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RETROSPECTIVE CHART REVIEW OF PEDIATRIC TUBERCULOSIS CASES FROM A CHEST CLINIC OF DELHI

Community Medicine

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ABSTRACT

BACKGROUND: India reports a large number of TB cases, children are at special risk to develop the disease, but there are not enough studies for this age group to study the epidemiology. Current research was carried out to study the socio-demographic profile, pattern of TB, treatment outcome and associated factors amongst the pediatric TB patients reporting to Chest Clinic of Delhi.

METHODS: Retrospective chart review of pediatric TB patients who reported from January 2015 - December 2016 to Municipal Corporation of Delhi Chest Clinic in Delhi. Data for a total of 213 pediatric TB patients was entered in Numbers and percentages were calculated.

RESULTS: Pediatric TB cases contributed to 11.16% of total. There were 213 pediatric patients, of which 33.33% were males and 66.66% were females. 24.4% cases had Pulmonary TB while 74.1% cases were of extra-pulmonary TB and 1.40% cases had both. There were 2 cases who were positive for HIV. 1 case had treatment failure after completion of Category I treatment, 2 cases died during the treatment and 1 case was transferred out.

CONCLUSIONS: Pediatric age group patients are especially vulnerable to TB and at the same time diagnostic modalities are few and limited for this age group. Early detection and adequate treatment is necessary to contain occurrence of TB in children.

KEYWORDS

pediatric TB, childhood TB, retrospective chart review

Introduction:

TB is the ninth leading cause of death worldwide and the leading cause from a single infectious agent, ranking above HIV/AIDS. Globally in 2016, there were an estimated 6.7 million incident cases of TB among males, of which 6.2 million were adults and 550,000 were children. There were 3.7 million incident cases of in females, of which 3.2 million were adults and 490,000 were children. These numbers correspond to 65% of cases being males and 35% females, and 90% of cases being adults and 10% children. At least 1 million children become ill with tuberculosis (TB) each year. In 2015, 170,000 children died of TB, and there were an additional 40,000 TB deaths among children who were HIV-positive.[1,2]

The global burden of childhood TB is under-reported due to paucibacillary (PT) disease which makes diagnosis by sputum smear microscopy and culture difficult.

Pediatric TB results from failure of TB control in adults. Epidemics in future may occur as children with latent infection become reservoir of infection, which may get reactivated during adulthood. Children less than 5 years have a less developed immune system and hence are more prone to develop the disease with young age also being a risk factor of spread of disease to other parts of the body.[3] An infant whose mother has sputum smear positive PTB has a higher chance of getting infected. Also INH chemo-prophylaxis amongst all asymptomatic contacts less than 6 years of age is much desired. Against this background, the current study was done amongst the pediatric TB patients with the objective to study their socio-demographic profile, pattern of TB, treatment outcome and associated factors.

Materials and Methods

Study Design: Retrospective chart review. Records of the paediatric TB patients at Chest Clinic were studied to get the desired information and make interpretations.

Study Area: Municipal Corporation of Delhi, Chest Clinic, SPM Marg, Pili Kothi, Delhi. It compiles reports from 5 DOTS and microscopy centers - MC 1 Pili Kothi, MC 2 Lal Kuan Dispensary, MC 3 Aruna Asaf Ali Hospital, MC 4 Hindu Rao Hospital, MC 5 MCD Allopathic Dispensary, Kashmere Gate.

Study Population: Pediatric age group - taken to be 0-14 years as described in RNTCP. (Technical and Operational Guidelines for TB Control in India 2017)[4]

Sample: All pediatric tuberculosis cases that reported to the Chest Clinic for the period between January 2015 - December 2016 which totalled to 213. Definitions for the related terms were taken from the official website of Ministry of Health & Family Welfare (MoHFW). (Technical and Operational Guidelines for TB Control in India 2017).[4] Data for a total of 213 Pediatric TB patients was entered and analysed in Numbers. Prior permission was taken from the State TB Officer and TB officer in charge of the MCD Clinic to conduct the study.

Study period: March 2018

Results: Out of the total 1,908 tuberculosis patients who reported at Chest Clinic, in the time period of January 2015 to December 2016, pediatric TB patients constituted 213 cases (11.16%). Of these, 10 cases were under the age of 5 years (4.69%), while 203 (95.30%) were above 5 years of age.

Table 1: Age and sex wise distribution of Pediatric TB cases (N=213)

S. No.	Sex	Age wise distribution		Total
		1 - 4 years	5 - 14 years	
1	Male	8 (3.75%)	63 (29.57%)	71 (33.33%)
2	Female	2 (0.93%)	140 (65.72%)	142 (66.66%)
	Total	10 (4.69%)	203 (95.30%)	213

With a ratio of 2:1, the majority 142 (66.6%) of the reported TB patients were girls, whereas in the age group of 1-4 years 8/10 (80%) were males. (Table 1)

Table 2: Distribution of pediatric TB cases according to category of Treatment (N=213)

S. No.	Category	Age wise distribution				Total Number of cases
		1 - 4 years		5 - 14 years		
		Male	Female	Male	Female	

1	I	7 (3.28%)	2 (0.93%)	54 (25.35%)	124 (58.21%)	187 (87.8%)
2	II	1 (0.46%)	0 (0.00%)	9 (4.22%)	16 (7.51%)	26 (12.2%)

187/213 (87.8%) of the total pediatric TB patients belonged to category I. Out of a total of 10 patients in the age group of 1-4 years, 9 (90%) belonged to category I and in the age group of 5-14 years, 178/203 (87.7%) of those belonged to category I. (Table 2)

Table 3: Distribution of cases as per site of TB (N=213)

S. No.	Type of TB	Age wise distribution				Total Number of cases
		1 - 4 years		5 - 14 years		
		Male	Female	Male	Female	
1	Pulmonary	2 (0.93%)	1 (0.46%)	7 (3.28%)	42 (19.71%)	52 (24.4%)
2	Extra-Pulmonary	6 (2.81%)	1 (0.46%)	54 (25.35%)	97 (45.53%)	158 (74.1%)
3	Pulmonary and Extra-Pulmonary	0 (0.00%)	0 (0.00%)	2 (0.93%)	1 (0.46%)	3 (1.40%)

Extra-pulmonary TB was the commonest form of TB presentation reported by 158 cases (74.1%) of the total 213 cases. 3 cases (1.4%) had both pulmonary and extra pulmonary TB. (Table 3)

Table 4: Pre treatment sputum smear positivity amongst pediatric Pulmonary TB patients (n=55)

S. No.	Type of TB	Age wise distribution				Total
		1 - 4 years		5 - 14 years		
		Male	Female	Male	Female	
1	Smear positive	0 (0.00%)	0 (0.00%)	3 (5.45%)	22 (40.00%)	25 (45.45%)
	Scanty	0 (0.00%)	0 (0.00%)	0 (0.00%)	3 (5.45%)	
	1+	0 (0.00%)	0 (0.00%)	1 (1.82%)	10 (18.18%)	
	2+	0 (0.00%)	0 (0.00%)	1 (1.82%)	4 (7.27%)	
	3+	0 (0.00%)	0 (0.00%)	1 (1.82%)	5 (9.09%)	
2	Smear negative	0 (0.00%)	1 (1.82%)	5 (9.09%)	20 (36.36%)	26 (47.27%)
3	Not done	2 (3.63%)	0 (0.00%)	1 (1.82%)	1 (1.82%)	4 (7.27%)
	Total					55

Out of a total 213 pediatric TB cases, 55 (25.82%) were of pulmonary TB and out of those 55 pulmonary TB patients, 25 cases (45.45%) were sputum smear positive and for 4 cases (7.27%), sputum smear was not done. (Table 4)

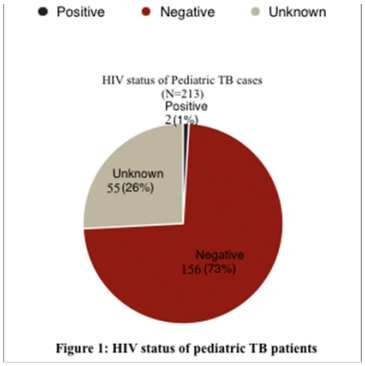

Figure 1: HIV status of pediatric TB patients

There were two cases who tested positive for HIV (0.93%). Also, HIV status of about a fourth (26%)of pediatric TB cases was not known. (Figure 1)

Table 5: Distribution of extra-pulmonary cases as per clinical presentation (n=158)

S. No.	Type of extra-pulmonary TB	Age wise distribution		Total
		1 - 4 years	5 - 14 years	
1	Lymph Node	1 (0.63%)	67 (42.40%)	68 (43.04%)
2	Abdominal	1 (0.63%)	24 (15.19%)	25 (15.82%)
3	Pleural Effusion	0 (0.00%)	19 (12.02%)	19 (12.02%)
4	Pott's spine	2 (0.93%)	7 (4.43%)	9 (5.67%)
5	Bone	1 (0.63%)	6 (3.80%)	7 (4.43%)
6	Brain	0 (0.00%)	5 (3.16%)	5 (3.16%)
7	Skin	1 (0.63%)	3 (1.90%)	4 (2.53%)
8	Cold Abscess	0 (0.00%)	4 (2.53%)	4 (2.53%)
9	Others	0 (0.00%)	4 (2.53%)	4 (2.53%)
10	Unknown	1 (0.63%)	12 (7.56%)	13 (8.23%)
	Total	7 (4.43%)	151 (95.57%)	158

Involvement of the lymph nodes was the commonest presentation amongst extra-pulmonary cases (68/158 - 43.04%) followed by abdominal TB with 25 cases (15.82%) and pleural effusion with 19 cases (12.02%). (Table 5)

209 (98.12%) of the cases completed treatment or were cured (for sputum positive pulmonary TB cases), 1 (0.47%) had treatment failure after completion of Category I treatment, 1 case was transferred out and 2 cases (0.93%) died during the course of treatment. No record was available for patients not reporting for treatment/ collection of medicines on the scheduled date and also for INH prophylaxis given to children less than 6 years of age, who were close contacts of the patients.

Discussion:

Our study showed that 11.16% of the patients who reported to DOTS centre were children which is almost similar to the statistics of states like Delhi, Chandigarh, Madhya Pradesh, Mizoram, Nagaland, Arunachal Pradesh that report, more than 10% TB patients were children but higher than the national statistics that states, the proportion of children among new TB patients reported was 6% in 2016. Absence of appropriate samples coupled with decentralized capacity to get good samples from children to test for TB, remains to be a challenge in pediatric TB case detection.[5] This finding is also almost similar to global finding of pediatric TB cases to be 10%.[1,2]

In our study, with a ratio of 2:1, the majority 142 (66.6%) of the reported TB patients were girls, whereas in the age group of 1-4 years 8/10 (80%) were males. In a study from Delhi by Satyanarayana S. et al, 651 of 1074 patients (61%) were females.[6]

Sharada M.P. et al from Bangalore reported, there were more females (62.68 %) than males (37.32 %).[7] This was similar to findings of a study done by Saxena et al in a DOTS centre of South Delhi in which, out of the 153 pediatric TB patients assessed, 111 (73 %) were females and 42 (27%) were males.[8] In another study by Sharma S. et al from tertiary referral governmental hospital in Delhi, 61.3% of cases were girls.[9]

In our study, we found that 10 cases (4.69%) were young TB patients or those less than 5 years of age. Satyanarayana S. et al in their study reported a higher proportion 122 (11%) to be less than 5 years of age.[6]

This was also reported by Sharma S. et al, where 17.5% of cases were in the age group 0-5 years.[9] A similar study conducted in Delhi by Saxena et al had shown similar findings in which 13 cases were aged ≤ 5 years (8.5%).[8] A high proportion of young TB patient indicates active infection in adults, who have spread it to them.

Extra pulmonary form of TB was the commonest form of TB presentation reported in 158 cases (74.1%) of the total 213 cases. 3 cases (1.4%) had both pulmonary and extra pulmonary TB. Muley P. et al from a tertiary care rural hospital reported, extra-pulmonary TB (60.56%) was more common than pulmonary TB (39.43%).[10]

Satyanarayana S. et al reported that, 680 (63%) had extra-pulmonary TB (EP-TB).[6]

This was similar to findings of a study done by Saxena et al in which, 67.32% of cases were of extra-pulmonary TB, while 32.68% of cases were of pulmonary TB which corresponds with other studies in similar age groups.[8] 12 of 26 (46%) had extrapulmonary disease, as reported by Jain S.K. et al from a tertiary urban public hospital.[11]

209 (98.12%) of the total pediatric cases completed treatment or were cured (for sputum positive pulmonary TB cases). Patients in our study had a higher completion rate than the national statistics of 72 % which may be due to better health care delivery and more awareness in the capital than the peripheries.[1]

In a study by Satyanarayana S. et al, overall reported treatment completion rate was 95%.[6] This finding was also similar to the finding in the study of Saxena et al which had overall completion rate of 90.7%.[8]

In our study, out of 55 pulmonary TB patients, 25 cases (45.45%) were sputum smear positive and for 4 cases (7.27%), sputum smear was not done. In a study by Satyanarayana S. et al, among 394 pulmonary TB (PTB) cases, 165 (42%) were sputum smear-positive.[6]

This was also reported in a study done by S. R. Mazta et al from Shimla, in which 43.09% cases were smear negative.[12]

In a retrospective study done in TB unit in West Bengal, statistically significant differences (P = 0.000) were seen in the proportion of smear positive TB cases in children (21.6%) and adults (55.5%). However, the proportion of smear negative cases among the two groups was not different (P = 0.574). The number of cases where sputum examination was not done was higher in children (14, 27.5%) than adults (2, 0.10%) and the difference was statistically significant (P = 0.000).[13]

In our study, involvement of the lymph nodes was the commonest presentation amongst extra-pulmonary cases (68/158 - 43.04%) followed by abdominal TB with 25 cases (15.82%) and pleural effusion with 19 cases (12.02%).

Satyanarayana S. et al reported that, most commonly (46%) peripheral lymph node disease occur in extra-pulmonary TB.[6] In study done by Sharma S. et al, lymph node TB was the commonest type of EPTB responsible for total 669 (669/941; 71.1%) cases.[9] This was also reported in the study done by Sharada M.P. et al, which showed that tubercular lymphadenopathy was the most common manifestation of extra-pulmonary TB.[7] It is also supported by the findings of S. R. Mazta et al and Swaminathan S. et al, in which among the extra pulmonary TB cases most common site was lymph node in 81 (33.1%) cases and (67%) respectively.[12,14]

In the study done in TB unit in West Bengal, among new extra-pulmonary TB cases, proportions of tubercular lymphadenitis (children = 21.0%, adults = 4.4%) and skeletal TB (children = 7.8%, adults = 1.2%) were higher in children with significant statistical differences (P = 0.000 and 0.001, respectively)[13]

The most common disease entities identified in the 72 children with extra-thoracic TB were cervical lymphadenitis (35, 48.6%) as reported by Marais B.J et al from South Africa.[15]

In another study carried out in Kottayam, Kerala, 34 (22.5%) were extra-pulmonary TB patients. Out of 34 extra-pulmonary TB cases, peripheral lymph node disease 25 (73.5%) was most common. Other EPTB cases included spine 5 (14.7%) and pleura 4 (11.7%).[16]

There were two cases who tested positive for HIV (0.93%). Also, HIV status of about a fourth of pediatric TB cases was not known.

There is no study which gives us an exact estimate of the HIV status in pediatric TB patients.

In a report by WHO, Provider-initiated HIV testing should be offered to everyone with TB and people presenting with signs and symptoms suggesting of TB in settings with a high prevalence of HIV infection. TB often represents an early entry point for detecting and treating HIV. A total of 2.1 million people with TB were tested for HIV in 2010, equivalent to 34% of all notified TB cases, versus 28% in 2009 and 3% in 2004. Of the people tested in 2010, 488 000 (23%) were HIV-positive.[17]

Also, in a mathematical modelling study published by Dodd, Peter J et al, about 17% of deaths were in children with HIV.[18]

In our study, 2 cases of TB died, 1 of them had HIV.
There is no study which gives us an exact estimate of the mortality in children directly due to tuberculosis.[7]

According to a study by Dodd, Peter J et al. published in the Lancet Global Health, although younger children are vulnerable to severe forms of tuberculosis disease, no age-disaggregated estimates of pediatric tuberculosis mortality exist, and tuberculosis has never been included in official estimates of under-5 child mortality. India was by a huge margin the top contributor to the TB deaths in children, with more than 60,000 deaths in 2015. 191 000 (80%, 132 000–257 000) of tuberculosis deaths occurred in children younger than 5 years, and almost all (228 000 [96%]) occurred in children not on treatment.[18]

A study by Helen E et al using systematic review and meta-analysis in studies in the recent era, when most children had tuberculosis treatment, the pooled case fatality ratio was 0·9% (95% CI 0·5–1·6).[19]

Banu Rekha V. V. et al from Tamil Nadu reported that among the 220 contacts of TB cases aged 0–14 years, only 31 (14%) had been screened for TB disease. Of the 55 patients who had children aged <6 years, only 15 (27%) stated that they had been informed about the provision of IPT (Isoniazid Preventive Therapy) for their children. Among children aged <6 years, only 16 (19%) had been initiated on IPT, with no difference between rural and urban groups. There was no follow-up of the child initiated on IPT. No documentation of the number of children aged <6 years residing in the household, nor of those screened for TB.[20]

Conclusions:
Pediatric age group is more vulnerable to TB infection and at the same time diagnosis of pediatric TB is a challenge. Extra-pulmonary form of TB was more commonly reported among which lymph node was the commonest site. This also makes diagnosis a bigger challenge. Sputum smear positivity was detected in almost half cases of pulmonary TB so we need to give equal attention even if the sputum smear results are negative. There is a lack of data which gives us an exact estimate of the HIV status in pediatric TB patients. Currently, TB and HIV are major threats to public health worldwide. We found that HIV status of almost a fourth of cases was not confirmed. So, we have to strengthen HIV surveillance in pediatric TB patients. While the data on drug resistant tuberculosis in children is not sufficient, they should not be ignored as they significantly affect management. Till the time we are able to find definite diagnostic tools available for this age group we should provide INH prophylaxis to all the children who are in contact with an adult suffering from TB. We want to emphasise here the absolute importance of treatment and prevention of pediatric TB which will occur only when a strong impetus is given to early detection. The study also proves DOTS to be an effective strategy to combat pediatric TB.

Recommendations: One limitation of the study was that it was record based. We recommend that large scale prospective studies need to be conducted to look into the details of the various socio-demographic factors which were not available in record and may have an important role to play in TB epidemiology, nutrition status assessment, BCG vaccination status, delay in seeking treatment, family and contact history etc.

Conflict of interest: None

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