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TYPES OF TUBERCULOSIS IN CHILDREN UNDER 15 YEARS OF AGE –A HOSPITAL BASED OBSERVATIONAL STUDY

Paediatrics

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ABSTRACT

Objective: This study was conducted to determine the frequency of different pattern of Tuberculosis (TB) in children under the age of 15 years and to evaluate its clinical spectrum in a tertiary care hospital.

Methodology: This observational study was conducted in the outpatient department (OPD) of 250 Bedded TB Hospital, Shyamoli, Dhaka, between October 2016 to September 2017. A total of 187 children of either sex, aged 0 to 15 years with Tuberculosis (TB) were enrolled in this study. The data were processed and analyzed in relation to age, sex, socioeconomic status, contact history, BCG vaccination status and clinical presentation.

Results: Among the 187 cases of TB, 137 (73%) had extra pulmonary TB and 50 (27%) had pulmonary TB, commonest age group was 6 to 15 years with female preponderance. Majority (46.7%) of EPTB cases involved the lymphnodes followed by TB meningitis (11.67%), osteoarticular TB (11.67%), pleural effusion (8.02%), osteomyelitis (5.10%), abdominal TB (4.37%) and localized TB abscess (3.64%). The cervical lymphadenitis (82.81%) was the commonest followed by mediastinal (7.81%), inguinal (4.68%) and axillary (4.68%). Along with the higher percentage of smear positive PTB cases (50%), one military TB and one multidrug resistant TB (MDR TB) were detected. Pulmonary tuberculosis (PTB) commonly presented with fever, cough, anorexia, weight loss & dyspnoea. TB lymphadenitis had systemic presentation more (58%) than that of local (42%). Among the total study cases 14% had contact with smear positive patients and 73% being positive for Tuberculin test (MT).

Conclusion: Extra pulmonary tuberculosis is more prevalent among childhood tuberculosis predominantly cervical TB lymphadenitis and commonest age group is 6 to 15.

KEYWORDS

Introduction: Tuberculosis (TB) caused by the *Mycobacterium tuberculosis* remains as an infection of tremendous clinical and public health importance worldwide. Despite the accelerated efforts to control TB for decades, it remains the seventh leading cause of death globally[1]. WHO estimated that over 1.3 million cases of TB and 450000 associated deaths occur annually in children [2] which represents about 6% of the global TB burden[3]. The World Health Organization (WHO) currently estimates that in 2015, about 1 million children under 15 years suffer from Tuberculosis (TB) globally and more than 136,000 die each year [4]. Every day, up to 200 children die from TB though it is a preventable and curable disease. Over half a million children fall ill with TB each year and struggle with treatment. In high TB burden countries it has been noted that 15-20% of all TB cases are among children, whereas in low burden countries it is 2-7%.[4]. The impact of tuberculosis (TB) remains a serious concern worldwide with an estimated 8.7 million new cases (13% co-infected with HIV) and 1.4 million deaths (430,000 in HIV-infected individuals)[4] in 2011.

The South-East Asia region accounts for a disproportionately high number of global TB cases and Bangladesh remains one of the 22 'high TB burden' countries[4] representing 10% child TB cases[1] and the burden of TB patients is the sixth of its world burden[5]. In 2014, there were 187,005 new cases of TB in Bangladesh and it was the leading cause of death, accounting for 81,000 fatalities [4]. Ending the TB epidemic by 2030 is one of the health targets of the newly adopted Sustainable Development Goals[4]. WHO has set a target for a 95% reduction in deaths and a 90% reduction in TB incidence by 2035[4]. Childhood tuberculosis is under-reported in Bangladesh due to difficulties in confirming diagnosis, lack of guidelines for systematic screening, difficulties in referral of suspected childhood TB cases[4]. High prevalence of malnutrition renders the skin test for TB ineffective and lack of laboratory facilities is also an impediment for diagnosis of TB in children. Moreover, lack of awareness about TB in children also plays a role in the low detection rate of the disease[4]. TB in children is a direct consequence of adult TB and is a good marker of current transmission in the community. The two main factors detecting the risk of progression to disease are patient's age and immune status[6-11]. Although the pulmonary TB is the most common presentation, extra pulmonary TB accounts for up to one thirds of all cases of TB[12-15]. The most common extra pulmonary form of tuberculosis is lymphatic which accounting for about two thirds of all cases of EPTB. The second most common form is meningeal form arising in 13% of children with TB[16,17]. Tuberculosis in children is mostly related to primary infection and it presents with various forms of relatively less aggressive primary tuberculosis[12-15]. However contrary to the common notion, aggressive forms of pulmonary tuberculosis akin to adult forms are increasingly seen in pediatric clinical practice especially in adolescents[12-15].

The clinical and physical manifestations of disease tend to be different by the age of onset of disease. Neonates are at higher risk of progression of infection to disease, with higher rate of miliary TB and meningeal involvement [17]. Half of young children with radiographically moderate to severe pulmonary TB don't have any symptoms or physical findings and, mainly, are detected by contact tracing of an adult with pulmonary TB[7-11]. Children between 5 to 10 years are less likely to develop disease than other age groups, and adolescent patients can present with progressive primary pulmonary tuberculosis or cavitary disease [7-11,16,17].

Over the last few years, interest of WHO in childhood TB has increased dramatically. For the first time ever, in 2012, WHO included an estimate for childhood TB in their annual report [18] and in 2012, the

focus of World TB Day was children [19]. The global TB control strategy has focused predominantly on smear-positive cases and, therefore, not on childhood TB as it is usually paucibacillary and smear negative [19]. WHO recommends that children with TB should be treated and notified through the national TB control program [4]. However, studies on epidemiology, clinical profile and diagnostic methods of childhood TB from low-income countries are lacking [4]. In this context this study was carried out to know the recent pattern of childhood TB cases admitted in a tertiary care hospital in Dhaka.

Materials &Methods: This 12 months observational study was conducted in the Out Patient Department (OPD) of 250 bedded TB Hospital, Shyamoli, Dhaka, from October 2016 to September 2017. This tertiary level health care facility receives referred TB patients from primary, secondary or other tertiary level hospitals all around the country and also from private practitioners. A total 187 children of either sex, aged 0 to 15 years with TB were enrolled in this survey. Only the subjects, who were diagnosed as TB in this hospital or elsewhere, already on anti TB drugs or going to be introduced anti TB therapy were enrolled**.** For the confirmation of TB, clinical response to anti TB therapy who were previously not responded to other antibiotics, tuberculin skin test (TST) result, smear test, radiograph, FNAC or Biopsy results were used. The data were analyzed in respect to age, gender, socioeconomic status, mode of presentation, contact history, BCG vaccination status and the clinical findings.

Result: This study showed among 187 cases of TB, commonest age group was 6-15 years with higher percentage of female patient. Prevalence of child TB was more common in income group 18,000 taka per month (42%) whereas in the lower middle income group (6500-8999 taka per month), it was 11.76%. Rate of TB was more common among school going (63.63%) and urban children (74.33%) than that of madrasa and rural children. One thirty seven cases (73%) had extra pulmonary TB (EPTB) and 50 (27%) had pulmonary TB. The majority of EPTB cases involved the lymphnodes which comprised 46.7% of the total EPTB cases followed by TB meningitis (11.68%), osteoarticular TB (11.67%), pleural effusion (8.02%), osteomyelitis (5.10%). abdominal TB (4.37%) and localized TB abscess (3.64%). The cervical lymphnode involvement (82.81%) was the commonest presentation of TB lymphadenitis followed by mediastinal (7.81%), inguinal (4.68%) and axillary (4.68%). Fifty percent of the total PTB cases were smear positive, 2% (1) cases miliary TB and 2% (1) cases MDR. Pulmonary tuberculosis (PTB) commonly presented with fever (90%), cough (84%), anorexia (58%), weight loss (52%), dyspnoea (16%) and to a lesser extent with chest pain and not gaining weight. Most of the children with lymphadenitis had systemic presentation (58%) than local (42%). Among the total study cases 14% had contact with smear positive patient and 73% had been positive for Tuberculin test (MT).

Discussion: TB is a wide spread disease in Bangladesh with a large number of open adult cases who are constant threat to the whole population specially children. In this study, EPTB constitutes 73% of all cases of TB, while about 15% to 20% was reported by Fanning [20,21] and 10% by Haegi [20,21]. Study done by Charlett, et. Al [22], in the United Kingdom, showed 15% British children presented with extrapulmonary TB whereas in Bangladeshi, Pakistani or Indian ethnic, it was 50% [22]. In a study in Nepal [4] 55% of all TB patients had extra-pulmonary involvement. A recent study in Addis Ababa [4] is also comparable to our study. On the other hand WHO reported in 2014, 70-80% of children had TB in their lungs (pulmonary TB) and the rest had extra pulmonary TB[4]. According to our National Child TB guideline EPTB accounts for about 30% [23] of TB in children, as seen in high burden country. Although this study result does not represent the national incidence of child TB, this figure indicates that there is a gap between the NTP (National Tuberculosis Control Program) reported child TB and actual disease burden in the community [23]. In 2013 WHO estimated the prevalence of primary MDR TB in India around 3.5% [16]. Study by Jain [24] in India reported that 50% had DR TB of whom 47% had MDR. In a study in Bangladesh [4] 16.39% children were diagnosed to have miliary TB whereas we found 2% cases of MDR and miliary TB in this study.

In this study, the majority of EPTB cases presented with TB lymphadenitis (46.10%) and the commonest lymphnode involvement was the cervical group (82.81%). A study by Shafi Ulla [25] showed the lymph nodes to be the most common site of EPTB as observed in 66% of studied cases which is consistent with this study result. In a study in Hong Kong [14], the most common site of EPTB was the pleura, followed by the lymph nodes. Another study in Holland [26] showed that the most common sites of EPTB were both pleura and lymph node (17% for each). So our study result is almost similar to these studies.

In this study the commonest group of lymphnode involved in TB lymphadenitis was cervical (82.81%) followed by mediatsinal (7.80%) and inguinal (4.68%). A study by Hatwal D [27] showed the cervical lymphadenopathy to be the commonest followed by axillary and inguinal group and in Ethiopia [28] cervical lymph nodes were mostly affected (55.5%) followed by axillary nodes (24%) which is consistent with this study.

In this study commonest age group was 6-15 with female predominance which is comparable to another study [4] from Bangladesh showing female predominance in case of PTB. Similar epidemiological profile was found in study [29] done in India showing female predominance but mean age was 31 months. In the study of Shafi Ullah [25], the overall male: female ratio was 1:2; that was also found in several other studies like Ethiopian study [28] where the peak age groups were 1-4 years with female preponderance.

A study by Napoleon [29] showed fever, cough, weight loss, expectoration and haemoptysis were the commonest symptoms among the PTB cases which is consistent with this study where most of the patient with PTB presented with fever (90%), cough (84%), anorexia (58%) and weight loss (52%). Another study by Hatwal D [27] showed that all their cases of EPTB presented with fever, anorexia, weight loss, malaise and the result is also comparable to this study findings.

Dhara, et, al. [30], in his study showed that history of contact with smear positive TB patients was 28% which is 14% in this study. This can be explained by the lack of knowledge or awareness among people about TB, its clinical symptoms and the need for consultation with physician for proper diagnosis in our country which hinders the screening and identification of smear positive cases. In the same study done by Hatwal D [27] showed that positive MT was present in 70.85% of the study cases which is also similar to this study result (73%). Another study in India [24] showed Tuberculin skin test (TST) was positive in 20% of children. Though negative MT doesn't rule out TB, malnutrition, overwhelming disease may be responsible for negative result. According to this study BCG vaccination status was 97.32% which is much higher than other studies done in India [24] (86%) and Ethiopia [28] (57.4%).

Conclusion and Recommendation: From the present study it can be concluded that extra-pulmonary tuberculosis is more prevalent among childhood tuberculosis in a tertiary level set up where cervical TB lymphadenitis is the commonest. Further large scale multi-centre study is recommended to delineate the original TB scenario in the country. While this data on MDR TB are limited by small sample size, they are however concerning; additional studies are needed to more accurately define the prevalence of MDR-TB in this vulnerable population.

Table1: Socio-demographic characteristics of studied children (N=187)

Variables		*Total Number*	*Percentage*
Age	0-5 years	53	28.34%
	6-15 years	134	71.65%
Sex	Male	79	42.24%
	Female	108	57.75%
Education	No schooling∞	58	31.01%
	School student	119	63.63%
	Madrasa student	10	5.34%
Living area	Rural¶	48	25.66%
	Urban¥	139	74.33%
Socio economic status	Upper⁎	67	35.82%
	Upper middleΩ	65	34.75%
	Lower middle©	22	11.76%
	Lower♦	33	17.64%
Parent's profession	Day laborers	19	10.16%
	Driver	39	20.85%
	Small traders	33	17.64%
	Garment workers	06	3.20%

	Others	90	48.12%
TB contact	Present	32	17.11%
	Absent	155	82.88%
BCG status	Vaccinated	182	97.32%
	Not vaccinated	05	2.67%

[ж]Either minor or did not go to school for some other reasons. [¶]Living in village, upazilla .[¥]Living in district, metropolitan city.

[*]Per month income 18,000 taka. [Ω]Per month income 9000-17999 taka. [©] Per month income 6500-8999 taka. [♦] Per month income <6500 taka .(Source: Kuppuswamy classification of socioeconomic status-January 2015).

Table 2: Distribution of studied children according to pattern of TB(N=187)

Pattern of TB No (%)		*Number of patients*	*Percentage*
Pulmonary TB 50 (27%)	Smear negative	25	50%
	Smear positive	23	46%
	Miliary TB	01	02%
	MDR	01	02%
Extra-pulmonary TB 137 (73%)	TB lymphadenitis	64	46.7%
	TB meningitis	16	11.67%
	Osteo articular TB	16	11.67%
	Pleural effusion	11	8.02%
	TB osteomyelitis	07	5.10%
	Abdominal TB	06	4.37%
	Localized TB abscess	05	3.64%
	Disseminated TB	04	2.91%
	Brain abscess	03	2.18%
	Ocular TB	03	2.18%
	Pericardial TB	01	0.73%
	Parotid gland TB	01	0.73%

Table 3: Distribution of studied children having TB lymphadenitis (N=64)

Site of Involvement	*Number of patients*	*Percentage*
Cervical	53	82.81%
Mediastinal	05	7.81%
Inguinal	03	4.68%
Axillary	03	4.68%

Table 4: Clinical presentation based on history of PTB (N=50)

Presentation	*Frequency*	*Percentage*
Fever	45	90%
Cough	42	84%
Anorexia	29	58%
Weight loss	26	52%
Dyspnoea	08	16%
Chest pain	07	14%
Not gaining weight	04	8%
Hemoptysis	01	02%

Table 5: Clinical Presentation of studied children having TB lymphadenitis (N=64)

Presentation	*Number of patients*	*Percentage*
Systemic presentation	73	58%
Local (only lymph node) presentation	27	42%

Table 6: Contact with smear positive case (N=187)

Contact with smear positive case	*Number*	*Percentage*
Absent	161	86%
Present	26	14%

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