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A Study on Prevalence and Treatment Outcome of Tuberculosis Among Paediatric Population in Eluru District

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ABSTRACT

Diagnosis and treatment of paediatric TB has been a challenge since long. Difficulty in sample acquisition and paucibacillary specimen might challenge the diagnosis of paediatric TB. Tuberculosis treatment among children has problems with compliance. Knowledge about treatment outcome in children is essential for successful functioning of NTEP. So, we have done a study to know the prevalence, diagnostic samples used and treatment outcomes in paediatric population in our district. Globally there appears to be less research on paediatric TB burden and outcomes. In the current study prevalence, different diagnostic modalities used, drug resistance, HIV-TB coinfection and treatment outcome among children are studied among children in our district. It is a descriptive cross-sectional study of 3 year records done among all registered cases of tuberculosis aged = 18 years, between January 2020-December 2022 in Eluru district, Andhra Pradesh. Data about 918 paediatric TB cases was collected from TB registers and analyzed. Prevalence of TB among paediatric population is found to be 0.74 per 1000 population. 12% cases were micro biologically confirmed and the rest were clinically diagnosed. 2.61% were HIV seropositive paediatric TB cases. 10 cases out of 918 were drug resistant. Poor treatment outcomes were among male children, smear positive TB cases and HIV- seropositive paediatric TB cases. All the diagnosed paediatric TB cases needs regular follow up and treatment under supervision to prevent recurrence, dissemination, prevent resistance and decrea

INTRODUCTION

Tuberculosis in children is not a topic of concern till, due to paucibacillary nature of disease in children which implies less transmission in the community through children[1]. However diagnosing and notifying paediatric TB cases is important as tuberculosis is among first 10 causes of death in children[2]. TB in children can also contribute to tuberculosis in adult. Evey year 1.1million children fall ill with TB and more than 226000 of them lose their lives[3]. Establishing diagnosis of TB in children can be challenging, especially in early stages and much more in latent TB[4]. Children usually present with non-specific symptoms and radiological findings. Microbiological diagnosis is difficult as obtaining respiratory samples is also difficult in children. So most of the times treatment of TB is initiated based on clinical suspicion[5].We wanted to study the prevalence, mode of diagnosis and treatment outcome in our district through this study.

Aim and Objections: To study the prevalence and treatment outcomes, diagnostic modalities used, HIV-TB coinfection, drug resistance, among paediatric TB patients in Eluru district in past 3years.

MATERIALS AND METHODS

It is a retrospective study done among registered tuberculosis cases in children (<18yrs of age) between January 2020-December 2022 in Eluru district. Data is collected from 918 children for the study and analysed for treatment outcome on basis of records.

Inclusion Criteria: All the cases of age <18years registered for TB treatment under NTEP at District tuberculosis centre are included in our study

Outcomes are Defined According to National Tuberculosis Elimination Program Guidelines:

Cured: Microbiologically confirmed TB patients at the beginning of treatment and who was smear or culture negative at the end of the complete treatment.

Treatment Completed: TB patient who completed treatment without evidence of failure or clinical deterioration with no record of smear or culture results of biological specimen in the last month of treatment were negative. (Because the test was not done or because the result is unavailable or the test is not feasible).

Treatment Regimen Changed: A TB patient who is on a first-line regimen and subsequently has been diagnosed with DR-TB and therefore, switched to a drug-resistant TB regimen before being declared as failed.

Failure: TB patient whose biological specimen is positive by smear or culture at the end of treatment.

Lost to Follow Up: A TB patient for whom treatment was interrupted for one month or more.

Died: A patient who has died during the course of anti-TB treatment.

RESULTS AND DISCUSSIONS

Prevalence of TB among Paediatric is found to be 0.74 per 1000 population. Proportion of paediatric TB cases are found to be 7% among TB cases of all ages. Mean age of study population is 13 years. 417(45.42%) were male, 501 (54.5%) were females. 851(92.7%) newly diagnosed.

Successful: Patients who are cured and treatment completed.

Unsuccessful: Patients with treatment changed, failure, died, lost to follow up.

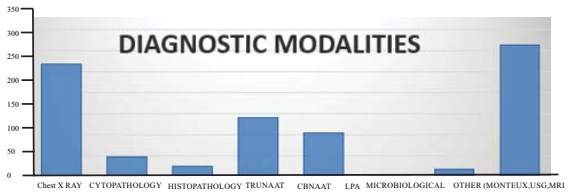

Fig.1: Different types of Diagnostic modalities used Microbiological positive-smear positive TB

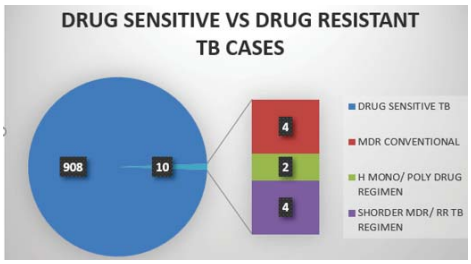

Fig. 2: Drug sensitive vs Drug resistance

67(7.2%) were retreatment cases.888(96.7%) HIV sero-negative TB cases, 24(2.61%) were HIV sero-positive TB cases and 6 were of unknown HIV status enrolled for treatment.

EPTB accounted for more than half 477(52%), Pulmonary smear negative TB accounted for 210(22.8%), pulmonary smear positive TB accounted for 231(25%). Lymph node TB accounts for 60% of EPTB cases. Among 918 paediatric TB cases, 218(23%) were cured and 700(76%) completed their treatment, 5 patients were lost to follow up and 9 were deaths and 2 were treatment failure.

Table 1: Sociodemographic characteristics of pediatric TB patients attending treatment among registered cases

Variables		Number (n)	Percentages
Gender	Male	417	45.42
	Female	501	54.58
Age in years	0-5	96	10
	6 to12	212	25
	13 to18	610	66
HIV	Positive	24	2.61
	Negative	888	96.7
	Unknown	6	0.65
Type of TB	PTB	SPTB - 231	25.10
		SNTB - 210	22.80
	EPTB	477	52
Category of treatment	New	851	92.70
	Re-treatment	67	7.20

SPTB: Smear Positive TB, SNTB: Smear Negative TB, EPTB: Extra Pulmonary TB

Table 2: Treatment outcome by socio-demographic characteristics and types of tuberculosis among children TB patients attending treatment.

	Successful	Un Successful
Male	403	12
Female	488	13
Age 0-5yrs	94	2
Age 6to12yrs	208	2
Age 13to18yrs	597	21
SPTB	217	17
SNTB	285	6
EPTB	391	2
New cases	827	23
Retreatment	66	2
Positive	22	2
Negative	865	23
Unknown	6	-

Tuberculosis in children poses a great challenge in day to day practice. The study's findings indicate a higher prevalence of tuberculosis among older age groups, with the highest number of patients falling between the ages of 13-18 years (51.8%) and the next highest group between 6-12 years (36.2%), with a mean age of 13 years. Similar trends have been reported in various studies like Hailu *et al.*[6]. in Addis Ababa in. In India various studies had reported similar findings with 11-14 years being the commonest age group suggesting that children aged 11-14 years are commonly affected. Similar findings were also reported in studies from Delhi, by Sharma *et al.*[7]. and Bai *et al.*[8]. (55.1% and 49.3% patients in this age group respectively). Possible reasons for the lower number of cases seen in children under six years old in the study could be attributed to these children not being included in the treatment program or due to non-referral to Directly Observed Treatment Short-course (DOTS) by their treating physicians or pediatricians, likely because of the severe nature of the disease in this age group prompting pediatricians to handle treatment themselves.

The study revealed a higher prevalence of tuberculosis among female children compared to male children, consistent with observations a study revealed higher prevalence of tuberculosis among female children compared to male children, consistent with observations from various a study by Sharma *et al*. in LRS institute of Tuberculosis and Respiratory Diseases in New Delhi found 61.7% of pulmonary TB cases were females. findings are similar to a study done by Mazta *et al.*[9]. viz. more female in 11-14-year age group (79.36%) and pulmonary TB being commoner in females (26.6%) as compared to males. Indian studies where over 60% of childhood TB cases affected females. The higher number of affected girls could be attributed to factors like neglect, leading to poor nutrition, weakened immunity and delayed diagnosis and treatment due to suboptimal treatment-seeking behaviour by parents. from various Indian studies where over 60% of childhood TB cases affected females. 2.72% of paediatric TB cases were HIV reactive in our study. Betsy *et al.*[10]. from CMC Vellore, The observed co-infection rate of HIV and TB was 2.9%, consistent with the findings of the current study being referenced. However, further information about the comparison with another study is not provided in the text selection. Fairlie *et al.*[11]. from South Africa, HIV prevalence was observed in 52 % of pediatric TB cases. These differences may be attributed to the overall prevalence of HIV infection in respective region. The presence of HIV coinfection compounds the well-recognized challenges of reaching a definitive diagnosis in children with suspected TB.

In our study, 28.8% cases were microbiologically confirmed among which CBNAAT positive in 104cases (11.34%)TRUNAAT positive in 141cases(15.37%), smear positive in 18 cases(0.02%), Line Probe Assay positive in 2cases and the rest were clinically diagnosed 340 (37.03%) based on chest X Ray, histopathology(fine needle aspiration cytology, lymph node biopsy etc.), Cytopathology, Monteux test, Ultrasound, Magnetic Resonance Imaging(MRI), CT Chest. In a study by

Swaminathan *et al.*[12]. in 2008, 7.9 % were microbiologically confirmed TB Schopfer K *et al.*[13]. in and McIntosh *et al.*[14]. in 2018 had documented CBNAAT TB in 22.5 % and 27.8 % respectively. In our study 10 cases(0.1%) were found drug resistant. Zhou *et al*. 15 mentioned that in Shandong, the prevalence of MDR-TB in childhood TB was low at 5.6%. Raizada *et al.*[16]. did a study on 3340 pediatric TB cases of which 8.8% of the cases found to be drug resistant. However, the presence of DR-TB among children depends on many factors such as environment, reach to medical facilities ,financial status of region and ethnicity.

In our study EPTB accounted for 477 cases, among which lymph node TB cases were 277(58%), followed by abdominal(13.1%), pleural(5.9%), TB meningitis(4.3%), Bone(2.7%), spinal(2%),1case of pericardial and genitourinary TB each, site not specified(14%). A study by Balew Arega *et al.*[17]. the commonly involved EPTB sites were found to be lymph nodes (40%), abdominal (23.4%) and pleural (13.5%) followed by genitourinary and CNS-TB. also, our study in line with study done by Robert J Blount *et al.*[18]. where EPTB is more predominant than Pulmonary TB. In our study, majority (97%) had a favorable outcome and 3% had a poor outcome of which 9 cases died during the treatment. In line with our study Tao N *et al.*[19]. documented a favorable outcome of 94.2 % and a poor outcome of 5.8 % with 0.2 % deaths. Successful treatment outcome was found among SPPTB (23%) similar to study done by Mohandas *et al.*[20]. but less compared to studies done in Ethiopia. The odds of successful treatment outcome was found significant among age group of <5years (p = 0.5 and crude odds ratio with CI:1.65 i.e;0.38-7.16), it is in line with study done by Ramesh *et al*. in Kerala and Mohandas B *et al.*[20]. a study done in Calicut. This is not same with other studies. This difference might be due to effective treatment modalities, proper follow up till the end of treatment which would increase compliance towards drugs.

CONCLUSION

Pediatric TB stands out from adult TB due to its extra pulmonary prevalence more compared to pulmonary. Challenges in diagnosis yields delay in diagnosis and treatment. Pediatric TB requires much attention to achieve the global TB goals. Screening the contacts and early treatment might prevent further challenges. HIV/TB co-infection poses to affect the treatment outcome.

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