

## A Study of the Socio-Demographic Profile and Treatment Outcome of Paediatric Tuberculosis Patients

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### Abstract

**Background:** Tuberculosis (TB) continues to be one of the most devastating and widespread infections in the world. Of the 9 million annual tuberculosis cases, about 1 million (11%) occur in children (under 15 years of age). In countries worldwide, the reported percentage of all tuberculosis cases occurring in children varies from 3% to more than 25%. Childhood tuberculosis is a neglected aspect of the tuberculosis epidemic.

**Methodology:** There are nine Tuberculosis units in Patna. Five Tuberculosis units from the nine tuberculosis units were selected by simple random sampling method. The study was conducted from Jan 2022 to Oct 2022. The paediatric patients diagnosed as TB and registered under RNTCP were included in the study till the sample size of 209 was reached. Data regarding sociodemographic profile, type of TB was collected, and the patients were followed for treatment outcome.

**Conclusion:** Paediatric tuberculosis still continues to be a major problem in 1-5 years of age who are undernourished and belonging to low socioeconomic status. Thus, improving the socioeconomic conditions and proper treatment of adult TB who are the source of infection to children will go a long way in preventing paediatric TB.

**Keywords:** Paediatric Tuberculosis, sociodemographic profile, treatment outcome.

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### Introduction

Tuberculosis (TB) continues to be one of the most devastating and widespread infections in the world. It is estimated that one third of the world's population is infected with *Mycobacterium tuberculosis* (the bacterium that causes tuberculosis), and that each year, about 9 million people develop TB, of whom about 2 million die. Of the 9 million annual TB cases, about 1 million (11%) occur in children (under 15 years of age). Of these

childhood cases, 75% occur annually in 22 high-burden countries that together account for 80% of the world's estimated incident cases. In countries worldwide, the reported percentage of all TB cases occurring in children varies from 3% to more than 25% [1].

Childhood TB prevalence indicates: Community prevalence of sputum smear-positive pulmonary tuberculosis, Age-related

prevalence of sputum smear-positive pulmonary tuberculosis. Prevalence of childhood risk factors for disease Stage of epidemic [2].

Many western nations have been experiencing a resurgence of TB with most of the new cases imported from countries with high rates of the disease. Young children carry the greatest burden of disease. They are the most likely to develop disease after infection and are significantly more likely to develop extrapulmonary and severe disseminated disease than adults. Infected children represent the pool from which a large proportion of future cases of adult TB will arise. In addition, childhood TB is a sentinel event, indicating on going transmission of TB within communities [3]. Though an estimated 1 million new cases of tuberculosis (TB) occur in children worldwide each year, pediatric TB has not been given the same priority as its adult counterpart [4]. Childhood TB is a neglected aspect of the TB epidemic. This "orphan disease" exists in the shadow of adult TB and is a significant child health problem but is neglected [5]. Does this justify ignoring childhood tuberculosis? Proper identification and treatment of infectious cases will prevent childhood TB. However often Childhood TB is accorded low priority by National TB Control program. Probable reasons include: - Diagnostic difficulties, rarely infectious, limited resources, misplaced faith in BCG and lack of data on treatment.

Interest in tuberculosis has been rekindled. But the interest in childhood tuberculosis continues to be lukewarm. Since the declaration by the WHO of a global 'TB emergency' in 1993, a wealth of publications has addressed important aspects of the burden, management and control of tuberculosis (TB). In general, however, the emphasis has been on adult disease. By contrast, paediatric TB has been relatively neglected. As a result both research and

surveillance data in the field of childhood TB have been greatly limited [6]. However, children are particularly vulnerable to severe disease and death following infection, and those with latent infection become the reservoir for future transmission following disease reactivation in adulthood, fuelling future epidemics. Further research into the epidemiology, immune mechanisms, diagnosis, treatment, and prevention of childhood tuberculosis is urgently needed. Advances in our understanding of tuberculosis in children would provide insights and opportunities to enhance efforts to control this disease [6]. Studies of pediatric TB are scantily available both in global and national contexts. Reliable data on the burden of all forms of TB amongst children in India are not available. Hence, a study of pediatric TB cases was carried out to determine the socio demographic profile, type of TB and treatment outcome in the Tuberculosis units knowing the socio-demographic profile can help in understanding the groups that are vulnerable to the disease and treatment outcomes in the various groups can indicate as to the type of population that have favourable and non favourable outcomes. This can help in focusing on those specific groups when diagnosing and treating childhood TB.

### Objectives

- To know the socio-demographic profile of pediatric tuberculosis patients.
- To know the type of tuberculosis and treatment outcome in pediatric tuberculosis patients.

### Materials and Methods

A longitudinal study was done in nine Tuberculosis units (TU) of Patna, Bihar. The study period was from Jan 2022 to Oct 2022. Patna has a population of 46,52,566 with nine TU each covering 5.5 lakhs population. Five Tuberculosis units from the nine tuberculosis units were selected by simple random

sampling method. Paediatric patients in the age group of 0 to 14 years diagnosed as TB and registered under RNTCP were randomly selected proportionate to the TU's population size till the sample size of 209 was reached. Data regarding sociodemographic profile and the type of TB was collected and the patients were followed for treatment outcome.

### **Inclusion criteria**

All paediatric cases in the age group of 0 to 14 years diagnosed as TB, registered under RNTCP put on DOTS regimen and whose parents consented to participate in the study.

### **Exclusion criteria**

Patients whose parents did not consent to participate in the study.

Data collection was started after obtaining clearance from ethical committee, respective authorities from Patna. Among the selected TU paediatric patients were enrolled after obtaining informed consent from the parents/guardians till the sample size was reached. Data regarding socio demographic profile and type of TB of the pediatric TB patients registered under RNTCP was collected using a structured and pretested questionnaire during their visit to hospital /health centre from the attenders accompanying them. The patients were examined after initiation of treatment to know the response to treatment by assessing the improvement of signs and symptoms, weight gain, increase in appetite, sputum examination etc. The patients were examined at end of treatment for treatment outcome as per RNTCP definitions.

The educational status was assessed by Kuppaswamy's socioeconomic status scale (2007).

**Illiterate -** Illiterate is a person who could not read or write. This category also included those who could only sign or reproduce same writings mechanically and had no formal education at all.

**Primary School:** Those who have studied up to 4<sup>th</sup> standard.

**Middle School:** Those who have studied between 5<sup>th</sup> and 7<sup>th</sup> standard  
4 High School - Those who have studied up to 10<sup>th</sup> standard.

**Intermediate:** Those who have studied between 11<sup>th</sup> and 12<sup>th</sup> standard or any other diploma.

**Graduate:** Those who have obtained graduate degree from any university.

**Post Graduate:** Those who have obtained post graduate degree from any university.<sup>8</sup>

**Professional -** Those who have obtained professional degree like MBBS, B.E. Etc.

**Joint Family:** It is type of family grouping, in which a number of married couples and their children live together in the same household. All the men are related by blood and women of household are their wives, unmarried girls and widows of family kinsmen.

**Nuclear Family:** It consist of married couple and their children while they are still regarded as dependents.

**Three generation family-** It is a family where representatives of three generation are living together. Young married couples continue to stay with their parents and have their own children as well.

**Close contact** is defined as living in the same household as or in frequent contact with a source case (e.g. the child's caregiver) with sputum smear-positive pulmonary TB.

## Results and Discussion

**Table 1: Distribution of patients according to age and gender**

Age group in years	Male	Female	Total (%)
<1	2	1	3(1.4%)
1-5	32	47	79(37.7%)
6-10	21	41	62(29.6%)
11-14	23	42	65(31.1%)
Total	78	131	209(100%)

The table shows that the maximum number of patients were in the age group of 1 to 5 years, followed by the age group of 11 to 14 years. Similar findings were reported in a hospital-based study done by Sushama Bai S *et al* in 1998 in Kottayam district of Kerala where they also observed that the maximum number of cases were in the 1 to 5 years age group which was 49.5% [7]. This is different from the study done by Arora V K *et al*, where the maximum number of patients were in the age group of 11-14 years which was 51.1% [8] and Sharma S *et al* where the maximum number of patients were also in the age group of 11 to <15 years (55.1%) [9]. These differences may be due to factors, like the differences in study population, whether it was a hospital-based study & in the case of Sharma *et al* [10], where only pulmonary tuberculosis cases were studied. The study revealed that the mean age of the patients was 7.5 years (SD =4.1) and median age was 8 years. Youngest patient was 9 months old and oldest was 14 years of age. From this we say that the average age for acquiring TB is around 7 years. CK Indumati *et al* also observed that mean age of their patients to be 7.6 and and Shivanandan S *et al* [11] observed that the median age was 7.9.

**Table 2: Distribution of patients according to sex**

Sex	Frequency	Percentage	
Female	131	62.6	Male to female
Male	78	37.4	ratio=
Total	209	100	0.6:1

Table shows that there were more female patients (62.68%) which is similar to the observation of Sharma S *et al* in a retrospective analysis of paediatric patients which reported more females (61.7%) than males (38.3%). The study revealed a male to female ratio of 0.6:1 while a study done by C K Indumathi *et al* revealed a male to female ratio of 0.8:1. The high prevalence of cases in females in our study could be explained by the fact that most of our study population belonged to labour class where the female child's nutrition and health may be neglected.

**Table 3: Distribution of patients according to religion**

Religion	Frequency	Percentage
Hindus	122	58.4
Muslims	76	36.4
Christians	11	5.3
Total	209	100

Table shows that among all the cases the proportion of Hindus was 58.4% which is lower than the census data, which reported that 80.5% of the population were Hindus, so it does not imply that cases were more in Hindus but because the proportion of Hindus were more in the general population, more cases were reported among Hindus.

**Table 4: Distribution of patients according to type of family and gender.**

Type of family	Male (%)	Female (%)	Total (%)
Nuclear	60(39.2)	93(60.8)	153(73.2%)
Joint	17(37.8)	28(62.2)	45(21.5%)
Three generation	0(0)	10(100)	10(4.8)
Others	1(100)	0(0)	1(0.5%)
Total	78(37.4)	131(62.6)	209(100)

Table shows that majority (73.2%) of the population lived in nuclear families as most of the families in urban area are nuclear. Rajeshwari *et al* in their study on adult tuberculosis observed that 68.09% patients were from nuclear families.[12]

**Table 5: Distribution of patients according to educational status of mother**

Educational status	Frequency	Percentage
Illiterate	113	54.1
Primary school certificate	54	26
Middle school certificate	23	11.1
High school certificate	14	6.7
Intermediate or post high school diploma	4	1.9
Total	208	100

Table shows that 54.1% of the mothers of the patients were illiterate, the highest level of education was intermediate or post high school diploma. It was observed that the percentage of pediatric TB cases progressively reduced with increasing educational status of their mothers. Mother's educational status, educational status, occupation of head of the family and birth order could be obtained only for 208 patients out of 209, as one patient was an orphan.

**Table 6: Distribution of patients according educational status of head of the family**

Educational status	Frequency	Percentage
Illiterate	61	29.3
Primary school certificate	65	31.2
Middle school certificate	35	16.8
High school certificate	27	13.0
Intermediate or post high school diploma	17	8.2
Graduate or postgraduate	3	1.4
Total	208	100

Table shows that 31.2% of the head of the families were educated till primary school. Greater percentage of TB cases was noted among children with head of families of low educational background.

**Table 7: Distribution of patients according to the Socioeconomic status according to Kuppaswamy's classification (2007).**

Socioeconomic status	Frequency	Percentage
Upper middle	9	4.8
Lower middle	61	29.1
Upper lower	138	65.6
Lower	1	0.5
Total	209	100

In the study 95.2% of the patients belonged to low socioeconomic status and 4.8% belonged to middle class. Thus reemphasizing that TB is associated with low socioeconomic status. While in a study by Sushmabhai S *et al* in Kottayam district of Kerala slightly more than half (55.8%) belonged to low, 38.9% to middle and 5.3% to high socio-economic groups as the study comprised of a more aware group as it was done in BCG vaccinated children.[7]

**Table 8: Distribution of patients according to history of contact with tuberculosis patients**

History of contact	Frequency	Percentage
Yes	48	23
No	161	77
Total	209	100

Table shows that 23% of the patients had history of contact with tuberculosis patients. Similar to the findings observed by Madhi F *et al* in a Paris suburb, where 22% had history of contact with tuberculosis patients.

**Table 9: Type of Tuberculosis in the adult contacts of the patients with history of contact.**

Sputum status	Frequency	Percentage
Sputum positive	42	87.5
Not known	6	12.5
Total	48	100

Table shows that 87.5% of the adult contacts, of the patients had sputum positive TB. Thus, open pulmonary cases in adults are the common source of infection to the children.

**Table 10: Distribution of patients according to treatment outcome**

Treatment outcome	Frequency	Percentage
Treatment completed.	196	94.7
Cured	10	4.8
Death	1	0.5
Total	207	100

Table shows that 94.7% of the study population completed treatment, 4.8% were declared cured and one child died. According to RNTCP cure is defined only for sputum positive pulmonary TB, since most of the paediatric patients have sputum negative TB and extrapulmonary TB the outcome of treatment was declared as treatment completed. However, as the symptoms of the patients improved, they can be considered apparently cured. Thus, the treatment outcome of paediatric patients put on RNTCP treatment regimen is in accordance with the objective of the programme. Sharma S *et al* in their study also observed that the treatment completion rate was 94.9% and death rate was 0.3%. Kabra *et al* in their study observed 80% completed treatment.[13] A.D. Harries *et al* in nation-wide case finding and treatment outcome of childhood TB in Malawi in Africa, reported that only 45% of children completed treatment.

**Table 11: Distribution of patients according to treatment outcome and type of TB**

Treatment outcome	Pulmonary TB (%)	Extra Pulmonary TB (%)	Total (%)
Treatment completed	118(57.3)	88(42.7)	206(95.5)
and cured Death	1(100)	0(0)	1(0.5)
Total	119(57.5)	88(42.5)	207(100)

Table shows that the treatment outcome in males and females were not significantly different.

**Table 12: Gender wise distribution of patients according to treatment outcome**

Treatment outcome	Male (%)	Female (%)	Total (%)
Treatment completed and cured	76(36.9)	130(63.1)	206(95.5)
Death	1(100)	0(0)	1(0.5)
Total	77(37.2)	130(62.8)	207(100)

Table shows that the treatment outcome in males and females were not significantly different. A. D. Harries *et al* in their study also observed no differences between boys and girls in the treatment outcome.

**Table 13: Distribution of TBM patients according to presence of sequelae**

TBM with sequelae	Frequency	Percentage
Present	3	14.3
Absent	18	85.7
Total	21	100

Table shows that in the study population 85.7% of the TBM patients had no sequelae and 14.3% had sequelae in the form of motor deficit. This is similar to the observation of a prospective study done by C K Indumathi *et al* to evaluate intermittent short course therapy for pediatric tuberculosis where 86 % children had complete cure without sequelae [9].

## Conclusions

Most of the patients coming to the RNTCP centres belong to the under-privileged group. Out of 209 registered patients studied 3(1.43%), were less than one year, most of the patients were in the age group of 1 to 5 years, which were 79 (37.7 %). There were more females (62.68 %) than males (37.32 %), male to female ratio was observed to be 0.6:1. The mean age of the patients in our study was 7.5 years and median age was 8 years. Majority of the patients were Hindus (58.4%) followed by Muslims (36.4%). Majority of the patients lived in nuclear families.

Majority of the mothers of the paediatric patients were illiterate (54.08%). It was observed that the percentage of paediatric TB cases progressively reduced with increasing educational status of their mothers. Majority (96 %) of the study population belonged to low socioeconomic status as per Kuppaswamy classification. Thus, reemphasizing that TB is associated with one's socioeconomic status.

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