International Journal of Contemporary Pediatrics
Anuradha G et al. Int J Contemp Pediatr. 2019 Jul;6(4):1450-1455
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20192127

Original Research Article

Clinical profile of children with tuberculosis from a semi urban referral centre in South India: a prospective observational study

Anuradha G., Muraleetharan G.*

Department of Pediatrics, IRT- Perundurai Medical College and Hospital, Perundurai, Erode, Tamil Nadu, India

Received: 24 April 2019
Accepted: 30 April 2019

***Correspondence:**
Dr. Muraleetharan. G,
E-mail: drmuraleetharang@yahoo.co.in

ABSTRACT

Background: Global TB report 2018 reports that in India, an estimated 2.2 lakh children become ill with tuberculosis (TB) each year. In spite of new rapid diagnostic methods, lack of gold standard test for confirming childhood tuberculosis remains an obstacle for the effective reporting of childhood TB and hence these cases often remain under diagnosed. The main objective was to study the clinical profile of childhood tuberculosis with relevant laboratory investigations aiding in early diagnosis.
Methods: A prospective observational hospital-based study was conducted in IRT-Perundurai medical college hospital from April 2016 to March 2018. Children less than 18 years of age with tuberculosis were included in the study. Demographic details, presenting symptoms, family history of TB contact, nutritional status and clinical examination findings were documented. Complete blood count, ESR, Mantoux test, chest X-ray and sputum analyses for AFB were done for all patients.
Results: Out of the total 124 children studied, the most common age of presentation of tuberculosis was >10 years of age (n=58, (46.8%)). There was a female preponderance (n=71 (57.25%)). Pulmonary tuberculosis (n= 87, (70.16%)) was the most common form followed by extra pulmonary (n=32, (25.80%)) and disseminated type (n=5, (4%)). Lymph node TB was the most common manifestation (n=20, 62.50%) among extra pulmonary form. Cough (n=75, 60.5%) with sputum (n=55,44.4%) were the predominant symptoms noted followed by fever (n=53, 42.7%). Bacteriological diagnosis was possible in 19.5% (n=17) patients only.
Conclusions: This study reinforces that the diagnosis of childhood tuberculosis is based on the constellation of symptom evaluation, contact history, clinical examination, with relevant laboratory investigations.

Keywords: Children, Clinical profile, Tuberculosis

INTRODUCTION

Tuberculosis in children is common in our community. pediatric tuberculosis is among the top 10 causes of death in children. India accounts for one fourth of the global tuberculosis (TB) burden, standing one among the 30 high TB burden countries.[1] Hence, children in India are at increased risk of acquiring TB infection and developing TB disease and death following infection. Latent TB infection in children may be reactivated in later life and become active adulthood tuberculosis and thereby a potent TB reservoir in the community. Global TB report 2018 reports that in India, an estimated 2.2 lakh children become ill with tuberculosis (TB) each year (22% of the global TB burden).[1] Although childhood tuberculosis in any high burden country are estimated to be approximately 15%-20% of total adult incidence, only 10% of the total tuberculosis cases reported to the revised national tuberculosis control program (RNTCP) are children.[2] Poor case identification, lack of resources for

active case finding in most settings with limited pediatric surveillance data fail to provide an accurate burden of childhood TB.[3] In spite of new rapid diagnostic methods, lack of gold standard test for confirming childhood tuberculosis remains an obstacle for the effective reporting of childhood TB, and hence these cases often remain under diagnosed and underreported.[4,5] As TB in children follows a recent infection, than a secondary reactivation, pediatric tuberculosis remains an indicator of its current transmission in a community.[6]

With this background, the study was designed to evaluate the spectrum of presenting symptoms, contact history of tuberculosis, BCG status and relevant laboratory investigations in children. This study aimed at a better understanding of pediatric tuberculosis and early identification of tuberculosis in children, thereby improving early reporting and treatment of these patients.

METHODS

This is a prospective hospital based observational study conducted in IRT-Perundurai medical college hospital, Perundurai from April 2016 to March 2018, after obtaining the institutional ethical committee clearance. Children less than 18 years of age diagnosed to have tuberculosis were included in the study after getting a written informed consent. Parents not giving consent and children with other chronic respiratory ailments were not included in the study. After getting the demographic details, presenting symptoms, clinical examination findings including BCG scar and nutritional status were documented. Weight for age was plotted for patients with WHO (age <5 years) and IAP (age 5-18 years) charts; weight below -2 SD in children <5 years and BMI <3rd centile in children above 5 years were considered as under nutrition. Details of contact with tuberculosis patient were collected from history and also by analyzing the lab reports of potential contacts.

Complete blood count, erythrocyte sedimentation rate, Mantoux test and chest X-ray were done for all patients. 2 sample sputum analyses for AFB (Resting gastric juice for younger children) was done for all the cases. Other investigations like lumbar puncture, FNAC, USG abdomen, CT chest/abdomen, MRI brain were done in accordance with the clinical situation.

Statistical analysis

The data collected were entered in MS Excel and exported to SPSS v 21 for statistical analysis. The descriptive statistics were expressed in frequencies and percentages. The inferential statistics was done using the chi-square test and Fisher exact test wherever applicable and p value less than 0.05 was considered as significant.

RESULTS

A total of 124 children, diagnosed with tuberculosis in IRT Perundurai medical college, during the study period and satisfying the inclusion and exclusion criteria were recruited for the study. Among the study population, children less than 6 years of age were 35 (28.2%), between 6-10 years were 31 (25%) and more than 10 years were 58 (46.8%). There were an increased number of childhood tuberculosis patients in more than 10 years of age. The total number of males was 53 (42.74%) and females were 71 (57.25%). Female preponderance was seen in all age groups (Figure 1).

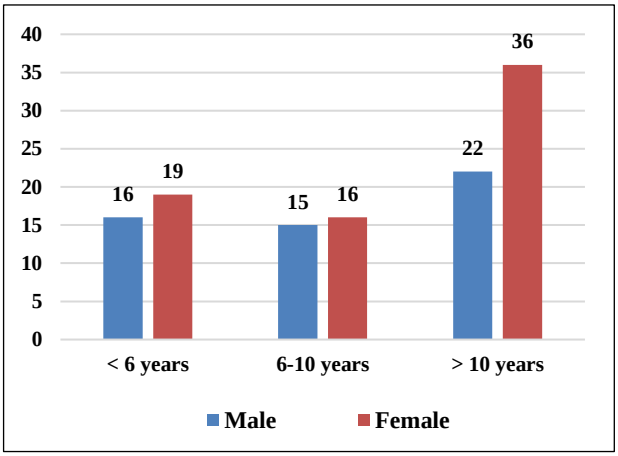

Figure 1: Demographic data of childhood tuberculosis (n=124).

The predominant type of diagnosis was pulmonary tuberculosis in 87 (70.16%) patients, followed by extrapulmonary in 32 (25.80%) and disseminated type was noticed in 5 (4%) patients. Age and gender distribution of the different forms of tuberculosis was given in (Table 1 and 2) respectively.

Table 1: Age wise distribution of childhood tuberculosis.

Diagnosis	Age categories			Statistical significance
	<6 years	6-10 years	>10 years	
	Frequency (%)	Frequency (%)	Frequency (%)	
Pulmonary TB (n= 87)	24 (68.6%)	22 (71.0%)	41 (70.7%)	P 0.076
Extra pulmonary TB (n= 32)	10 (28.6%)	8 (25.8%)	14 (24.1%)	
Disseminated (n=5)	1 (2.9%)	1(3.2%)	3 (5.2%)	

Table 2: Gender distribution in childhood tuberculosis.

Diagnosis	Sex		Statistical significance
	Male	Female	
	Frequency (%)	Frequency (%)	
Pulmonary TB	40 (75.5%)	47 (66.2%)	p 0.036*
Extra pulmonary TB	13 (24.5%)	19 (26.8%)	
Disseminated	0 (0.0%)	5 (7.0%)	

Table 3: Spectrum of presenting symptoms in pediatric tuberculosis.

Presenting symptoms (n)	Pulmonary TB	Extra Pulmonary TB	Disseminated
	Frequency (%)	Frequency (%)	Frequency (%)
Cough (75)	64 (85.3)	8 (10.7)	3 (4.0)
Sputum (55)	46 (83.6)	6 (10.9)	3(5.5)
Fever (53)	38 (71.7)	11(20.8)	4(7.5)
Loss of appetite (39)	28 (71.8)	8 (20.5)	3(7.7)
Loss of weight (39)	27 (69.2)	8 (20.5)	4 (10.3)
Lymphadenopathy (23)	2 (8.7)	19 (82.6)	2 (8.7)
RRTI (19)	18 (94.7)	1 (5.3)	0 (0.0)
Breathlessness (18)	16 (88.9)	0 (0.0)	2 (11.1)
Abdominal pain (10)	3 (30.0)	5 (50.0)	2(20.0)
Vomiting (5)	2 (40.0)	2 (40.0)	1 (20.0)
Chest pain (7)	7 (100)	0 (0.0)	0 (0.0)
Hemoptysis (3)	3(100.0)	0 (0.0)	0(0.0)
ALOC (3)	0 (0.0)	3 (100)	0(0.0)

Table 4: Undernutrition, absent BCG scar, HIV positivity and contact history in childhood tuberculosis (TB).

		Pulmonary TB	Extra pulmonary TB	Disseminated
		Frequency (%)	Frequency (%)	Frequency (%)
Nutrition	Normal	30 (34.5)	17 (53.1)	1 (20.0)
	Under nourished	57 (65.5)	15 (46.9)	4 (80.0)
BCG scar	Present	75 (86.2)	25 (78.1)	5 (100.0)
	No scar	12 (13.8)	7 (21.9)	0 (0.0)
HIV	Non-reactive	84 (96.6)	32 (100.0)	5 (100.0)
	Reactive	3 (3.4)	0 (0.0)	0(0.0)
Contact History	No	38 (43.7)	19 (59.4)	3 (60.0)
	Yes	49 (56.3)	13 (40.6)	2 (40.0)

Among the 32 cases with extrapulmonary TB, lymph node TB (n=20, 62.50%) was the most common manifestation. Central nervous system (n=5, 15.62%) and abdominal TB (n=5, 15.62%) were the next most common types followed by bone TB (n=2 6.25%). (Table 3) illustrates the commonest signs and symptoms of patients at the time of diagnosis. Overall, cough (n=75,60.5%) with sputum (n=55,44.4%) were the predominant symptoms noted followed by fever (n=53, 42.7%). Whereas, lymph node swelling in 19 (82.6%, p value <0.001) children was the predominant symptom in extra pulmonary form of tuberculosis patients (Table 3).

There were an increased number of undernourished patients in pulmonary (n=57, 65.5%) and disseminated forms (n=4, 80.0%) of tuberculosis (Table 4). BCG scar was seen in the majority of patients, with pulmonary tuberculosis in 75 (86.2%), extra pulmonary tuberculosis in 25 (78.1%) and disseminated type in 5 (100%). There were 3 HIV positive patients (3.4%), belonging to the pulmonary group. Around 49 (56.3%) pulmonary tuberculosis patients had a positive contact history with known tuberculosis patients. Patients diagnosed with extra pulmonary TB (n=13, 40.6%) and disseminated type (n=2, 40%) had a positive contact history (Table 4).

Erythrocyte sedimentation rate (ESR) was done in all the patients in the study. High ESR (>20mm) was noted in 75 (86.2%) patients in pulmonary group and 28 (87.5%) patients in extra pulmonary group. All children with disseminated tuberculosis had a high ESR (Table 5).

Overall, the Mantoux screening test was reactive in 85 (68.5%) patients and two-thirds of the undernourished children were Mantoux positive. Either sputum or resting gastric juice was taken for detecting acid fast bacilli in relevant patients. In 3(7.4%) patients, both were not done. AFB was positive in 17 (19.5%) patients in pulmonary group and 1 (20.0%) among disseminated TB patients. Chest radiograph findings suggestive of tuberculosis were noted in 93.25% pulmonary tuberculosis patients and all the disseminated tuberculosis patients (Table 5). Non-homogenous opacities (patchy infiltrations) in lung fields were the most common finding in both the groups in 36 (40.9%) children followed by consolidation in 29 (32.9%). Pleural effusion enlarged hilar nodes, cavity, bronchiectasis and miliary pattern are the other radiological findings.

FNAC was suggestive of tuberculosis in 18 (90%) lymph node tuberculosis patients and 3 (60%) children with disseminated TB and 1(1.1) pulmonary tuberculosis patient. Ultrasonography abdomen suggested tuberculosis in 4 (12.5%) children with extrapulmonary TB and 2 (40%) disseminated tuberculosis patients. Out of the total 124 TB children, 119 (96%) children were started on category 1 ATT and 5 (4%) children started on category 2 ATT.

Table 5: Frequency of high ESR, mantoux positivity, AFB smear positivity and positive radiological findings in pediatric tuberculosis (TB).

		Pulmonary TB	Extra pulmonary TB	Combined
		Count (%)	**Count (%)**	**Count (%)**
ESR	Normal	12 (13.8)	4 (12.5)	0 (0.0)
	High	75 (86.2)	28 (87.5)	5 (100.0)
Mantoux	Non-reactive	29 (33.3)	8 (25.0)	2 (40.0)
	Reactive	58 (66.7)	24 (75.0)	3(60.0)
AFB smear	Negative	69 (79.3)	30 (93.8)	4 (80.0)
	Positive	17 (19.5)	0 (0.0)	1 (20.0)
	Test not done	1 (1.1)	2 (6.3)	0(0.0)
Radiological findings	Not suggestive of TB	4 (4.6)	31 (96.9)	0 (0.0)
	Suggestive of TB	83 (95.4)	1 (3.1)	5 (100.0)

DISCUSSION

Around 124 children diagnosed with tuberculosis in the IRT-Perundurai medical college, during the 2-year study period were included in the study. Out of the study population, authors had a female preponderance compared to males. Kamath KM et al, in their decade long study of tuberculosis with 289 cases had a female preponderance (53.6%) over males (46.4%).[7]

There was a higher prevalence of tuberculosis in >10 years age group than younger kids in present study. This may be due to the inclusion of children till 18 years of age. This finding was similar to the study conducted on childhood tuberculosis by Shrestha S et al, in Nepal.[8]

Pulmonary tuberculosis was the most common form of tuberculosis in present study than extrapulmonary and disseminated TB. This was the similar finding in a study conducted by Goyal A et al, on childhood tuberculosis.[9] Lymph node TB was the predominant manifestation among extrapulmonary forms of tuberculosis in present study Dendup T et al, in their study in Bhutan reported lymph node TB as the commonest form of extrapulmonary tuberculosis.[10]

Cough and sputum production are the most common symptoms noticed in pulmonary tuberculosis patients followed by fever. Pama CP et al, in their study of tuberculosis, found that the frequent symptoms were fever (86.6%), cough (76.1%), malnutrition (52.3%), weight loss (50.7%), anorexia (44.8%), and breathing difficulty (28.4%).[11] Lymph node swelling was the predominant symptom in extra pulmonary form of tuberculosis patients. Hatwal D et al, on their study on extrapulmonary tuberculosis reported that lymph node swelling was the commonest symptom among extrapulmonary TB.[12]

About 65.5% of pulmonary TB children and 80% of disseminated TB children were undernourished in present study. Swaminathan S et al, documented 62% of TB patients with grade III and IV malnutrition in their study.[13] Majority of patients had BCG scar in present study. A high ESR (>20) was noticed in a large number of patients (86-100%) in all forms of tuberculosis. This correlated well with varying studies in tuberculosis, which documented a good correlation between a high ESR and tuberculosis.[14,15] ESR is a reliable marker of tuberculosis.

History of contact with tuberculosis was found in 56.3% of pulmonary TB children and in 40% of cases with extrapulmonary TB and disseminated TB. Somu N et al, had 61.2% of positive contact history of children diagnosed with tuberculosis.[16] This reinstates the importance of screening kids in a family of an adult with tuberculosis.

Mantoux reactivity was noted in 66.7% children with pulmonary TB, 75% of extrapulmonary TB and 60% of patients in disseminated group. Similarly, Sreeramareddy CT et al, in their study on tuberculosis had a Mantoux positivity of 66% in pulmonary group with higher Mantoux positivity of 71% in extra pulmonary form of tuberculosis.[17]

Acid fast bacilli were demonstrated in 19.5% patients in pulmonary group and 20.0% in disseminated group. Similarly, in various studies, the yield of tubercle bacilli was <20% in childhood tuberculosis.[17,18] Newer diagnostic methods like CBNAAT were not performed as they were not available free of cost in our center during the study period. Inclusion of CBNAAT would have substantially increased the bacteriological diagnosis. Positive chest X ray findings were noticed in 93.5% of pulmonary tuberculosis patients and all children with disseminated TB. Non homogenous opacities, consolidation, pleural effusion, hilar nodes, bronchiectasis and military pattern are the chest X-ray findings noticed in our patients. Shrestha S et al, in their study had documented hilar lympadenopathy (23.3%), unilateral pleural effusion (23.3%), nonspecific findings (21.7%) and consolidation (15%) as the common radiological findings.[19] FNAC confirmed the diagnosis of tuberculosis in 21 out of 23 patients (91.03%) who underwent the investigation. In a similar study by Sreeramareddy CT et al, FNAC was positive for TB in 32 out of 38 (84.2%) patients.[17] There are few limitations in present study. Present study had the limitation of not performing CBNAAT for the patients. We did not follow up the cases fully, as these cases were referred to the nearby primary health centres for getting the drugs under RNTCP.

CONCLUSION

Paediatric pulmonary tuberculosis is common in our setting. In children, as there is no gold standard investigation for diagnosing tuberculosis, present study reinforces the importance of a complete history, tracing of adult contacts, clinical examination and appropriate laboratory investigations in diagnosing tuberculosis.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Global tuberculosis report 2018. Geneva: World Health Organization 2018. Available at: https://apps.who.int/iris/bitstream/handle/10665/274453/9789241565646-eng.pdf.
2. TB India 2017, RNTCP, Annual status report, central TB division, Directorate general of health services. Available at: https://tbcindia.gov.in/WriteReadData/TB%20India%202017.pdf.
3. Nelson LJ, Wells CD. Global epidemiology of childhood tuberculosis. Int J Tubercul Lung Dis. 2004;8(5):636-47.
4. Connell TG, Zar HJ, Nicol MP. Advances in the Diagnosis of Pulmonary Tuberculosis in HIV-Infected and HIV-Uninfected Children. J Infect Dis. 2011;204:1151-8.
5. Nicol MP, Workman L, Isaacs W, Munro J, Black F, Eley B, et al. Accuracy of the Xpert MTB/RIF test for the diagnosis of pulmonary tuberculosis in children admitted to hospital in Cape Town, South Africa: a descriptive study. Lancet Infect Dis. 2011;11(11):819-24.
6. Marais BJ, Obihara CC, Warren RM, Schaaf HS, Gie RP, Donald PR. The burden of childhood tuberculosis: a public health perspective. Int J Tubercul Lung Dis. 2005;9(12):1305.
7. Kamath KM, Giridhar BH, Philip P. Paediatric tuberculosis: A decade-long experience in a tertiary care centre. Indian J Child Health. 2018:116-9.
8. Shrestha S, Bichha RP, Sharma A, Upadhyay S, Rijal P. Clinical profile of tuberculosis in children. Nepal Med Coll J. 2011;13(2):119-22.
9. Goyal A, Shah I, Patankar N, Chilkar S. Clinical profile of children with pulmonary Tuberculosis. Clinic Epidemiol Global Health. 2014;2(1):24-7.
10. Dendup T, Dorji T, Edginton ME, Kumar AM, Wangchuk D, Dophu U, et al. Childhood tuberculosis in Bhutan: profile and treatment outcomes. Public Health Action. 2013;3(1):11-4.
11. Pama CP, Gatchalian SR. Clinical profile of culture proven tuberculosis cases among Filipino children aged 3 months to 18 years. PIDSP. 2002;5(1):13-23.
12. Hatwal D, Chaudhari S, Joshi AK, Rathaur VK. Patterns of extrapulmonary tuberculosis in children: a hospital-based study. Indian J Comm Health. 2013;25(1):22-7.
13. Swaminathan S, Datta M, Radhamani MP, Mathew S, Reetha AM, Rajajee S, et al. A profile of bacteriologically confirmed pulmonary tuberculosis in children. Indian Pediatr. 2008;45(9).
14. Qazi SA, Khan S, Khan MA. Epidemiology of childhood tuberculosis in a hospital setting. J Pak Med Assoc. 1998;48:164-7.
15. Al-Marri MR, Kirkpatrick MB. Erythrocyte sedimentation rate in childhood tuberculosis: is it still worthwhile?. Int J Tubercul Lung Dis. 2000;4(3):237-9.

16. Somu N, Vijayasekaran D, Kannaki M, Balachandran A, Subramanyam L. Adult contacts in children with Tuberculosis. Indian Pediatr. 1997;34:819-22.
17. Sreeramareddy CT, Ramakrishnareddy N, Shah RK, Baniya R, Swain PK. Clinico-epidemiological profile and diagnostic procedures of pediatric tuberculosis in a tertiary care hospital of western Nepal-a case-series analysis. BMC Pediatr. 2010;10(1):57.
18. Garg P. Childhood tuberculosis in a community hospital from a region of high environmental exposure in north India. JDCR. 2008;2(1):634-8.
19. Shrestha S, Marahatta SB, Poudyal P, Shrestha SM. Clinical profile and outcome of childhood tuberculosis at Dhulikhel hospital. J Nepal Paediatr Soc 2011;31(1):11-6.

Cite this article as: Anuradha G, Muraleetharan G. Clinical profile of children with tuberculosis from a semi-urban referral centre in South India: a prospective observational study. Int J Contemp Pediatr 2019;6:1450-5.