

Original Research Article

## Protein Energy Malnutrition & Outcome of Paediatric DOTS Treatment

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### ABSTRACT

**Introduction:** Tuberculosis (TB) in a child represents recent and ongoing transmission of TB bacteria. Young children are most likely to become exposed and infected with TB by close contacts, such as family members. Children can develop TB disease at any age, but the severe forms of TB are most common among children between 1 and 4 years of age. Children can get sick with TB disease very soon after being infected with TB bacteria, or they can get sick at any time later in life. They can even infect their own children, decades later, if not treated.

However there is limited information the basic demographic, clinical characteristics and programme defined outcomes of these children with TB. Present study is carried out at city tuberculosis center, Solapur with purpose to find out protein energy malnutrition and treatment outcome in children with tuberculosis treated under short course chemotherapy.

**Aim & Objectives:** To assess the outcome of paediatric Directly Observed Treatment Short course (DOTS) treatment. To assess association between protein energy malnutrition and outcome of paediatric DOTS.

**Study Design:** A descriptive longitudinal study conducted in all paediatric (1-15 years) patients registered for tuberculosis treatment in city tuberculosis center solapur during 1<sup>st</sup> November 2010 to 31<sup>st</sup> December 2012. A pre-designed, pre-tested structural questionnaire was used for data collection. Physical examination was undertaken after the interview was over. Mean, standard deviation and  $\chi^2$  test were used for statistical analysis.

**Results:** Total 93 paediatric patients registered for DOTS treatment. 36.56% patients were between 1-5 years of age. Male & female patients were distributed in almost equal proportion. 84.95% patients were completed the DOTS treatment, while 3.22% were defaulter and outcome in 1.05% was treatment failure. PEM is associated with TB while it is not associated with outcome of DOTS treatment.

**Key words:** DOTS, outcome, TB, treatment, defaulter, relapse, PEM.

### INTRODUCTION

Tuberculosis (TB) is among the top 10 causes of death among children worldwide; however, children with TB are given low priority in most national health programs and are neglected in this epidemic. TB in children is a direct

consequence of adult TB and is a good marker of current transmission in the community. Although advances have been made in diagnostics and new drugs for treatment of TB in adults, development in children has lagged behind. [1] In 2013, there were an estimated 9.0 million

incident cases of TB globally, equivalent to 126 cases per 100000 populations; of the 9.0 million incident cases, an estimated 550000 (6%) were children and 80000 deaths among children who were HIV-negative. [2] In low-burden countries, childhood TB constitutes ~5% of the TB caseload, compared with 20%-40% in high-burden countries. [3,4] In India 63919 new paediatric TB cases were notified accounting for 5% of all cases during 2013. However, the proportion of paediatric TB case detection significantly varies from 5-14% in larger states. [5] Children are susceptible to infection with mycobacterium tuberculosis in community, at greater risk of progressing to active disease when infected at very young age [6] and there are also well documented cases of children acting as a source of infection within a community. [7,8] There is however limited information the basic demographic, clinical characteristics and programme defined outcomes of these children with TB. Present study is carried out at city tuberculosis centre, solapur with purpose to find out treatment outcome in children with tuberculosis treated under short course chemotherapy under routine operational condition.

## MATERIALS AND METHODS

Present longitudinal study conducted at Solapur city tuberculosis centre from 1st November 2010 to 31st December 2012. Inclusion criteria were all children between ages (1-15 years) registered for tuberculosis treatment in city tuberculosis centre, Solapur. All the registered cases were selected and followed up until their complete treatment. Data was obtained using semi structured pretested questionnaire and followed RNTCP guidelines for evaluation and treatment of suspected TB case. Exclusion criteria were all TB patients associated with HIV infection and old TB cases. All the questions were explained to the

children and total confidentiality was assured. Physical examination was undertaken after the interview was over. It included local & systemic examination with anthropometric measurements such as height, weight mid-arm circumference. Outcome was assessed as cured, treatment completed, extension of treatment or change in regimen, transferred out or lost to follow-up default and treatment failure.

## RESULTS

Total 93 paediatric patients registered for DOTS treatment. Maximum numbers of TB cases (35) were in the age group of 1 to 5 years, followed by 27 cases each in 5 to 10 years and 10 to 15 years; only 5 cases were below one year of age. Male to female patient's ratio was approximately found to be 1.02:1 [Table 1].

Table 1 Age & Gender profile of cases (n=93)

Sr. No.	Age in years	Gender		Percentage
		Male	Female	
1	< 1	1	4	5.38%
2	1-5	20	14	36.56%
3	5-10	15	12	29.03%
4	10-15	11	16	29.03%
Total		47	46	100%

In our study 36 cases had history of contact with TB infection while 57 patients had negative history. We observed grade 1 to grade 4 protein energy malnutrition (PEM) in 70 children as per Indian Academy of Paediatrics (IAP) [Table 2].

Table 2: Distribution of cases according to PEM (IAP classification)

Sr No	Stages of Malnutrition	Number of patients	Percentage
1	Grade 1	30	32.26%
2	Grade 2	18	19.35%
3	Grade 3	18	19.35%
4	Grade 4	4	04.30%
5	Normal	23	24.74%
Total		93	100%

In the present study 67.74% patients had pulmonary TB while remaining 32.26% had extra pulmonary TB [Figure 1].

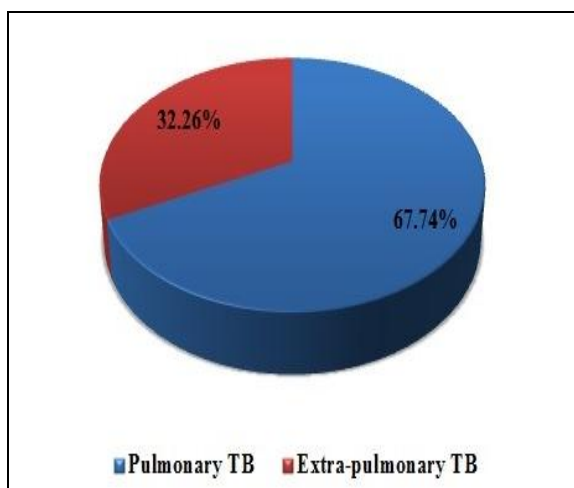


Figure 1: Distribution of patients according to type of TB

Table 3: Distribution of patients according to weight gain at the end of treatment

Sr.No.	Weight gain in kg	Number of patients	Percentage
1	0	4	4.3%
2	0-1	22	23.66%
3	1-2	29	31.18%
4	2-3	20	21.50%
5	3-4	17	18.28%
6	>4	1	1.08%
Total		93	100%

\* Mean body weight gain = 2.29 kg.

Out of 93 patients 90 patients received Category I DOTS treatment while 03 patients got Category II DOTS treatment. At the end of treatment 89 (95.70%) patients gained body weight which ranged from 0-1 to >4 kg. while four patient's body weight did not increased [Table 3].

In the present study 84.95% of patients completed DOTS treatment, 10.75% was cured, so treatment success was seen in 95.7% of total cases, 3.22% were defaulter and outcome in 1.05% was treatment failure. Reason for default was drug intolerance in two cases & one patient was transferred out. There were 3 deaths, of which 1 was a case of failure, 2 were defaulter. We observed two mortalities in the age group of 5 to 10 years while one in 1 to 5 years of age. The association between age group and outcome of DOTS treatment found statistically significant [Table 4].

Table 4: Age wise distribution of patients according to outcome of DOTS treatment

Sr. No.	Age in years	Outcome				
		Treatment completed	Cured	Defaulter	Failure	Death
1	< 1	03	02	00	00	00
2	1-5	33	00	00	01	01
3	5-10	23	01	03	00	02
4	10-15	20	07	00	00	00
Total		79	10	03	01	03

Yates'  $\chi^2 = 18.73$  d.f. = 9 p = 0.027 Significant

Table 5: Association of PEM with outcome of DOTS treatment

Stages of Malnutrition	Treatment completed	Cured	Defaulter	Failure	Death
Grade 1	25	05	00	00	00
Grade 2	16	01	01	00	01
Grade 3	16	00	01	01	01
Grade 4	03	00	01	00	01
Normal	19	04	00	00	00
Total	79	10	03	01	03

Yates'  $\chi^2 = 9.68$  d.f. = 12 p = 0.64 Not significant

We observed malnutrition in 70 patients; out of which 60 (85.71%) patients completed DOTS treatment, 06 (8.57%) patients were cured, 4.28% were defaulter and 1.43% was failure cases. All three mortalities were seen in PEM patients; one each in Grade 2, 3 and 4 [Table 5].

## DISCUSSION

We observed maximum proportion (36.56%) of patients were in the age group of 1 to 5 years followed by (29.03%) in 5

to 10 years & 10 to 15 years and least (5.38%) in < 1 year. Garg P<sup>[9]</sup> in their hospital based study in Agra reported maximum numbers of paediatric TB patients in the age groups 3 to 5 years (48.8%) followed by 21.4% in the 5 to 7 years age group. Similarly in Sushma Bai et al<sup>[10]</sup> study maximum proportion (49.5%) of cases observed in 1 to 5 years of age group while Arora V K et al<sup>[11]</sup> and Sharma et al<sup>[12]</sup> study reported maximum (>51%) cases in 11 to 14 years age group

and 11 to 15 years of age group respectively. In our study 50.54% cases were males and 49.46% were females among total 93 patients. Ileana Puiu et al [13] showed a slight predominance of females (51.6%), as compared to males (48.4%) among total TB cases. Jhaa et al [14] and Castro et al [15] study has shown a slight female preponderance 1:1.3. In the present study 70 (75.26%) patients had protein energy malnourishment; out of which 42.86% had Grade 1 PEM, 25.715% had Grade 2 PEM & Grade 3 PEM and 5.71% had Grade 4 PEM. Vimlesh seth et al [16] study had shown malnutrition in 88% of patients while Sushma Bai et al [10] study observed malnutrition in 42% of patients, of which 37% had Grade I or Grade II PEM and 5% had Grade III PEM. We observed positive history of contact with TB infection in 38.91% of patients. A study conducted by Vijayasekaran et al [17] at Institute of Child Health and Hospital, Chennai showed positive contact history in 30.4% of patients while a study conducted at AIIMS by Vimlesh Seth et al [16] shown positive contact history in 19% of children. In our study pulmonary TB cases outnumbered the extra-pulmonary TB cases (67.74% versus 32.26%). Similar observation noticed in Gocmen A. et al [18] study where 75% cases had pulmonary TB and only 25% had extra-pulmonary TB. In the present study we observed that 95.70% of total patients gained body weight at the end of DOTS treatment and mean body weight gain of patients was 2.29kg which can be comparable to M.Vasantha et al [19] study where 89.3% patients gained body weight & mean body weight gain of patients was 3.22 kg. We observed that 84.95% of patients completed DOTS treatment, 10.75% patients were cured, so treatment success was 95.70% of total cases, 3.22% were defaulter and outcome in 1.05% was treatment failure. A prospective study done by C K Indumathi et al [20] showed the overall cure rate was 95% which can be comparable to present

study, also in Satyanarayana et al [21] study over all completion rate was 97%. In Sharma et al [12] study treatment completion rate was 94.9% and the default rate was 2.2% with a failure rate of 2.5% and death rate was 0.3%. In the present study there was no association between PEM and outcome of DOTS treatment.

## CONCLUSION

Thus it could be concluded that the DOTS therapy using paediatric patient wise boxes is highly efficacious in childhood tuberculosis. Malnutrition is associated with childhood tuberculosis and weight gain is the one of the important indicator of good treatment outcome.

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