting the community and the State Health department, this outbreak investigation was an exercise of academic interest as well. This field activity served as an opportunity for training public health specialists (postgraduates) in the field. It helped in planning and reviewing the steps of an outbreak investigation. It also enables understanding the principles of descriptive epidemiology in terms of time, place and person during an outbreak

investigation. It helps in improving advocacy and communicating recommendations to the relevant target groups. This experience was again shared with the undergraduate students through Problem based learning in order to make them understand the principles of descriptive epidemiology, role of medical officer in outbreak investigation and the role of inter-sectoral coordination in health.

#### **Conclusion:**

Ensuring uninterrupted provision of safe drinking-water is one of the most important preventive measures to be implemented following a natural disaster. Improved detection and response to communicable diseases is important in order to monitor the incidence of diseases, to document their impact and to help to better quantify the risk of outbreaks following natural disasters.

**Acknowledgement:** We sincerely acknowledge the Director of Medical Services, Pondicherry, for his permission to conduct the investigation. We also wish to thank the Residents of the Dept. of PSM, JIPMER and Interns who helped in conducting the field work. We sincerely thank Mrs. Kritika for her help in compiling the data collected in the field.

**Conflict of Interest: nil**

**Source of funding: nil**

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Original Research Article

Experiences Sharing on Hospital - Based Surveillance at Department of Community Medicine, SMVMCH, Puducherry, India.

V Anand Kumar<sup>1</sup>, Kalaiselvan G<sup>2</sup>, Purushothaman V<sup>3</sup>, Dongre AR<sup>4</sup>

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Abstract

**Introduction:** Passive Epidemiological Surveillance has been routinely done by our Epidemiological Unit of Department of Community Medicine (DCM). Medical interns posted in DCM pay daily evening visit to hospital wards and note the demographic and investigation details of selected infectious disease conditions. Control measures are expected to be initiated in local community of confirmed infectious disease patients by Post-graduates. **Objective:** To study the passive epidemiological surveillance data for the past two years (2010 and 2011). **Material and Methods:** Secondary data analysis of the passive epidemiological surveillance data from the registers maintained at the Department of Community Medicine, Sri Manakula Vinayagar Medical College and Hospital, Puducherry for the time period from 2010-2011. Analysis was done by using Epi\_info (3.4.3 Version) software package. **Results:** The data information of 592 (2010) and 1295 (2011) infectious patients with complete records were preserved. In both the years, most of the cases had fever, followed by acute watery diarrhea. Notably, there were 147 (79.5%) and 273 (45.7%) confirmed enteric fever cases in year 2010 and 2011 respectively. **Conclusion:** Enteric fever cases were the most common reported condition. In response to this, a locality with high enteric fever cases was investigated and local community was educated.

**Keywords:** *Passive Epidemiological Surveillance, Infectious Diseases, Medical College, Puducherry, India.*

Authors:

<sup>1</sup> Post graduate, <sup>2</sup> Associate Professor, <sup>3</sup> Assistant Professor, <sup>4</sup> Professor and Head Department of Community Medicine, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India.

Corresponding Author:

Dr. V. Anand Kumar, Post-graduate in Department of Community Medicine, Sri Manakula Vinayagar Medical College and Hospital, Kalitherthalkuppam, Madagadipet, Puducherry – 605107.  
Email – dranandkumarmbbs@gmail.com

Introduction:

Surveillance is defined as on-going, systematic collection, analysis, and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control.<sup>1</sup> The main purpose of surveillance is to empower decision makers to lead and effectively manage health activities by providing timely, useful evidence. Passive Epidemiological Surveillance has been routinely done by Epidemiological Unit of Department of Community Medicine (DCM).<sup>2</sup> Medical interns posted in DCM pay daily evening visit to

hospital wards and note the presence of infectious diseases like Polio, Chicken pox, Measles, Malaria, Japanese Encephalitis, Meningitis, Dengue Hemorrhagic Fever, Hepatitis A or C, Cholera, Tetanus, Diphtheria and Enteric Fever (Table 1). Reports are generated on a monthly basis and presented in departmental review meetings.

These findings are also communicated to the public health authorities of the respective districts on a weekly basis, in the presence of any of the above mentioned diseases. Control measures like larval survey, health education are initiated in the local community of confirmed infectious disease patients by the

**Table: 1 Disease conditions covered under 'Passive Epidemiological Surveillance' at DCM, SMVMCH.**

Early warning sign or symptoms	Disease condition
Acute flaccid paralysis	Polio
Fever with rash	Chicken pox, Measles
Fever with chills	Malaria
Fever with alerted sensorium or convulsions	Japanese encephalitis, Meningitis
Fever with bleeding from skin\ mucus membrane	Dengue Hemorrhagic fever
Fever with jaundice	Hepatitis A or C
Fever	Do follow up to rule out diagnosis number 2,3,4,5
Acute watery diarrhea	Cholera, Tetanus, Diphtheria

Post-graduate posted in DCM. These activities are expected to increase the practical experience of the medical interns and post-graduates.

**Objective:** To study the passive epidemiological surveillance data for the year 2010 and 2011.

#### **Material and Methods:**

**Study Setting:** The present study was a hospital-based study, carried out in the Department of Community Medicine (DCM), Sri Manakula Vinayagar Medical College and Hospital, Puducherry.

**Study Period:** The study was carried out with the data collected from April 2010 to December 2011.

**Data collection:** The details of selected conditions with early warning signals like Acute flaccid paralysis, Fever with rash, Fever with chills, Fever with alerted sensorium or

**Table: 2 Distributions of Suspected Infectious Disease Conditions Admitted in the Hospital**

Suspected infectious disease conditions	2010	2011
	No. of cases	No. of cases
Acute flaccid paralysis	02 (0.3)	03 (0.2)
Fever with rash	02 (0.3)	04 (0.3)
Fever with chills	07 (1.2)	44 (3.4)
Fever with bleeding from skin or mucus membrane	01 (0.2)	01 (0.1)
Fever with jaundice	08 (1.4)	02 (0.2)
Fever	458 (77.3)	953 (73.6)
Acute watery diarrhea	114 (19.3)	288 (22.2)
<b>Total</b>	<b>592</b>	<b>1295</b>

(Figures in parenthesis are percentages)

Convulsions, Fever with bleeding from skin\ mucus membrane, Fever with jaundice, acute watery diarrhea and Fever, these early signs are entered. The cases are followed up on a regular basis to rule out diseases like Polio, Chicken pox, Measles, Malaria, Japanese encephalitis, Meningitis, Dengue Hemorrhagic fever, Hepatitis A or C, Cholera, Tetanus, Diphtheria and enteric fever. The data is entered in the program created in Epi\_info (3.4.3 Version) software package in the Epidemiological Unit of DCM, SMVMCH. We used secondary data from the above mentioned study period for the present analysis.

#### **Results:**

We processed the data of 592 and 1295 cases with complete information for the year 2010 and 2011 respectively. In first year (April – December 2010, Table: 2), there were a total of 592 cases, 312 (52.7%) were males and 280 (47.3%) were females. In age wise distribution, 104(17.6%) children belonged to 0-5 yr. age

group of which 57(54.8%) were male and 47(45.2%) were female. In the 6-14 age group, 47 (51.1%) were male and 45 (48.9%) were female. A total of 370 (62.5%) belonged to the 15-60 yrs age group, among them 195 (52.7%) were male and 175 (47.3%) were female. The age group more than 60 years were 26 (4.4%), of whom 13 (50%) were male and 13 (50 %) were female.

**Table: 3 Age and Sex distribution Suspected Infectious Disease Conditions Admitted in the Hospital**

Age Group	Male	Total no. of cases 2010	Male	Total no. of cases 2011
	Female		Female	
0 - 05 years	57 (54.8)	104 (17.6)	165 (58.7)	281 (21.8)
	47 (45.2)		116 (41.3)	
06 - 14 years	47 (51.1)	92 (15.5)	131(58.7)	223 (17.3)
	45 (48.9)		92 (41.3)	
15- 60 years	195 (52.7)	370 (62.5)	380 (54.5)	697 (54.0)
	175 (47.3)		317 (45.5)	
> 60 years	13 (50.0)	26 (04.4)	51 (57.3)	89 (06.9)
	13 (50.0)		38 (42.7)	
<b>Total</b>	<b>312(52.7)</b>	<b>592 (100)</b>	<b>727 (56.4)</b>	<b>1290 (100)</b>
	<b>280 (47.3)</b>		<b>563 (43.6)</b>	

(Figures in parenthesis are percentages)

In second year (January – December 2011, Table: 3), there were a total of 1290 cases, 727 (56.4%) were males and 563 (43.6%) were females in which the data for 5 cases were missing. In age wise distribution, 281 (21.9%) children belonged to 0-5 years age group of which 165 (58.7%) were male and 116 (41.3%) were female. In the 6-14 age group, 131 (58.7%) were male and 92 (41.3%) were female. A total of 697 (54%) belonged to 15-60 years age group, among them 380 (54.5%) were male and 317 (45.5%) were female. The subject of age group more than 60 were totally 89 (6.9%), of whom 51 (57.3%) were male and 38 (42.7 %) were female.

In 2010, the distribution of confirmed cases (Table: 4) were as follows Acute gastroenteritis 4 (2.2%), Cholera 18 (9.7%), Dengue fever 4 (2.2%), Enteric fever 147 (79.5%), Hepatitis 1

(0.5%), and Malaria 9 (4.9%). In 2011, the distribution of confirmed cases were as follows Acute gastroenteritis 170 (28.4%), Cholera 3 (0.5%), Dengue fever 16 (2.7%), and Enteric fever 273 (45.7%), Viral fever 79 (13.2%), Malaria 25(4.2%), and Chikungunya 1 (0.2%).

**Table: 4 Distributions of Confirmed Infectious Conditions**

Confirmed Infectious Conditions	2010 - No. of Cases (%)	2011 - No. of cases (%)
Acute gastroenteritis	04 (02.2)	170 (28.4)
Cholera – Ogawa & Inaba serotype	18 (09.7)	03 (0.5)
Dengue fever - I <sub>g</sub> G & I <sub>g</sub> M	04 (02.2)	16 (02.7)
Enteric fever	147 (79.5)	273 (45.7)
Hepatitis – A	01 (0.5)	–
Malaria - P.vivax & P.falciparam	09 (04.9)	25 (04.9)
Viral fever	–	79 (13.2)
Chikungunya	–	01 (0.2)

(Figures in parenthesis are percentages)

### Discussion:

In both the years, majority of the cases had fever, followed by acute watery diarrhea. Notably, there were 147 (79.5%) and 273 (45.7%) confirmed enteric fever cases in year 2010 and 2011 respectively. Majority of the cases admitted belonged to the age group 15-60 in both years 370 (62.5%) and 697 (54%) in 2010 and 2011 respectively, followed by children (0 - 14 yrs) 196 (33.1%) in 2010 and 504 (39.2 %) in 2011. In our study the common serotype for the disease like Cholera was Ogawa serotype, Dengue was I<sub>g</sub>G and for Malaria was P.vivax.

Surveillance reports from various parts of the world are available though they are limited to a particular disease; Salma A et al have done hospital-based surveillance for acute febrile illness in Egypt. It has been suggested that the development of a sentinel surveillance network is an efficient and low-cost option to enhance the detection and characterization of selected diseases and has led to a better understanding of the epidemiology of acute febrile illness.<sup>3</sup>

Nachtnebel et al for acute respiratory infections states that comprehensive surveillance of RI cases was feasible in a network of community hospitals.<sup>4</sup>

Greenberg et al- Kinshasa, Zaire for malaria-related pediatric morbidity and mortality, this study indicates that hospital-based surveillance may be useful in monitoring disease-specific morbidity and mortality elsewhere in Africa.<sup>5</sup> Mengal et al- Balochistan, Pakistan for Anti-Hepatitis C Virus Antibodies has said that keeping in view the alarming level of anti-HCV antibodies, routine screening of subjects through rapid ICT is suggested, which is an important and economical tool and can help in reduction of HCV transmission.<sup>6</sup> Mukherjee et al- Kolkata, India for enteric parasites have mention that continuation of this surveillance study is necessary to obtain an accurate understanding of the burden and cause of parasitic diarrhoea in this area.<sup>7</sup>

The Integrated Disease Surveillance Project (IDSP) was started in 2004. The main objective was early detection and response to outbreaks. The components of IDSP include Integration and Decentralization of Surveillance activities, Strengthening of Public Health Laboratories, Human Resource Development and Use of Information Technology for Data Management. Under the project weekly disease surveillance data on epidemic prone disease are being collected from reporting units such as Sub-Centres, Primary Health Centres, Community Health Centres, Hospitals including government and private sector hospitals and Medical colleges. These reports are provided to the district and state health authorities, in addition Data compilation/analysis and response is also being done at the district and state levels. Medical colleges serve as referral institutes within the districts and attract population in and around the district for the advanced curative services they offer. In the event of an emerging outbreak, the private sector units may detect the warning signs earlier than the public sector.<sup>1</sup>

Surveillance activities in our department are not only limited to data generation, the data is shared with the concerned authorities of Villupuram district of Tamilnadu state and Puducherry. Periodic activities like health education are carried out in the field areas regarding vector control, sanitation and personal hygiene. Survey on vector indices for dengue was carried out and health education on environment stagnant water was given to the community.

**Limitations:** The passive surveillance was done by medical interns where we might have missed reporting few cases in the process. The detailed follow up of the referred patients and those who were discharged against medical advice could not be compiled.

**Challenges:** Our experience has shown that with regular reporting, proper follow up of patients and proper interventions, surveillance could indeed be used an effective tool to offer service in local community. The major challenges faced were to ensure proper training of medical interns in data collection and data entry, orientation of medical interns to these techniques in the initial days of their posting has been initiated to address the shortcomings, the current orientation exercise may help reduce and possibly avoid missing details of patients. The referral details of cases should also be taken into account for the effective functioning of any surveillance program. The follow up of the interventions taken up by the public health authorities should also be undertaken.

**Conclusion:** Enteric fever cases were the most common. In response to this, locality with high enteric fever cases was investigated and local community was educated. Passive epidemiological surveillance seems like a permissible option for control of infectious disease condition in our settings.

**Conflict of Interest:** nil

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Original Research Article

The Awareness about Tuberculosis and DOTS among the Aspiring Doctors in a Tertiary Medical College Hospital, Salem, Tamil Nadu

S. Sangeetha Balamurugan<sup>1</sup>, Swaminathan<sup>2</sup>, Sivaji Rao<sup>3</sup>

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Abstract

**Background:** India is one of the major developing countries which accounts for more than 1/5<sup>th</sup> of the world's Tuberculosis cases. The disease is rapidly developing which is resistant to multi drugs. This study aims to study the awareness about Tuberculosis and DOTS among the interns and Post Graduates in a Medical college hospital, Salem, Tamil Nadu. **Materials and Methods:** A questionnaire based survey was conducted amongst 150 interns and post graduates students of a tertiary care hospital. **Results:** Out of 150 doctors who were assessed regarding the knowledge in Tuberculosis 68 of them (45.3%) scored between 6–9 marks, out of 12 questions. It was found that 140 (93.3%) students answered with maximum correct answer for the primary site of tuberculosis, while 97 (64.46%) students answered with maximum incorrect answers for the dosage of anti-tubercular drugs and 23 (15.3%) students answered with maximum do not know answer for the treatment for smear negative tuberculosis and extra pulmonary, not seriously ill. **Conclusion:** This study shows that the knowledge among the interns and the post graduates is inadequate despite Directly Observed Therapy of Short Course (DOTS) being a regular part of the Health system.

**Key Words:** Awareness, Tuberculosis (TB), Knowledge, Aspiring doctors, Directly Observed Therapy of Short Course (DOTS)

Authors:

1. Associate Professor, Department of Community Medicine, Annapoorana Medical College, Salem, 2&3. Interns. Vinayaka Missions Kirupananda Variyar Medical College, Salem, Tamil Nadu.

Corresponding Author:

Dr. S.Sangeetha Balamurugan, Associate Professor, Dept. of Community medicine, Annapoorana Medical College, NH-47, Sankagiri main road, Periaseeragapadi, Salem- 636308, E-mail: balamurugan.sangeetha@rediffmail.com

Introduction:

India is a developing nation, where tuberculosis is highly prevalent. The nation constitutes about 1/5<sup>th</sup> of the global tuberculosis incident cases and nearly 2 million people in India develop tuberculosis, of which around 0.87 million are infectious cases. It is estimated that around 3,30,000 Indians die due to tuberculosis annually. Tuberculosis still remains worldwide public health problem, despite the causative organism was discovered more than 100 years ago. Although availability of highly effective drugs and vaccines to prevent and cure the disease is present, still tuberculosis is on widespread.<sup>1</sup>

Tuberculosis (TB) continues to be one of the most important global public health threats. About one-third of the global population is infected with Mycobacterium tuberculosis and at risk of developing the disease.<sup>2</sup> More than eight million people develop active TB annually with more than 90% of deaths occurring in the developing world. Early detection and adequate treatment are critical measures for disease control. The World Health Organization (WHO) has published guidelines for TB control in low income countries. But inadequate case detection and poor treatment continue to be some of the major factors for the increasing burden of TB globally. Although some studies have documented inadequate TB knowledge and poor

compliance with TB treatment guidelines among practicing physicians, such data are lacking in India.<sup>3</sup>

Tuberculosis easily spreads through respiratory system, India being a very populated country, the control and prevention of tuberculosis is at query. Our government in order to put a full stop to the disease introduced the Directly Observed Therapy of Short Course (DOTS) in 1993 via The Revised National Tuberculosis Control Program (RNTCP). The RNTCP is implementing the World Health Organization's (WHO) recommended "Stop TB Strategy", which in addition to DOTS, addresses all the newer issues and challenges in Tuberculosis Control.<sup>4</sup>

Globally DOTS strategy has been recognized as the best cost effective approach to tuberculosis control. Even then, in many various places in and around India, people are unaware of medical facilities. The world health organization has implemented the DOTS which raises the level of awareness, diagnosis and treatment of TB.<sup>4</sup>

A very few studies have been conducted to test the awareness of tuberculosis amongst interns and Post graduate students. Hence an attempt was made to find out the knowledge and their preparedness to tackle the disease among interns and Post graduate students of VMKV Medical College, Salem, Tamil Nadu.

The objective of this study was to assess whether medicos have awareness about the disease and how well they are prepared to tackle the disease. The students, who were used to conduct the study, were the interns and postgraduates from VMKVMC Salem.

### Materials and methods:

The survey was conducted among 150 interns and post graduate students of Vinayaka Mission Kirupanandha Variyar Medical College, Salem, from July 2012-Sept 2012. A select 12 questions that would test basic knowledge about the

disease was set by the author and distributed among the interns without allowing them for discussion. Each question was allotted one mark. The questionnaire was given to every participant, who answered the questions anonymously and the answers were kept confidential. The survey was set in a basic pattern of Multiple Choice questions. Questions that were included are diagnosis of tuberculosis, DOTS regime, its categories and the side effect of the drugs.

### Results:

This study involved a tertiary care teaching hospital in which a total of 150 post graduate medical trainees and interns were surveyed regarding the level of basic knowledge about tuberculosis by giving them a questionnaire. It was found that out of 12 marks, the scores obtained by 24(16%) of them were less than 5, 68 (45.3%) scored between 6-9 and 58 (38.7%) scored between 10-12. (Table 1). The Mean score was 5.92, SD is  $\pm 2.3$  and the scores ranged from 2 marks to 11 marks.

**Table 1-Distribution of subjects according to the scores obtained in assessing knowledge regarding Tuberculosis**

Scores	Number	Percent (%)
Less than 5	24	16
6 – 9	68	45.3
10 – 12	58	38.7
Total	150	100

Mean score=5.92 ,Standard Deviation(SD)= $\pm 2.3$ , Range 2-11

Table 2 shows various parameters evaluated to assess the knowledge of tuberculosis among the doctors and it was found that the number of doctors, who answered correctly for the primary site of tuberculosis were 140 (93.3%).while 10(6.7%) gave incorrect answer.

**Table 2: Distribution of subjects by parameters evaluated and their responses in assessing the knowledge about tuberculosis**

Parameter evaluated	Correct response (%)	Incorrect response (%)	Did not know (%)
Primary site of TB	140(93.3%)	10(6.7%)	-----
Mode of transmission of Pulmonary TB	139(92.7%)	11(7.3%)	-----
Method to diagnose active pulmonary TB	121(80.7%)	29(19.3%)	-----
Current incidence of TB	51(34%)	77(51.3%)	22(14.7%)
Number of sputum samples to be collected under DOTS	118(78.7%)	25(16.7%)	7(4.7%)
Number of treatment categories in DOTS	82(54.7%)	58(38.7%)	10(6.7%)
Treatment in category I under DOTS	73(48.7%)	68(45.3%)	9(6%)
Side effects of anti-tubercular drugs	91(60.7%)	54(36%)	5(3.3%)
Dosage of anti-tubercular drugs under DOTS	32(21.3%)	97(64.7%)	21(14%)
Treatment for smear negative and EP*, TB not seriously ill patients	82(54.7%)	45(30%)	23(15.3%)
Type of patients for category II under DOTS	75(50%)	59(39.3%)	16(10.7%)
Positive Mantoux reading	92(61.3%)	53(35.3%)	5(3.3%)

\*EP-Extra pulmonary

For the mode of transmission of pulmonary TB as droplet infection, it was correctly answered by 139 (92.7%), while 11(7.3%) gave wrong answer. For the question of method to diagnose a patient with active pulmonary tuberculosis, it was answered correctly by 121 (80.7%), while 29(19.3%) gave incorrect answer. Regarding current incidence of tuberculosis was correctly answered by 51 (34%), while 77(51.3%) gave

incorrect answer and 22(14.7%) did not give any answer as they did not know the correct answer. The number of sputum samples to be collected under DOTS was answered correctly only by 118 (78.7%), while 25(16.7%) gave incorrect answer and 7(4.7%) did not respond as they did not know the answer.

The question regarding number of treatment categories in DOTS was correctly answered rightly by 82 (54.7%), 58(38.7%) gave wrong answer and 10(6.7%) did not know the answer. Regarding the Treatment in category I under DOTS was answered by 73 (48.7%) of them correctly, 68(45.3%) answered incorrectly and 9(6%) gave do not know answer. Side effects of anti-tubercular drugs was correctly answered by 91 (60.7%), while 54(36%) gave wrong answer and 5(3.3%) of them did not know the answer. Regarding question on dosage of anti-tubercular drugs under DOTS, 32(21.3%) gave correct answer, 97(64.7%) gave incorrect answer and 21(14%) did not know the answer. For the question of treatment for smear negative and Extra pulmonary tuberculosis, not seriously ill patients 82 (54.7%) answered correctly, 45(30%) gave incorrect answer and 23(15.3%) did not give any answer. Regarding type of patients for category II under DOTS, 75 (50%) answered correctly, 59(39.3%) gave incorrect answer and 16(10.7%) gave did not know answer. The reading values for positive Montoux test was correctly answered by 92(61.3%), while 53(35.3%) gave incorrect response and 5(3.3%) gave did not know answer.

### Discussion:

This study reveals that there is a great inadequacy of knowledge among medicos. Ineffective diagnosis and management of tuberculosis such as unethical practices leads to development of multi drug resistant bacteria which should be avoided in a developing country like India.

In a study done by Dinesh Mehta et al on the knowledge about Tuberculosis Management and

national tuberculosis program among medical students in Haryana, India, revealed a overall low level of knowledge among the participants of a tertiary care hospital. A number of 112 interns participated in the study and the results were poor. The number of sputum specimen required for diagnosis under RNTCP responded correctly by only 57%, while in our study it is 78.7%. The time duration in which sputum specimen should be processed was told correctly by only 42.5%, while the sputum examination guidelines for extra-pulmonary tuberculosis was known to 21%, while serious form of extra pulmonary tuberculosis was known only to 33%. The correct categorization of tuberculosis patients was done by only 50% of the respondents, similar to our study, where only 54.7% knew the correct categories under DOTS treatment. Treatment of tubercular meningitis was marked correctly by 69% of the respondents.<sup>5</sup>

Similarly another study conducted by Khan JA among 460 medical interns in Pakistan of teaching hospitals showed poor awareness of and low compliance to the WHO national tuberculosis program guideline among interns. Out of which only 22 % correctly identified the estimated number of new Tuberculosis cases in Pakistan, while in our study 34% told the correct incidence of tuberculosis. 96% knew that droplet infection was the mode of transmission, which is in par with our study of 92.7%. 38% considered sputum smears for Acid—Fast Bacilli as the best test for diagnosis, while in our study it was higher of 80.7%. The recommended four drugs anti tuberculosis regime were prescribed by 56.5%, similar to our study of 54.7%. 82% were not able to identify a single component of DOTS.<sup>6</sup>

A study in China found that majority of the students knew well on signs/symptoms associated with tuberculosis, but only a few students knew the prevalence of smear-positive pulmonary tuberculosis, while 25.5% of them knew of the BCG vaccination. 33.5% of the

participants understood the policy of convergence case-management of tuberculosis. Analysis showed that six of twelve items were slightly statistically different among the respondents. The study also demonstrated that 334 respondents had prescribed 80 different treatment regimens but only 16.8% were correct. 33.4% of the participants ordered sputum examination during tuberculosis treatment course. Only 4.5% had transferred the patients with tuberculosis to local tuberculosis dispensary after their discharge from hospital.<sup>7</sup>

The study in Oman investigated knowledge about tuberculosis among 142 medics (medical students, paramedics) and 133 non-medics (arts and social science students). Knowledge was assessed using a validated questionnaire with 28 statements on general knowledge, risk factors and diagnosis of tuberculosis. As expected, tuberculosis knowledge was significantly higher among medics but there was no significant difference between men and women. Although medics had better knowledge in general, some of the technical statements were answered correctly by higher proportions of non-medics.<sup>8</sup>

Medical students' knowledge of the main characteristic features of tuberculosis and the prevention of the disease was studied by means of an anonymous inquiry examination of 84 students of the Medical College of Varna during the 2009/2010 academic year. They presented with good knowledge of the main characteristics of tuberculosis such as predisposing factors, risk groups, Source and mechanism of transmission of the infection. They were better grounded in the common preventive measures for avoiding the tuberculosis infection rather than in those towards the contact persons. Most respondents indicated the role of Mantoux test (61%) and microbiological examination of sputum,<sup>9</sup> while in our study the role of Mantoux test and its readings for positive test was known to only 61.3%.

In a study conducted among Nigerian interns by O Busari et al, of 118 medical interns, none could correctly state the estimated number of new TB cases per year in Nigeria. 88.1% knew that droplet infection was the usual mode of TB transmission. Only 27.1 % could state correctly the definition of MDR-TB while none new the definition of XDR-TB. 62.7% identified Zeihl Neelsen staining for acid fast bacilli as the best diagnostic procedure for pulmonary TB. Only 46.6% recognized that streptomycin should not be used in pregnancy while 22.9% would isolate a child from a mother with smear positive pulmonary TB to prevent transmission. The recommended 4-drug anti TB regimen was prescribed by 56.8% in the initiation phase and the recommended 2-drug combination in the continuation phase by 62.7%.<sup>10</sup>

A study on Medical interns' knowledge of tuberculosis and DOTS strategy in northern Islamic Republic of Iran by A.R. Charkazi, et al found that knowledge about TB and the DOTS strategy among medical students in a high incidence area of the Islamic Republic of Iran, a questionnaire designed around the national TB programme guidelines was given to 80 interns in Golestan and Mazandaran medical schools in December 2007. The overall mean knowledge score was 1.80 (SD 1.61) items correct out of 15, while in our study the mean score was 5.92, SD is  $\pm 2.3$  and the scores ranged from 2 marks to 11 marks out of 12 marks.

Knowledge about diagnosis, treatment and monitoring was especially poor. There were no significant differences between the knowledge of interns who had completed their internships in the infectious diseases or community health departments compared with those who had not. In this study interns working in 7 medical centre's in Gorgan and Sari had very weak knowledge of TB.<sup>11</sup>

Our results are consistent with the findings of studies in other regions and countries<sup>12-16</sup>, in which most interns and GPs had insufficient

knowledge. Two studies in India and the Philippines showed poor knowledge about the mode of transmission, with about 4% of interns and 21% of physicians aware that droplet infection was the only route of transmission.<sup>17,18</sup>

Knowledge, attitude and practices regarding tuberculosis and DOTS among interns in Delhi, India by Rajpal S et al, found that after giving a pre-tested semi-structured questionnaire consisting of 30 items was administered to the young medical graduates/interns posted in different departments. The questions covered mode of transmission, symptoms of pulmonary TB, investigations, short course chemotherapy including DOTS as well as conventional anti-tubercular treatment, special situations, health education and chemoprophylaxis. A total of 287 interns were surveyed. Majority of the study subjects (92.7%) ranked DOTS strategy as more successful for treating tuberculosis in comparison to self-administered therapy. However, a mere 4.2% study subjects were aware of all modes of transmission. One hundred and eighty-nine (65.9%) correctly chose sputum examination for acid fast bacilli as the single most confirmatory test for diagnosing pulmonary TB, while in our study it was 80.7%. The rest either gave incorrect responses (including ELISA-17.0%, PCR-9.8%, X-ray chest-4.2%, ESR-1.7%) or did not respond (1.4%). Only 2.1% marked pyrazinamide and rifampicin as the agents to be avoided in patients with liver disease. One hundred and forty-one different treatment regimens were mentioned in the responses received and of those only 11(7.8%) were scientifically acceptable.<sup>19</sup>

This study brought out results that were very concerning as the knowledge about tuberculosis and DOTS therapy was fairly low among aspiring doctors. In order to control the prevalence and the spread of the disease, medicos should be thorough with the disease and its management.

It must be mandatory for interns and post graduates to get a hand on experience in DOTS centers as a routine during their medical and speciality courses. The government also must take measures to provide health education on tuberculosis at various educational levels. Medical practitioners must also account CME's to update their knowledge about the disease and its prevalence.

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Original Research Article

## A Study on the Prevalence of Overweight and Obesity among Medical Students of Kanchipuram District

Kokila Selvaraj<sup>1</sup>, P.Sivaprakasam<sup>2</sup>

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### Abstract

**Back ground:** Obesity is an increase in body weight as the result of excessive accumulation of body fat and obesity results when the caloric value of food intake exceeds energy output. Overweight and obesity is one of the preventable causes of death. The morbidity associated with overweight and obesity is also enormous. The social implication of obesity is a major problem area that is often neglected. **Aims and objectives:** 1.To study the prevalence of overweight and obesity among the students of Meenakshi medical college hospital and research institute, Kanchipuram district, Tamil Nadu.2.To assess the factors influencing the development of obesity and overweight among the medical students. **Materials and methods:** The study was conducted at Meenakshi Medical College hospital and research institute, Enathur, Kanchipuram district, Tamil Nadu. It is a cross sectional study where 458 students were included. The study involved administration of pretested questionnaire, measurements of anthropometry and waist circumference and also recording of blood pressure. **Results:** Out of 500 students, 458 (92%) participated in the study. Among them 54% were males and 46% were females. The prevalence of overweight was 24.3% and the prevalence of obesity was 8.6% according to WHO guidelines. Obese and overweight individuals had significant family history. Girls had significant increased and substantial risk for co morbid conditions than boys. Frequency of eating fatty food is high among obese & overweight individuals when compared to normal and underweight students. Overweight and obese individuals are spending more time on sedentary life style. The prevalence of high systolic and diastolic blood pressure was significant among over weight and obese individuals. **Conclusion:** This study shows a high prevalence of obesity and overweight among medical students. Sedentary life style and frequency of eating fatty food was high among over weight and obese individuals. Prevalence of diastolic and systolic blood pressure is significantly high among overweight and obese individuals. This study itself created awareness about their weight and promote physical activity among many students.

**Key words:** Overweight, obesity, blood pressure, physical activity

### Authors:

- 1.Professor, Department of Community Medicine,
2. Professor & HOD, Department of Community Medicine, Meenakshi Medical College & Research Institute, Kanchipuram.

### Corresponding Author:

Dr.KokilaSelvaraj, Professor, Department of Community Medicine, Meenakshi Medical College & Research Institute, Kanchipuram, 631 552.  
E-Mail:madhumo@yahoo.com

### Introduction:

In recent years, occurrence of Overweight and obesity are very high affecting both developed and developing countries like India.<sup>1,2</sup> In India, there is a nutritional transition from typical carbohydrate diet to fast food dietary habits, particularly young adults like medical students have been affected. Obesity is associated with a large number of debilitating and life-threatening disorders, such as cardiovascular, metabolic and other non-communicable diseases.<sup>3-5</sup>

The causes of adult obesity include a variety of factors like diet, genetic predisposition, lack of

physical activities and other behavioral factors.<sup>6,7</sup> The prevalence of obesity is increasing worldwide and it has become a significant health hazard. Obesity rates have now reached epidemic proportions in the western hemisphere constituting over 25% of population in US and 15% in Europe.

Prevalence of obesity in India is up to 50% in women and 32.2% among Men in the upper strata of the society.<sup>8</sup> In Delhi, the prevalence of obesity is 33.4% in urban women and 21.3% in Men<sup>9</sup>. Obesity and overweight are not only a problem of adults but also of the children and adolescents worldwide. Even in famine stricken

country like Ethiopia 25% of adolescents were found to be obese. In India little attention has been paid to childhood and adolescent obesity until recently.<sup>10</sup> Studies on medical students and health personnel in many countries, suggest that obesity is a problem among these population groups.<sup>11-15</sup>

The complications of obesity are type 2 Diabetes, Hypertension, Stroke, Coronary Heart diseases, Gall bladder diseases, Arthritis, Psychological problems and so on. The social implications of obesity are a major problem area that is often neglected. The obese, do less well academically, have poorer job prospects and lower self-esteem. Since this obesity becomes an alarming sign it is necessary to prevent this by young adult based approaches like changes in life style and health education. Before starting a health education programme to our students we want to assess the burden of the problem in our Institution. Hence this study was carried out with the objectives of estimating the prevalence of overweight and obesity among the students of our Institution and assessing the factors influencing the development of obesity and overweight.

### **Materials and Methods:**

The study was conducted at Meenakshi Medical College and Research Institute, Enathur, Kanchipuram district, Tamil Nadu, during January 2012 to September 2012. It is a cross sectional descriptive study where 458 out of 500 students of 19 to 23 years old were included.

Data collection was done for each semester separately. A brief introduction was given and the objective of the project was explained. After getting written consent from the students, a pre-tested questionnaire was administered. After the pilot study, necessary modifications were made and final version of the Questionnaire was prepared. The questionnaire comprised of information regarding factors related to obesity like genetic, socio – economic, metabolic factors, life style choices like over eating and sedentary life style, endocrine diseases and

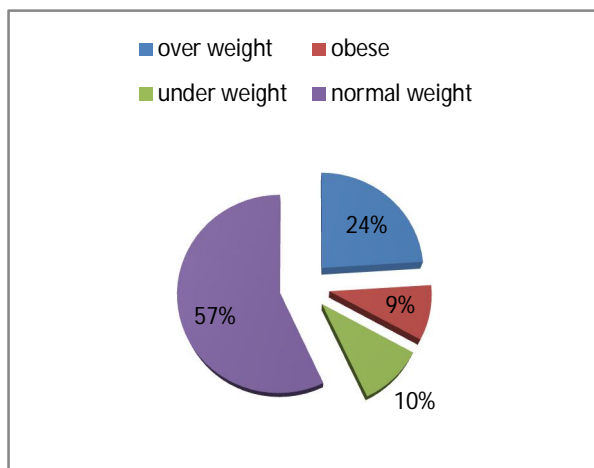
medications. Anthropometric measurements were taken for calculating BMI. A BMI of 30 or more is considered obese, a BMI of 25.0 - 29.9 is considered to be overweight<sup>15</sup>. The measurements were taken under the supervision of supervisors using a standardized weighing machine and a height measuring scale. Waist circumference was measured at the midpoint between the lower border of the rib cage and iliac crest<sup>16</sup>. Blood pressure was measured in sitting position in left upper arm as per JNC criteria<sup>17</sup>.

The physical activity was assessed by using International physical activity questionnaire (IPAQ) short form which includes the following domains like walking, moderate activity and vigorous activity. Scores were given for each domain which was converted into MET-minutes/week. Finally the candidates were categorized into low, moderate and high physical activity groups based on their MET values. The Sedentary life style included watching TV, sitting in front of computer, reading and others like talking over phone and listening to music. The consumption of fatty food was also assessed by noting the frequency of eating chicken/mutton/meat and fast food items more than 3 times per week. Statistical analysis was performed using the Statistical Package for Social Science (SPSS) version 15.0. Continuous variables (Age in years, body weight, height, BMI,) with normal distribution were expressed as mean. Significance of factors influencing body weight was done by chi - square test. The level of significance was set at p value <0.05.

### **Results:**

A total of 500 medical students, 458 (92%) participated in the study with the age range of the students from 19 to 23 years. Among them 54% were males and 46% females. The prevalence of overweight was 24.3% and the prevalence of obesity was 8.6% (Fig 1) according to WHO guidelines (Table 1).

**Figure – 1: Prevalence of overweight and obesity**



**Table – 1: Classification of overweight and obesity (WHO criteria)**

Classification	BMI (Kg/m <sup>2</sup> )
Under weight	<18.5
Normal weight	18.5-24.9
Overweight or pre obese	25.0 – 29.7
Obese	>30.0

Out of 111 Pre obese individuals in study population, 51% were males and 49% females were pre obese. Majority (65%) of overweight and obese individuals gave family history of obesity (Either Father / Mother / or both) and only 28% of normal and underweight gave family history which was statistically significant (P<0.01). History of sibling obesity was found to be 12% among overweight and obese individuals and 8% among normal and underweight which was not statistically significant.

Girls had increased and substantial risk for co morbid conditions than boys which was significant. (Table – 2)

**Table – 2 Co-morbidity Risk with Waist Circumference sex wise<sup>9</sup>**

Risk	Men	Women
Increased risk	(≥94cm) 6.5%	(≥80cm) 25%
Substantial risk	(≥102cm) 0.8%	(≥88cm) 38%

More percentage of overweight and obese individual are doing less physical activity in comparison with normal & under weight. (Table 3)

**Table:3 BMI and Physical Activity**

BMI	PHYSICAL ACTIVITY			
	Low	Moderate	High	Total
Under weight & normal	165 (54%)	66 (21%)	77 (25%)	308 (100%)
Over weight	65 (59%)	20 (18%)	26 (23%)	111 (100%)
Obese	26 (67%)	7 (18%)	6 (15%)	39 (100%)
Total	256	93	109	458

Over weight and obese individuals are spending more time on sedentary life style when compare to normal and underweight individual though it was not statistically significant. (Table – 4)

**Table – 4: BMI and Sedentary Life Style (In Hrs/Week)**

BMI range	15-30	31-45	>45	Total
Under weight & normal	184 (60%)	65 (21%)	59 (19%)	308 (100%)
Over weight	58 (52%)	26 (23%)	27 (25%)	111 (100%)
Obese	17 (43%)	10 (26%)	12 (31%)	39 (100%)
Total	259	101	98	458

Frequency of eating fatty food is high among obese & overweight individuals when compare to normal and underweight which is statistically significant. (Table – 5)

**Table – 5: BMI and Fatty Food Intake Per Week**

BMI range	<3 times	>3 times	Total
Under weight & Normal	146 (47%)	162 (53%)	308 (100%)
Over weight	48 (43%)	63 (57%)	111 (100%)
Obese	16 (41%)	23 (59%)	39 (100%)
Total	210	248	458

The overall prevalence of systolic blood pressure is 6.9% and it is significantly high (8% and 25%) among over weight and obese individuals. The overall prevalence of Diastolic Blood Pressure is 7.2% and it is significantly

high (8.1% and 15.3%) among over weight and obese individuals. (Table: 6)

**Table: 6 BMI and Blood Pressure**

Blood pressure	No and percent age	BMI	No and percent age
Systolic Blood pressure	Total 32/458 (6.9%)	Normal & under weight	13/308 (4%)
		Over weight	9/111 (8%)
		Obese	10/39 (25%)
Diastolic Blood Pressure	Total 33/458 (7.2%)	Normal & under weight	15/308 (4.8%)
		Over weight	9/111 (8.1%)
		Obese	6/39 (15.3%)

#### Discussion:

The prevalence of overweight and obesity among the medical students in the present study was similar to that of the general population in India. In our study, 8.6% of undergraduate medical students were obese which was almost similar to study conducted in West Bengal in India among undergraduate medical students.<sup>18</sup> Another similar study also reported a prevalence of 11.7% overweight and two per cent obesity among medical students of Delhi<sup>19,20</sup>. The international diabetes foundation has accepted BMI > 25kg/m<sup>2</sup> and >23kg/m<sup>2</sup> as cut off value for obesity for Asian men & women respectively<sup>7</sup> and according to this the prevalence of Obesity among males was 32% and among females was 52% which was alarming.

The waist circumference among females was very high implying that the risk of metabolic syndrome is high among females when compared with males. Abdominal obesity has been associated with high plasma triglyceride and low plasma high density lipoprotein HDL.

But in our study we have not measured the lipid profile.

Salient finding is that 65% of the overweight and obese gave H/O obesity of either or of both parents. This is almost similar to the fact that if one parent is obese there is 50% chance of children being obese. When both parents are obese the children have an 80% chance of being obese<sup>21,22</sup>.

In our study the sedentary life style was high among overweight and obese and they had low physical activity score. We were not able to assess the exact calorie intake but the frequency of eating fatty food was high among over weight and obese. The prevalence of both systolic and diastolic Blood pressure was significantly high among obese and overweight. The study itself created awareness about their weight and physical activity among many students.

**Conclusion:** From the present study it can be concluded that, overweight, pre- obese and obesity were much common among medical students. Certain factors such as physical activities like exercise, yoga as well as participation in outdoor sports will have a protective effect against these problems among the medical students. Due to the medical curriculum and the examination pattern, the students have less time to concentrate for extracurricular activities which ultimately lead them to sedentary life style. Irregular diet, restaurant visits more than once a week and a family history of obesity increased the risk of overweight and obesity. Based on this, it is recommended that healthy lifestyles should be adopted from young adulthood itself as these medical students are pillars of future Nation. Regular screening for overweight and obesity is a valuable approach in obesity prevention and development of complications.

Thus this study reinforces the need of healthy lifestyles, healthy food habits and a physically active daily routine, among the adolescents and youths of this country, so

that the dangers of the risks of developing chronic degenerative diseases can be prevented.

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Original Research Article

Views regarding use of audio-visual aids during didactic lectures in community medicine among first year medical students of Rural Medical College, Loni, Maharashtra

Purushottam A. Giri<sup>1</sup>, Deepak B. Phalke<sup>2</sup>

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Abstract

**Background:** Medical teachers have conventionally been using different teaching methods to educate medical students previously dominated by blackboard and slide projectors. However, the optimum use of audiovisual aids is essential for deriving their benefits. This study was done to know the students view regarding the various audiovisual aids, with an aim to improve their use in didactic lectures. **Materials and Methods:** A cross-sectional study was carried out among 125 medical students which includes undergraduate (first year MBBS) studying at Rural Medical College, Loni over a period of February 2012 to May 2012. Data was collected by using pre-designed, pre-tested, self-administered questionnaire. Results were analyzed in the form of percentage and proportions whenever appropriate. **Results:** In the present study, a total of 125 respondents, of which 67 (53.6%) were female and 58 (46.4%) were male; of them the majority (48.8%) respondents preferred a combination of audio-visual aids during a didactic lecture, especially for understanding a particular topic. For a better perception of diagrams and flow charts was best accepted with a power point presentation, whereas about 40.0% students preferred to take notes during the class. **Conclusion:** In this study, lectures delivered by using a combination of audio-visual aids are more appreciated by the students. Teachers should note that the students preferred a combination of visual aids and were interested in taking notes during lectures.

**Key words:** Audio-visual aids, Lecture, Medical students

Authors:

1. Associate Professor & 2. Professor and Head, Dept. of Community Medicine (PSM), Rural Medical College & Pravara Rural Hospital of Pravara Institute of Medical Sciences (Deemed University), Loni, Maharashtra, India

Corresponding Author:

Dr. Purushottam A. Giri, Associate Professor, Dept. of Community Medicine (PSM), Rural Medical College of Pravara Institute of Medical Sciences, Loni Maharashtra, India. PIN – 413 736  
E-mail- [drpgiri14@gmail.com](mailto:drpgiri14@gmail.com)

Introduction:

Lectures are the most traditional, old fashioned and didactic method of teaching. They are powerful techniques for getting across a large amount of theoretical information and are especially useful when a large number of learners must be taught at one time.<sup>1</sup> The other strength of lectures is the ability to support a complementary study of books or other material, by amplifying or explaining key points.<sup>2</sup> Medical teachers are being used to educate medical students by different audio-visual aids by emphasizing key points on a black board or white board, the projection of

written or printed matter on transparencies via an overhead projector (OHP) or increasingly nowadays via a computer based system, notably Microsoft power point application and of course, the distribution of preprinted support material and handouts.<sup>3</sup> At present, the most common ways of lecture delivery include the lectures using PowerPoint (PPT) presentations, lectures utilizing the transparency and overhead projector besides the traditional 'chalk and talk' method. There is no conclusive study stating the superiority of one method over the other. Hence this present study was done to know the students view regarding the various audio visual

aids, with an aim to improve their use in didactic lectures in community medicine.

### Material and Methods:

A cross-sectional study was carried out amongst 125 undergraduate (first year MBBS) medical students studying at Rural Medical College, Loni, western Maharashtra, India over a period of four months from February 2012 to May 2012. A pre-designed, pre-tested, self-administered questionnaire in English was used to collect data. The bio-social characteristics details like age, sex, type of school and visual aids used in school life of the respondents were also recorded. A 12-item questionnaire was constructed to assess views regarding audio-visual aids, based upon a review of literature and similar studies conducted elsewhere.<sup>[4,5]</sup> The participation to study was on voluntary basis. All participants were given a briefing about objective of the study and assured confidentiality in collection of personal data. Institutional ethical committee approval was obtained for the study. Data was entered in MS-Excel and were analyzed in the form of percentage and proportions whenever appropriate.

### Results:

The bio-social characteristics of the study population are shown in **Table 1**. The study sample consisted of 53.6% female students and 46.4% male students. Majority 84.8% of the participants had schooled in English medium and the visual aids which was predominantly used in the schools, was a blackboard (74.4%). As shown in **Table 2**, the majority (48.8%) respondents preferred a combination of audio-visual aids during a didactic lecture. The perception of diagrams, flow charts and note taking was best accepted with a power point presentation. In listening and understanding a particular topic, power point presentation (58.4%) was the most preferred aid. About (40.0%) of the respondents were interested in taking notes with power point presentation during class.

**Table 1: Bio-social characteristics of the study population**

Bio-social characteristics	Number (n=125)	Percent -age
<b>1. Gender</b>		
Male	58	46.4
Female	67	53.6
<b>2. Age (in years)</b>		
18-19	71	56.8
19-20	49	39.2
More than 20	05	04.0
<b>3. Medium of instruction at school</b>		
English medium	106	84.8
Own state medium	19	15.2
<b>4. Type of school</b>		
Government school	19	15.2
Private school	106	84.8
<b>5. Visual aids used in school life</b>		
Black board	93	74.4
Over head projector (OHP)	27	21.6
Power point	03	02.4
Combination of aids	02	01.6

**Table 2: Students views regarding audio-visual aids for various aspects of learning**

Comments	Black board No. (%)	Over Head Project No. (%)	Power point No. (%)	Combination of aids No. (%)
<b>A-V aids during didactic lectures</b>	05 (4.0)	01 (0.8)	58 (46.4)	61 (48.8)
<b>Better perception of diagrams</b>	41 (32.8)	01 (0.8)	54 (43.2)	29 (23.2)
<b>Better perception of flow chart</b>	37 (29.6)	02 (1.6)	82 (65.6)	04 (3.2)
<b>Understanding of topics is best with</b>	15 (12.0)	05 (4.0)	41 (32.8)	64 (51.2)
<b>Best aid for taking notes during class</b>	32 (25.6)	13 (10.4)	50 (40.0)	30 (24.0)
<b>Best aid for Listening and understanding</b>	22 (17.6)	05 (4.0)	73 (58.4)	25 (20.0)

### **Discussion:**

In India, at the undergraduate level, ten lectures of community medicine subject are made compulsory to first year medical students and the subject is horizontally integrated with certain basic science subjects like anatomy, physiology and biochemistry. The training program in community medicine uses a judicious mixture of didactic lectures with audio visual aids and problems based learning methods by using various clinical problems and practical. In the medical institutions of India, we observe the use of both conventional and non-conventional methods. The former encompasses blackboard and chalk with oral demonstrations and verbal dictations, while the latter consists of more modern teaching aids, like overhead projectors, PowerPoint slides, Medical videos and animation clips.

In the present study, majority (48.8%) students showed a preference for the use of a combination of visual aids during the didactic lectures. Similarly study done by Mohan L et al<sup>4</sup> revealed that 54.9% students prefer the use of a combination of visual aids during the didactic lectures. Another study done by Ashutosh Kumar et al<sup>5</sup> also revealed that 50.0% students showed a preference for the use of a combination of visual aids during the didactic lectures. A study done by Garget al.<sup>6</sup> have observed that students want the teachers to include audio-visual aids during the lectures, but it is not certain whether it increases their understanding or performance in the examinations.

In our study, for a better perception of diagrams, flow charts and note taking was best accepted with a power point presentation. Similar findings are supported by other studies.<sup>4-5</sup>

In listening and understanding a particular topic, power point presentation (58.4%) was the most preferred aid in this study. Similarly a study done by Mohan L et al<sup>4</sup> showed that 44.6% students preferred power point presentation. Another study done by Ashutosh Kumar et al

<sup>5</sup>also revealed that 34.1% students preferred power point presentation in listening and understanding a particular topic.

In black board-based teaching, the students are active participants and are better able to cope with the teaching speed of the teacher. It motivates an interest in learning and helps in holding attention in the class.<sup>7</sup> This study revealed that the understanding of topics is best possible with a combination of audio visual aids (including a blackboard), while the second best option was power point presentations.

### **Conclusion:**

This study demonstrated that lecture delivered by using a combination of audio-visual aids was more appreciated by the students. Teachers should note that the students preferred a combination of visual aids of the black board and power point presentations and were interested in taking notes during lectures. We plan to implement feasible student suggestions for further improving the use of audio-visual aids during didactic lectures in our institute.

One of the limitations of the study was the opinions were collected only from a single batch of first year medical students. The responses were collected by using a questionnaire and were not triangulated with the information from other sources.

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