



# Assessment of the Socio-Demographic Profile and Treatment Outcome of Pediatric Tuberculosis Patients

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## ABSTRACT

**Introduction:** Childhood tuberculosis is a reflection of sputum-positive pulmonary tuberculosis and extent of transmission of tuberculosis in the community. Children are especially vulnerable to effects of tuberculosis and often difficult to diagnose and to treat effectively. The study was conducted to assess socio-demographic profile and nutritional status among paediatric TB patients; and to know type of tuberculosis and treatment outcome in paediatric population.

**Methodology:** A descriptive analysis was performed using secondary data obtained from register and treatment cards from Malvani Urban slum TU in Mumbai from January to December 2013. Data was analyzed and tabulated.

**Results:** Among 69 pediatric tuberculosis patients, 61% were female. 61% patients were in age group 11-14 years. Majority of patients belonged to lower socio-economic status (99%). More than half (65%) patients were found to be malnourished. 52% had extra-pulmonary TB and 48% had Pulmonary TB with 29% patients had a history of TB contact. Among extra-pulmonary, 75% were found to have lymphadenopathy. 2 children were HIV positive. 90% of patients were treated with Category I regimen and 88% of the patients completed treatment.

**Conclusion:** Pediatric tuberculosis still continues to be a major problem in children who are undernourished and belonging to low socio-economic status.

**Key words:**-Socio-demographic, pediatric, tuberculosis, nutritional, outcome.

## INTRODUCTION

A significant proportion of global tuberculosis (TB) caseload is contributed by children throughout the world. About 1 million cases of pediatric TB are estimated to occur worldwide every year.<sup>1</sup> The proportion of pediatric TB cases registered under Revised National Tuberculosis Control Program (RNTCP) has been constant in the past five years and for 2013, 63919 new TB cases were notified accounting for 5% of all cases<sup>2</sup>.

TB in children is mainly due to failure of TB control in adults and childhood TB is a sentinel event indicating on-going transmission of TB within

communities<sup>3</sup>. One sputum positive patient can infect 10-15 persons in a year<sup>4</sup>. However, children are particularly vulnerable to severe disease and death following infection, and those with latent infection become the reservoir for future transmission following disease reactivation in adulthood causing future epidemic.

Childhood tuberculosis (TB) has remained a low priority for tuberculosis control programme in low-income countries with high TB burden. The challenge of implementing an effective childhood TB control has been complicated by poor estimates of case load and inadequate quality of data report-

ing of cases<sup>5</sup>. The management of TB in children is challenging because large number of cases go unrecognized due to paucibacillary nature of the disease and poor sensitivity of available diagnostic techniques. STOP TB strategy highlights the need to promptly identify and effectively manage TB in children with the adult TB<sup>6,7</sup>.

This study attempts to find out the demographic profile in the terms of age and sex distribution of childhood TB, site of disease and their treatment outcome. This will contribute to current knowledge of childhood TB epidemiology and better programme management as far as childhood TB concerned.

**METHODOLOGY**

The study was conducted over a period of 1 year (from 1<sup>st</sup> Jan 2013 - 31<sup>st</sup> Dec 2013) on 69 children aged 0-14 years diagnosed and treated at outpatient department for Tuberculosis at tuberculosis unit (TU) of Urban health Centre attached to and field practice area of teaching hospital and medical college, Mumbai. Permission of the ethics committee was taken to conduct the study.

The records were taken out and details of patients, their symptoms, signs, and results of various diagnostic investigations like sputum for microscopy, chest x-ray, USG abdomen, CT scan, MRI, FNAC, culture and sensitivity testing for Multi drug resistant Tuberculosis (MDR TB) etc, categorization and outcome of treatment were computed. A data collection sheet based on standard protocol and format, using common WHO definitions being followed by Revised National Tuberculosis Control Programme of India was used in the study.

Patients were diagnosed at TU and provided directly observed treatment short course (DOTS) as a fixed dose pediatric drug regime based on the category (H= 10 mg/kg, R= 15 mg/kg, Z= 35 mg/kg, E= 20 mg/kg). According to the weight of child, no. of tablets (Tb) were given as- 1) =+4-7 kg 1Tb of RHZ 75/50/150, +8-11 kg 2 Tb, +12-15 kg 3 Tb, +16-24 kg 4 Tb and +25 kg Adult dose was recommended. Later, health care worker visited the household to find any hidden cases and refer them to the centre and also ensure compliance of the patient for treatment. Patients those who required hospitalization refer to the nearby hospital where the specialty health care was available. Those referred cases were excluded from the study.

Those patients who were diagnosed as MDR TB cases by Gene xpert PCR were referred to nearby designated centre for starting of treatment, later managed at outpatient department of TU accordingly. During treatment any patient if required

hospitalization would refer to specialty health care centre where services are available.

Data was analyzed using SPSS 20.0 version and Epi info 16.0.

**RESULTS**

**Table 1** shows socio-demographic characteristics with maximum (65%) belonging to 10-14 years age group. Amongst all, majority was females (61%) and males were 39%. Majority were from nuclear family (67%) and having 49% illiterate mothers. It was observed that the percentage of pediatrics TB cases progressively reduced with increasing educational status of their mothers. Majority of the subjects belonged to upper lower class (51%) according to modified kuppuswami scale<sup>3</sup>.

**Table 2** depicts that more than half of the children's suffered from extra-pulmonary TB and out of the total, maximum i.e. 91% were a new cases suggesting the burden of disease in the community. Amongst the pulmonary cases 49% were new sputum positive, 33% were new sputum negative and 18% cases were unable to produce sputum and were diagnosed by chest X-ray, CT scan, MRI etc.

**Table 1: Socio-demographic profile of childhood TB cases**

Character	Cases (%)
<b>Age</b>	
0-4 Yrs	4 (5.8)
5-9 Yrs	20 (28.99)
10-14 Yrs	45 (65.22)
<b>Sex</b>	
Male	27 (39.13)
Female	42 (60.87)
<b>Type Of Family</b>	
Nuclear	46 (66.67)
Joint	23 (33.33)
<b>Mothers Education</b>	
Illiterate	34 (49.28)
Up To Primary School	29 (42.03)
Up To Secondary School	6 (8.7)
<b>Socio-Economic Status</b>	
Upper Middle	8 (11.59)
Lower Middle	25 (36.23)
Upper Lower	35 (50.72)
Lower	1 (1.45)

**Table 2: Distribution of study population according to type of TB**

	Pulmonary TB	Extra-pulmonary TB	Total
New cases	30 (43.48)	33 (47.83)	63 (91.31)
Re T/t cases	3 (4.35)	3 (4.35)	6 (8.7)
Total	33 (47.83)	36 (52.17)	69 (100)

\*Fig. in parenthesis represents percentage

**Table 3: Distribution of study population having extra pulmonary TB**

ExtraPulmonary TB	Frequency (n=36) (%)
Lymphadenopathy	27 (75)
Pleural effusion	6 (16.67)
Spine TB	2 (5.56)
Tubercular meningitis	1 (2.78)

**Table 4: Distribution of study subjects according to nutritional status**

Nutritional status	Frequency (n=69) (%)
Normal	24 (34.78)
Moderate thinness	22 (31.88)
Severe Thinness	23 (33.33)

Source: WHO child growth standard 2007 BMI for age (0-5 years and 5-15 years) for boys and girls  
 Moderate thinness (<-2SD); Severe thinness (<-3SD); Normal (-2SD to +1SD)

**Table 5:- Various determinants in pulmonary and extra-pulmonary TB**

Determinants	Pulmonary TB (n=33)	Extra-pulmonary TB (n=36)	p value
<b>Age (in Yrs)</b>			
0-9	7 (21%)	17 (47%)	0.02
10-14	26 (79%)	19 (53%)	
<b>Sex</b>			
Male	10 (30%)	17 (47%)	0.15
Female	23(70%)	19(53%)	
<b>H/O TB Contact</b>			
Present	15(45%)	5(14%)	0.004
Absent	18(55%)	31(86%)	

**Table 3** illustrates the different types of extra-pulmonary TB, tubercular lymphadenopathy (75%) is the most common manifestation of extra-pulmonary TB followed by pleural effusion (17%), spine TB (5%), tubercular meningitis (3%) and among the tubercular lymphadenopathy, and cervical lymphadenopathy (55%) is the most commonly involved.

**Table 4** shows more than half of the children were undernourished, of which 31.88% with moderate thinness (<-2SD) and 33.33% with severe thinness (<-3SD), according to WHO child growth standard 2007 BMI for age (0-5 years and 5-15 years) for boys and girls.

**Table 5** be statistically significant with the type of TB (p=0.004). In the present study, majority (65%) of the patients were belonged to 10-14 years of the age and out of them more than half (58%) were suffered from pulmonary TB and it was found statistically significant (p=0.023). For the sex distribution, it was not found statistically significant (p=0.150).

**Table 6** shows that 90% patients were put on Category I i.e.2 months of isoniazid (H), rifampicin (R), pyrazinamide (Z), ethambutol (E) three times per week followed by 4 months of isoniazide (H), rifampicin (R) three times per week (2 H<sub>3</sub>R<sub>3</sub>Z<sub>3</sub>E<sub>3</sub> /4H<sub>3</sub> R<sub>3</sub>), 8.70% on Category II i.e. 2 months of isoniazid (H), rifampicin (R), pyrazinamide (Z), ethambutol (E), Streptomycin (S) three times per week followed by 1 month of isoniazid (H), rifampicin (R), pyrazinamide (Z), ethambutol (E) three times per week followed by 5 month of isoniazid (H), rifampicin (R), ethambutol (E) three times per week ( 2S<sub>3</sub>H<sub>3</sub>R<sub>3</sub>Z<sub>3</sub>E<sub>3</sub>+ 1 H<sub>3</sub>R<sub>3</sub>Z<sub>3</sub>E<sub>3</sub> / 5H<sub>3</sub> R<sub>3</sub> E<sub>3</sub>) and 1.45% on category IV i.e. 6 month which may extend to 9 month kanamycin (Km), levofloxacin (Lvx), Cycloserin (Cs), pyrazinamide (Z), ethambutol (E) followed by 18 months levofloxacin (Lvx), ethionamide (Eto), cycloserin (Cs), ethambutol (E) (6 (9) Km Lvx Cs Z E/ 18 Lvx Eto Cs E). Prevalence of MDR TB infection was found to be 1.45%. A Case had known history of MDR TB contact and diagnosed as a new MDR TB after confirmation from Gene xpert PCR test. Patients received the pediatric drug regime as a fixed dose schedule.

Overall treatment completion and cure rate, defaulter rate, death and switch over to MDR TB after confirm report of susceptibility testing (which is not primary MDR TB case) rate was 88%, 7.25%, 2.90% and 1.45% respectively. Prevalence of HIV infection was found to be 2.9% (2 cases) and both of them died. Out of these two cases, one was 12 year old boy, on category II regime extra-pulmonary case and other was 9 year old female diagnosed as MDR TB and on category IV regime. Both the cases were newly diagnosed as HIV positive and started on anti retroviral T/t and died due to respiratory failure. Parents of both cases were also died due to TB with HIV.

**Table 6:- Distribution is according to treatment category and outcome of disease.**

Treatment	Outcome of Disease				Total (%)
	TC* & Cured	Defaulted	Died	Switch over to MDR	
Cat I (2 H <sub>3</sub> R <sub>3</sub> Z <sub>3</sub> E <sub>3</sub> +4H <sub>3</sub> R <sub>3</sub> )	57	4	0	1	62 (89.86)
Cat II(2S <sub>3</sub> H <sub>3</sub> R <sub>3</sub> Z <sub>3</sub> E <sub>3</sub> +1H <sub>3</sub> R <sub>3</sub> Z <sub>3</sub> E <sub>3</sub> +5H <sub>3</sub> R <sub>3</sub> E <sub>3</sub> )	4	1	1	0	6 (8.70)
Cat IV(6(9)KmLvx CsZE/18LvxEtoCsE).	0	0	1	0	1(1.45)
Total	61 (88.41%)	5 (7.25%)	2 (2.9%)	1 (1.45%)	69 (100)

\*TC= Treatment Completion;

H- isonizide, R- rifampicin, Z- pyrazinamide, E- ethambutol, S-streptomycin, Lvx-Levofloxacin, Km- Kanamycin, Cs- Cycloserin, Eto- Ethionamide

## DISCUSSION

Our study revealed that the maximum number of patients was in the age group of 10-14 years followed by 5-9 years. Similar findings were reported in hospital based study done by Sharma Sangeeta et al<sup>8</sup> on extra-pulmonary TB during January 1995-July 2004 at LRS Institute of Tuberculosis and Respiratory Diseases, New Delhi where they observed 55% patients were of the age group of 11-14 years. Higher percentage of children in this age group in present study indicates that children below 10 years were either missed or not diagnosed.

Our finding that there were more females (61%) is similar to the observation of Sharma et al<sup>8</sup> a retrospective analysis of pediatric patients. Marais et al<sup>9,10</sup> also observed disease to be more common in females (50.5%) than in males (49.5%) similarly Mazta S R<sup>11</sup> et al observed 65% females were affected. It is possible to hypothesize that higher frequency of disease in the females may reflect poor nutritional status and negligence to medical care of the girl child, making them more vulnerable to the disease.

This study revealed that 52% of the study population had extra-pulmonary tuberculosis, similar to the observation by Mazta S.R. et al<sup>11</sup> who also observed that extra-pulmonary tuberculosis was seen in 55% of the children. Among the extra pulmonary tuberculosis, tubercular lymphadenopathy was the most common manifestation followed by pleural effusion (17%), spine TB (5%) and TB meningitis (3%). A hospital based study in pediatric patients with extra pulmonary TB by H C Maltezou<sup>12</sup> between 1982 and 1998, also showed that lymphadenitis (47%) was the most common manifestation of extra pulmonary TB. A study conducted by BatraSrichand et al<sup>13</sup> revealed that only 16% patients had extra pulmonary TB and out of 84% pulmonary TB, 65% were sputum smear positive. This could be due to as the study was conducted on positive history of contact patients only.

Our observation of history of contact with TB patients is similar to the findings observed by Madhi F et al<sup>14</sup> in a Paris suburb, where they observed 22% patients with history of TB contact. Similarly Sharada MP<sup>15</sup> et al observed 23% patients with TB contact. However in a hospital based study at Kyriakou Children's Hospital at Athens by H C Maltezou et al<sup>11</sup>, 47% of the patients gave history of contact. In a study by Uysal G et al<sup>16</sup> in children with extra pulmonary tuberculosis in Ankara Social Security Children's Hospital Turkey between June 1995 and May 2003, a positive family history of active TB was reported in 39% of the cases.

Our TU were screened family members too for any hidden TB cases in community after diagnosing a

new TB case through sputum microscopy, Chest X-ray etc and started on treatment if found positive.

Prevalence of HIV infection was found to be 2.9% (2 patients). In India, HIV sero-prevalence in TB patient varies from as low as 0.7% in Delhi<sup>17</sup>, 2% in Aligarh<sup>18</sup>, and as high as 5.89% in Mumbai<sup>19</sup> and 20.1% in Pune<sup>20</sup>.

We observed an overall treatment completion and cure rate was 88%, 7.25% cases were defaulted. Sharma Sangeeta et al<sup>8</sup> showed 94.4% overall treatment completion rate, 2.2% cases were defaulted.

## CONCLUSION

In our study, high prevalence of paediatric tuberculosis was seen in female children. This could be explained by the fact that India is male dominant society and health of female child is still neglected. Also, Pediatric tuberculosis still continues to be a major problem in children who are undernourished and belonging to low socio-economic status. Treatment completion rate and outcome of disease is good in the present study.

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