



Spectrum of Adolescent Tuberculosis in a Tertiary Care Hospital at Shimla: North India.

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ABSTRACT

Background: Tuberculosis amongst adolescents is distinct from both childhood and adult tuberculosis in terms of incidence, disease manifestations and response. These peculiarities are due to issues related to immunity, hormone imbalance, social interactions and psychology unique to this phase of life. Adolescent tuberculosis remains a less studied area in India.

Aims: To study the spectrum of tuberculosis in adolescents.

Methods: We analyzed demographic, clinical and paraclinical data from 477 adolescents (10-19 years of age) diagnosed to have Tuberculosis, who reported to the in the Department of paediatrics, Indira Gandhi Medical College, Shimla between the years 2010 and 2014.

Results: The incidence of tuberculosis among hospital visiting adolescents was 0.8%. The incidence in females (1.00 %) was significantly more in comparison to males (0.63 %) with females having (OR1.60) 1.60 times more odds of suffering from Tuberculosis than males ($p < 0.001$). Isolated Pulmonary tuberculosis (PTB) was seen in 52% cases, extrapulmonary tuberculosis (EPTB) in 40 % and combined PTB with EPTB in 8 % cases. The most common forms of extrapulmonary tuberculosis were pleural effusion (25.6%) and central nervous system tuberculosis (24.7%). Infiltration (consolidation) was the most common chest x-ray finding (53.7 %).

Conclusion: Pulmonary disease accounted for high proportion of tubercular cases. Among Extrapulmonary forms isolated pleural effusion and central nervous system tuberculosis were the most common closely followed by abdominal tuberculosis, while lymphadenitis was less common. The incidence among females was significantly high in comparison to males ($P < .001$).

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Introduction

Tuberculosis (TB) has plagued the humankind since Neolithic times. Someone somewhere contracts TB every four seconds and one of them dies every 10 seconds.[1, 2] India and China together account for almost 40% of the world's TB cases. . [3] In India with 17% of world population we carry 26% of all tuberculosis cases. [4]

The two main factors determining the risk of progression of TB infection to disease are patient age and immune status. Neonates have the highest risk of progression to disease. Children from 5 to 10 years of age are less likely to develop disease when compared to other age groups, and the risk again increases during adolescence. [5] Hormonal changes and altered protein and calcium metabolism associated with adolescent growth contribute to increased risk for tuberculosis. [6, 7]

The endocrinal effect changes the disease nature through immune system and shortens the time interval between initial infection and the development of active disease. [8]

Adolescents are the major perpetrators of TB in the community due to reluctance in seeking health care and poor adherence to treatment. It leads to appearance of resistant strains and susceptibility of transmission increases due to greater social interaction.

Literature on disease burden of TB in adolescents is scarce in the developing countries including India. This study aims to find out the spectrum of tuberculosis in adolescents.

Materials and Methods

The study cohort comprised of 477 “adolescents” with tuberculosis, who visited the paediatrics department of Indira Gandhi Medical College, Shimla, between January 2010 and December 2014. [9] The data in terms of demographic characters, presenting symptoms, X-rays, bacteriological results, pathological findings and tuberculin

skin tests were recorded and analysed. HIV screening results were recorded wherever available.

Mantoux test was done in all the patients with intradermal injection of 0.1 ml PPD stabilized with Tween 80 containing 5 TU, available in government supply and read between 48-72 hours. Tuberculosis was classified into pulmonary (PT), extrapulmonary (EPTB) and PT with EPTB features as per RNTCP. [10] Cases with either sputum/gastric lavage positive for AFB, or chest x-ray suggestive of TB were classified as pulmonary TB. Cases with both pulmonary and extrapulmonary involvement were grouped separately.

Result

A total of 61,514 adolescents visited the Hospital during study period. Of these 37,494 (60.95 %) were males and 24,020 (39.05 %) females (M: F: 1.56: 1). Out of these, 477 cases (236 males and 241 females, M: F 1:1.02) were diagnosed to have tuberculosis. The prevalence of tuberculosis in females (1.00 %) was significantly more in comparison to males (0.63 %) with females having of 1.60 times more odds of suffering from Tuberculosis than males (95% CI: 1.33-1.92, $p < 0.001$) (Table 1).

Distribution of TB cases is shown in (Table 2). In all PTB patients chest X-ray was suggestive of TB (Table 3) and sputum positivity was seen in 46% (133/287) cases. Criteria used to diagnose EPTB and distribution of lesions is shown in Table 4. Of the extrapulmonary forms, the most common were tubercular pleural effusions and CNS tuberculosis followed by abdominal TB, Disseminated TB, Tubercular lymphadenitis, Skeletal TB and pericardial tuberculosis (Table 5).

Mantoux test was done in all the patients and was positive in 260 cases (54.6%). Screening for HIV was done in 299 out of 477 patients (CNS and Disseminated TB cases) and was found positive in 8/299 (2.6%) cases.

Table1: Prevalence of tuberculosis among Male and Female adolescents.

	Tb +ve	Tb -ve	Total	X ²	P value	OR (95% CI)
Male	236	37258	37494	26.601	<0.001	0.63(0.52– 0.75)
Row %	0.63 %	99.37 %	100.00 %			
Col %	49.48 %	61.04 %	60.95 %			
Female	241	23779	24020			
Row %	1.00%	99.00 %	100.00 %			
Col %	50.52 %	38.96 %	39.05 %			
Total	477	61037	61514			
Row %	0.78 %	99.22 %	100.00 %			
Col %	100.00 %	100.00 %	100.00 %			

TABLE 2: Distribution of TB cases.

TYPE OF TB	No of cases		Total cases	%
PTB	247	51.8%	287	60.2%
PTB with EPTB	40	8.4%		
EPTB alone	190	39.8%	190	39.8%
TOTAL	477		477	100%

Table no. 3: Distribution of radiological lesions in tuberculosis.

Radiological findings	No of lesions (n =363)	percentage
Infiltration and Consolidation	154	42.4 %
Post primary lesion (cavity, fibrosis, collapse and bronchiectasis)	74	20.4 %
Adenopathy	49	13.5%
Miliary pattern	10	2.8 %
Pleural effusion	59	16.3 %

TABLE 4: Distribution of cases based on diagnostic criteria used in cases with Extrapulmonary involvement (n=230).

DIAGNOSTIC CRITERIA MET	NO OF CASES	PERCENTAGE
Bacteriological evidence of TB on microscopy or culture of serous fluids	none	
Fine needle aspiration cytology (FNAC)/ Histopathological evidence of TB in biopsy	48	20.9%
Criteria 3	32	14.0%
(i)Tuberculin positivity	31	13.4%
(ii)ADA levels suggestive of TB in serous fluids	3	1.3%
(iii) CT/ MRI suggestive of tuberculoma or TB meningitis.	29	12.6%
(iv)Ultrasound abdomen suggestive of abdominal TB		
More than one of the above criteria among criteria 3	87	37.8%
TOTAL	230	100%

Table 5: Distribution of EPTB cases (n=230).

TYPE OF EPTB	No of cases	percentage
Pleural Effusion	59	25.7%
CNS TB	57	24.8%
Abdominal TB	51	22.2%
Disseminated TB	47	20.4%
TB lymphadenitis	7	3.1%
Skeletal TB	5	2.1%
Pericardial TB	4	1.7%

Discussion

The study reports the incidence and spectrum of tuberculosis in adolescents from Shimla, north India. To our knowledge no such study has been reported from this region till date. There are very few comparable studies which deal with the hospital based incidence of adolescent tuberculosis. Most of the adolescent studies are either grouped with adult or pediatric population hence information specific to this age group is limited.

Incidence of adolescent tuberculosis from various national and international population based studies varies from 0.14 to 0.45%. [11-13] Higher incidence (0.8%) in the present study may be due to our study cohort being adolescents visiting hospital which is a referral tertiary care hospital. Similar to observation by Jayasree poroor⁴ incidence of tuberculosis amongst adolescent females was higher in comparison to males (females 1.0 % and males 0.6%, $p < 0.001$), however, in our study this difference was statistically significant.

Frequency of PTB and EPTB in international literature varies from 22 to 78.6% and 15 to 35% respectively. [14-19] Our findings of 60% and 40% of PTB and EPTB are in accordance with above however in variance with study by Jaysree pooroor who observed EPTB to be more common amongst adolescents in comparison to PTB 52% vs. 48%. [4]

The radiologic findings in adolescents include parenchymal lesions and cavities. In our study, consolidation or infiltrates were the most common x ray finding. Cavitary lesions were seen in 20 % of cases and were low in comparison to reported range of 29 % to 56 % in other studies [19, 23-25]

We observed 46% sputum positivity in the study cohort and it was well in accordance with other study reports of 43 to 53.8%. [4, 19, 26]

Extra pulmonary tuberculosis accounts for up to one third of all TB cases and pleural involvement increases from childhood to adolescence. The most common form of EPTB in the present study was pleural effusion, which is similar to the studies conducted in Canada, France, central India and Bucharest while discordant with studies from USA¹⁷, South Africa and South India in which peripheral lymphadenopathy was the commonest EPTB form. [12, 16, 18, 20, 17, 13, 4] The difference may be due to differences in genetic susceptibility of populations [4]

Tuberculosis of the central nervous system (CNS), a highly devastating manifestation of tuberculosis was detected in 25% of our patients. Incidence of CNS TB is quite high in our study in comparison to range of 2.8 % to 13% in other published studies. [18,19,21,22] In addition we found high occurrence of Abdominal 22.2% and Disseminated TB 20.4% also. Since ours was a hospital based study, high incidence of CNS, abdominal and disseminated TB could be due to the clustering of seriously ill patients who are being referred to medical college.

Frequency of tubercular lymphadenitis amongst EPTB cases was 3%, which is higher than observation (0.7%) by Lotfian F while low in comparison to studies by Baghaie et al (7%) , Shrivastava AK et al (21%), Cruz AT et al (37%) and Jaysree (57%) as a manifestation of EPTB. [19, 27, 18, 17, 4] The low proportion of lymphadenitis in our study could be attributed to the study cohort being from tertiary care hospital and lots of cases of TB lymphadenitis are treated at primary and secondary level.

Conclusion

We have observed higher incidence of TB among females. Commonest forms of EPTB were CNS, abdominal and disseminated forms while Tubercular lymphadenitis was less common. It could be attributed to population differences or clustering of seriously sick patients in

a tertiary care referral hospital. Since the study had limitations of being restricted to hospital wider population based studies are required to identify the definite epidemiological differences.

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Competing Interests

None Declared

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