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Trend of Pulmonary and Extrapulmonary Tuberculosis in Pediatric Group

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ABSTRACT

Introduction: Tuberculosis (TB) remains a major global health problem affecting millions of people annually. India continues to have highest tuberculosis burden globally with 6% incidence of pediatric cases. Tuberculosis in children has unique features, making its diagnosis difficult. Rapid diagnostic test, GeneXpert paly a important role in early and accurate detection of both pulmonary TB (PTB) and extrapulmonary TB (EPTB). *Materials and methods:* Study was a retrospective, record based study carried out in Bowring and lady Curzon hospital between Feb 2018 to Feb 2019. Samples from clinically suspected PTB & EPTB cases of pediatric age group were collected and processed by Xpert MTB/RIF assay. *Results:* Total of 472 samples received, 90.4% were pulmonary and 9.5% were extrapulmonary samples. 9.3% were MTB positive. Of the total 472, 248 were males and 224 were females. Most of the cases were of the age group 11-16 years. 2.3% were HIV positive. Among pulmonary samples, 8.4% were MTB positive. Among positives, 5.5% was RIF resistance-positive. Maximum number of MTB was detected in the age group of 11-16 years Among extrapulmonary samples, MTB was detected in 8. No rifampicin resistance was found. All positives belong to the age group of 11-16 years. Maximum MTB positives were found in FNAC samples. *Conclusion:* Prevalence and detection rate of both pulmonary and extrapulmonary cases are high among the children of age above 10 years. Extrapulmonary case detection is significantly improved with the use of Xpert assay.

Keywords: Extrapulmonary TB, Pediatric group, Pulmonary TB, Xpert MTB/RIF assay.

INTRODUCTION

Tuberculosis (TB) remains a major global health problem affecting millions of people annually. It is one of the top 10 causes of death worldwide and top among infectious disease. Estimated cases of all forms of TB in 2016 were 10.4 million with 1.7 million deaths. India continues to have highest tuberculosis (TB) burden globally, with the incidence of 2.79 million TB cases and 147000 MDR/RR-TB cases in 2016 [1]. It is a major cause of disease, both pulmonary and extrapulmonary, and death in children from TB-endemic areas [2,3]. TB in children is increasingly recognized as an important component of global tuberculosis burden, with an estimate of 1 million cases and 239000 deaths of children <15 years of age in 2015 [4].

India accounts for 6% incidence of pediatric TB cases in a population that has 40% as estimated latent TB cases. Initially diagnosis was solely dependent on smear microscopy, paucibacillary cases were left undetected [5]. Tuberculosis in children has unique features, different from adults. The symptoms have a broad spectrum changing from non-specific

symptoms to severe clinical presentations which makes the diagnosis more difficult [6].

Mycobacteriological diagnostics used in adults remain the 'gold standard' but demonstrate low sensitivity in children because of paucibacillary nature of TB in children and problem in obtaining the adequate respiratory and non-respiratory specimens for bacteriological confirmation [7]. The development of rapid diagnostic test is recognized as a vital part of the WHO End TB strategy [8]. Hence children presenting with signs and symptoms suggestive of TB to any of public or private sector, Xpert testing was done and cases are diagnosed under RNTCP program [8.9]. Multiple studies have added to the early evidence for the diagnostic accuracy of Xpert in pulmonary and extrapulmonary TB in both children [10] and adults [11,12].

MATERIALS AND METHODS:

Study was a retrospective, record based study carried out in Bowring and lady Curzon hospital. We collected pediatric data from RNTCP lab attached to the department of microbiology between Feb 2018 to Feb 2019.

Total of 472 clinically suspected PTB & EPTB cases from pediatric age group were received in RNTCP lab from our hospital and other private hospitals.

Sampling method*:* Pulmonary samples (sputum, bronchoalveolar lavage, gastric lavage) and extrapulmonary samples (pus, aspirates, body fluids, lymph node [LN] tissue) were collected in special, plain, universal 30ml clear plastic container with cap (falcon tubes) under aseptic conditions. Buffer solution was added to the received sample, then the mixture is loaded to cartridge which were processed by Xpert MTB/RIF assay (Cepheid-Sunnyvale-USA), as per the guidance document given by Central TB division, Government of India (RNTCP, 2013; RNTCP, 2012). The results are read as MTB detected, MTB not detected, RIF resistance detected; RIF resistance not detected; RIF resistance indeterminate; or invalid/error with the help of positive beacons.

Pulmonary (sputum, bronchoalveolar lavage fluid, gastric lavage aspirate) and extrapulmonary samples (pus, aspirates, body fluids, LN tissue) from all the age group irrespective of gender were included in this study.

Blood samples, urine samples and any EP sample contaminated with blood is excluded and not included in our study.

Statistical analysis:

Descriptive analysis using charts, tables and graphs. Data were presented as percentages and proportions.

RESULTS:

Total of 472 samples received during study period, 427(90.4%) were pulmonary and 45(9.5%) were extra pulmonary samples. MTB was detected in 44(9.3%). Of the total 472, 248(52.5%) were males and 224(47.4%) were females as shown in the table 1. Most of the cases were of the age group 11-16 years as shown in the figure 1. Out of 472, 11(2.3%) were HIV positive. Among 472 samples received, 372(78.8%) were sputum, 3(0.63%) were bronchoalveolar lavage fluid, 52(11%) were gastric lavage aspirate, 14(2.9%) were of FNAC, 22(4.6%) Pleural fluid, 4(0.84%) CSF and 5(1%) pus as shown in the figure 2.

Among 427 pulmonary samples, MTB was detected in 36(8.4%) samples as shown in the figure-3. Whereas 319(91.5%) were found negative for MTB. Out of 36 positives, 34(94.4%) were MTB-positive/RIF resistance-negative and 2(5.5%) was MTB- positive/RIF resistance-positive. Maximum number of MTB was detected in the age group of 11-16 years (n=31, 86.1%) as shown in table 2. Among 427, 228(53.3%) were males and 199(46.6%) females, MTB was detected in 13(5.7%) and 23(11.5%) respectively as shown in table 1.

Among 45 extra pulmonary samples, MTB was detected in 8(17.7%). No rifampicin resistance was found. Among different samples received, Pleural fluid was in maximum number i.e. n=22(48.8%). Of the total 45, 20(44.4%) were males and 25(55.5%) were females. Among males and females, MTB detected in 2(10%) and 6(24%) respectively as shown in table 1. All positives belong to the age group of 11-16 years as shown in table 2. Maximum MTB positives were found in FNAC samples i.e. n=5(62.5%) as in figure 3.

DISCUSSION:

Children account for a major proportion of the global tuberculosis disease burden, especially in endemic areas. However, the accurate diagnosis of childhood

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tuberculosis od childhood TB remains as a major challenge [13]. Conventional methods for the detection of MTB like culture methods are time consuming. Therefore, there is a need for new and rapid diagnostic methods, nucleic acid amplification techniques like GeneXpert (CBNAAT) [14].

Many studies have assessed the outcome of PCR techniques for the diagnosis of EPTB [15,16].

Devrim I et al., conducted a study in which maximum cases are of PTB compared to EPTB cases and there is no significant difference between PTB and EPTB according to age [6]. Similar results were found in our study. 81.8% cases are of PTB while 18.8% are of EPTB.

Studies by Raizada N et al., and Balasubramanian et al., showed that males have higher MTB diagnostic rates compared to females [17,18]. This is in contrary to our study where the distribution of pediatric cases is more in females (12%) compared to males (6%). In a study on Sexual Dimorphism found no significant male-female difference in TB incidence among children [19].

Among the samples, Gastric lavage aspirate contributed the most after sputum. Detection rate is very poor in the age group below 1 year of age among the suspects. Positives were maximum in the age group between 11 to 16 years, followed by 1-5 tears. In a study by Das P K et al., sputum were maximum followed by Gastric lavage aspirate. But a maximum positive was observed in the age group of 1 to 5 years [5].

Several studies showed higher prevalence of RIF resistance i.e. 6.9% [20] and 11.7% [17]. In contrary our study showed 4.5% of MTB positives are of RIF resistance which is comparatively less. Higher proportion of RIF resistance found in the children above 10 years of age. This is not in agreement with finding of a study by Raizada N et al., where maximum rifampicin resistance was observed in children less than 5 years of age compared with children in the age group 10-14 years [17].

In Sanjay G M et al., maximum EPTB samples processed were of pleural effusion (49.81%) [21]. In our study, maximum EPTB samples looked for MTB was of pleural effusion. But FNAC contributed to 62.5% of total EPTB positives and Highest positive rate was observed in FNAC samples i.e. 35.7% (5/14). Where as in a Lu J et al. study, author found that gastric lavage aspirate showed highest positive rate (51.2%) [20.21]. In a study done by Armand S et al, among individual extrapulmonary samples, the sensitivity of CBNAAT was highest among lymph nodes (94.7%) [22].

CONCLUSION:

Children are vulnerable group to TB disease. As they fail to show the characteristic features of the disease, difficulty in collecting sample, diagnosis of TB in this group continue as an unresolved challenge. The study showed that prevalence and detection rate of both pulmonary and extrapulmonary cases are high among the children of age above 10 years. Extrapulmonary case detection is significantly improved with the use of Xpert assay. None of the extrapulmonary TB cases were found drug resistant in our RNTCP center.

Table 1: Gender distribution of cases

	Males (n-248)		Females (n-224)	
	Pulmonary cases	EP cases	Pulmonary cases	EP cases
Total	228	20	199	25
Positives	13	2	23	6

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Figure 1: Age distribution of pulmonary and extrapulmonary samples processed

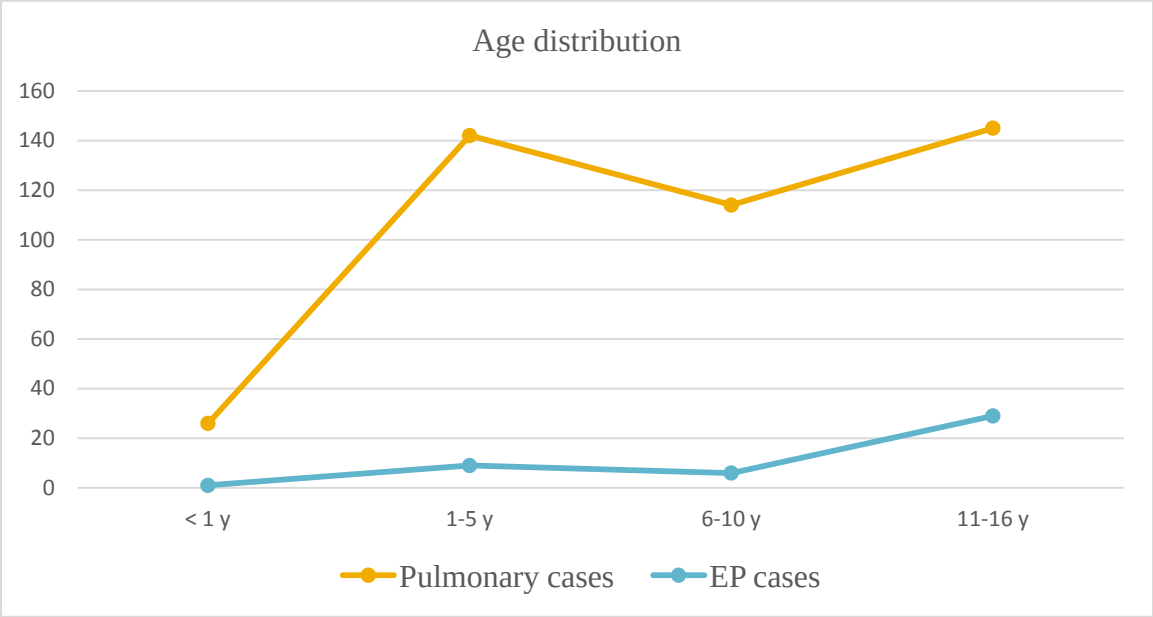

Figure 2: Different sample received for PTB and EPTB detection

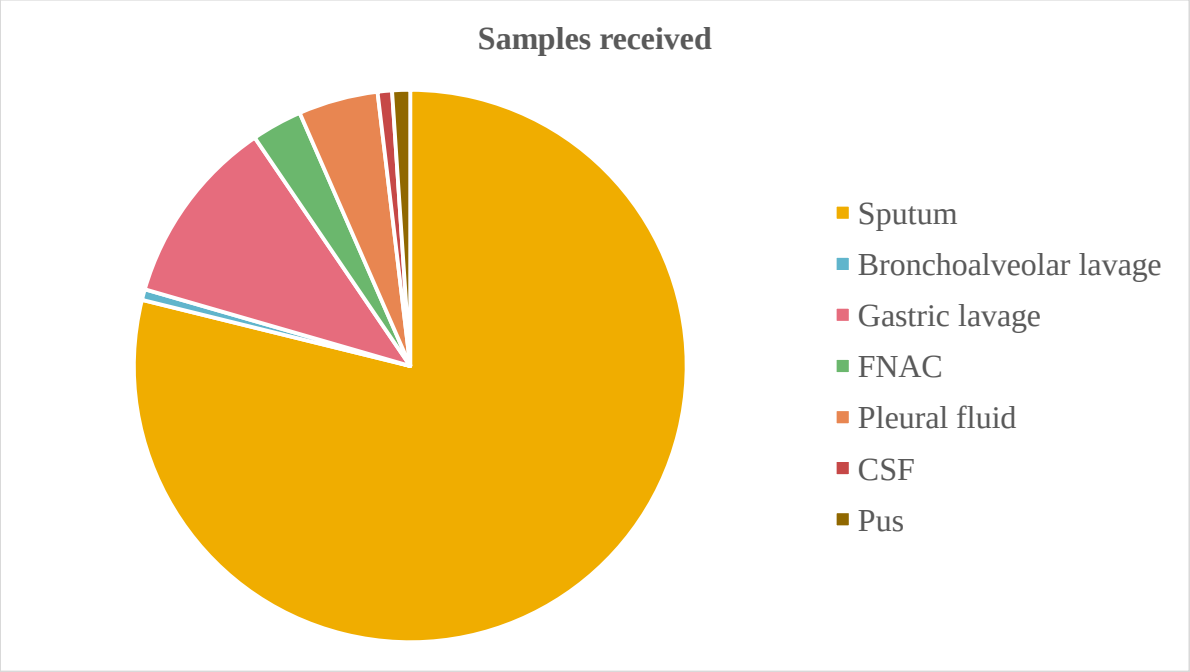

Table 2: Positive Case distribution of pulmonary TB and Extrapulmonary TB among different age groups

Age groups	PTB	EPTB
<1 years	0	0
1-5 years	4	0
6-10 years	1	0
11-16 years	32	8

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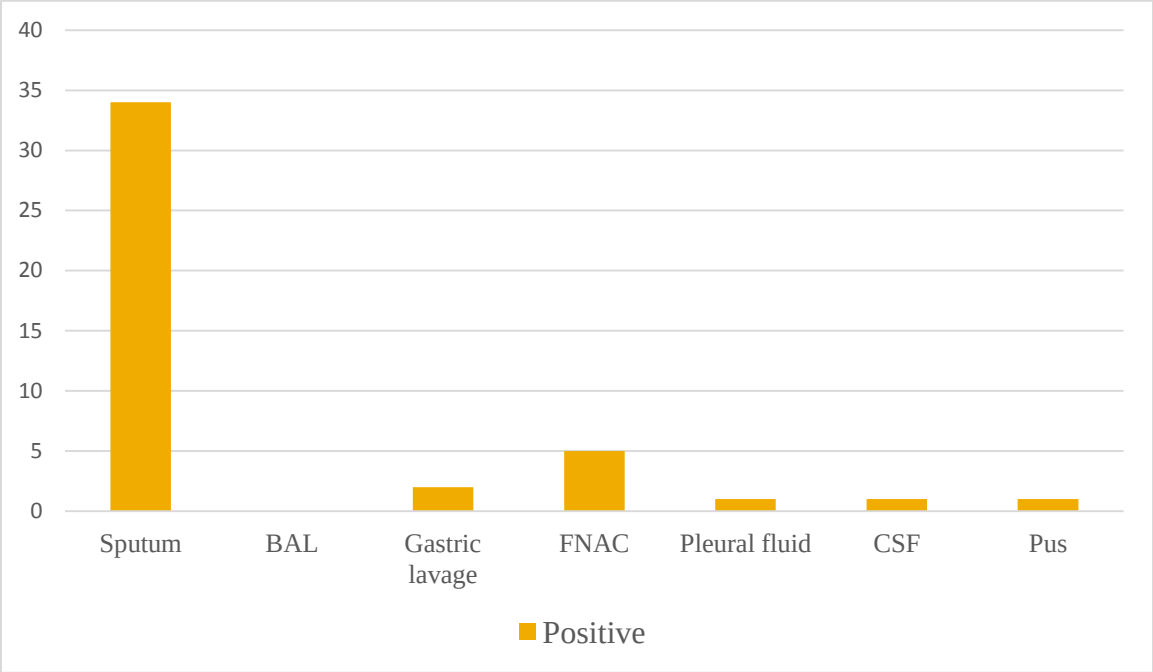
Figure 3: Total positive among different samples



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