

# Spinal Tuberculosis in Pediatric Patients

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**Abstract:** *This cross sectional study was done in National Centre for Tuberculosis and Research and 250 bed TB Hospital, Shymoli, Dhaka. In this study 203 patients suffering from spinal tuberculosis attending the hospital between January 2007 to December 2017 were included. Patient were diagnosed on the basis of clinical manifestation, laboratory, X-ray and magnetic resonance imaging findings (n=37). Histopathological confirmation were done in four cases with fine needle aspiration cytology. The purpose of this study was to analyze pattern of spinal tuberculosis in pediatric patients in a developing country. This study revealed that 20.20% of the patients were of pediatric age group. There were two peak age groups of incidence of spinal tuberculosis among pediatric patient. The first peak was in age group 2-5 years and there were 16(38.98%) children and in the second peak in the age group 11-15 years there were 17 (41.46%) children. Majority of the patient in the study 22 (53.65%) were presented with clinical manifestation of evening rise of temperature and weight loss. Among the pediatric patient 31 (75.60%) comes from very low income family. The predisposing factors included are malnutrition, poor nutrition, sanitation and educational status.*

**Keywords:** Tuberculosis, Pediatric, Spinal

## 1. Introduction

Tuberculosis in children under 15 years also called pediatric tuberculosis, is a public health problem of special significance because it is a marker of recent transmission of tuberculosis<sup>1,2</sup>. Spinal tuberculosis is a destructive form of skeletal tuberculosis which accounts for 50% of all skeletal tuberculosis, 15% of extra pulmonary tuberculosis and 1-3% of all cases of tuberculosis<sup>3,4</sup>. Tuberculosis is one of the oldest diseases known to mankind and has been found in Egyptian mummies dating back to 3400 BC<sup>5</sup>. The disease was a leading cause of mortality in the beginning of twentieth century<sup>6</sup>. Though there was a major decline in its prevalence in later decades of twentieth century, it has been reported in recent decade that there is a rising incidence of spinal tuberculosis along with other organ tuberculosis in both developing and developed countries. The recent emergence of drug resistant variant of *M. tuberculosis* in particular poses further threat and raised great concerns world wide<sup>7,8,9</sup>. It is known that spinal tuberculosis is more severe, dangerous and disabling in children than in adult. Children also represents a high risk group for acquiring the disease. Malnutrition, poor sanitation and exanthematous fever are the factors contributing to the spread of the disease. The commonest causative organism for spinal tuberculosis is mycobacterium tuberculosis, an acid fast bacillus growing only on media enriched with egg and potato base or serum. The bacteria may reach the spine through the arterial circulation or via the Batson's plexus of veins. Initially two contiguous vertebral bodies are involved due to a common vascular supply. Destruction of vertebral bodies compromises the nutrition of the intervertebral disc and leads to progressive destruction and vertebral collapse. The clinical feature of spinal tuberculosis is extremely variegated, it is usually insidious in onset and the disease progresses at a slow pace. The manifestation of spinal tuberculosis depends on the severity and duration of the disease, site of disease and the presence of complications such as abscess, sinuses, deformity and neurological deficit<sup>10,11</sup>. The common clinical features of tuberculosis of spine include insidious onset of localized pain in the spine and this is usually accompanied by fever, malaise, anorexia and weight loss, there may be evidence of extra pulmonary tuberculosis like cough,

expectoration, lymphadenopathy, diarrhoea and abdominal distension. Physical examination of the spine reveal localized tenderness and paravertebral muscle spasm. A kyphotic deformity due to prominence of spinous process may be evident due to collapse and anterior wedging of vertebral bodies. Tubercular necrotic material from cervical spine may collect in the form of cold abscess in the retropharyngeal region, at the posterior border of sternocleidomastoid muscle and in the back of the neck along spinal nerves and in axilla along axillary sheath. Involvement of the dorsolumbar spine may lead to cold abscess formation in the rectus sheath and lower abdomen along the intercostal, ilioinguinal and hypogastric nerves, in the thigh along the psoas sheath, in the back along the posterior spinal nerves, in the buttock along superior gluteal nerves, in the peti's triangle along the flat muscles of the abdominal wall, in the ischiorectal fossa along the internal pudendal nerves. The presence of sinus in the back with a thin watery discharge is a strong evidence of tubercular involvement of the posterior arch of a vertebral body. Predisposing factor for spinal tuberculosis include poverty, overcrowding, illiteracy, malnutrition, alcoholism, drug abuse, diabetes mellitus, immunosuppressive treatment and HIV infection<sup>12-13</sup>. There are many article published on spinal tuberculosis but there is a paucity of reports on spinal tuberculosis in children.

Objective of this series is to study the pattern of pediatric spinal tuberculosis in a developing country like Bangladesh.

## 2. Materials and Methods

A cross sectional study was carried out collecting data of pediatric patients attending in National Tuberculosis control hospital, Shymoli, Dhaka, Bangladesh from January 2007 to December 2017 with diagnosis of spinal tuberculosis. A total of 203 Patient were enrolled in this study, among them 41 patient were in pediatric age group. Patients were diagnosed on the basis of clinical features, x-ray and magnetic resonance imaging findings. Needle aspiration cytology were done in four cases for histopathological confirmation. Patient were selected irrespective of sex, social status, educational background and religion . Data of 41 pediatric patients were collected in a prestructured data sheet searching the hospital

record of these patients. The collected data were checked, edited and processed with computer keeping view of the objective of the study.

Diagnosis of spinal tuberculosis depends on characteristic clinical and neuro- imaging findings. Etiological confirmation requires the demonstration of acid fast bacillus on microscopy or culture of material obtained following biopsy from the lesion. Polymerase chain reaction is also an effective method of bacteriological diagnosis of tuberculosis<sup>13</sup>.

### 3. Results

In this series there were 203 patients suffering from spinal tuberculosis in total. Among them 41 (20.20%) patient were of pediatric age group. Among the pediatric patient 16 (38.98%) were in the age group 2-5 years and another 17 (41.46%) were in the age group 11-15 years. The study shows two peak age of incidence of spinal tuberculosis among children. There were only 2 (4.87%) child below the age of two years. Regarding clinical manifestation 22 (53.65%) children were presented with evening rise of temperature, malaise and weight loss, 10 (24.39%) children with localized pain in spine, anorexia and other constitutional symptoms. 7 (18.06%) patient presented with advance stage of the disease with deformity, neurological deficit and cold abscesses .

21 (51.21%) children had come from very low income group family with monthly income below 10,000 BDT. Another 10 (24.39%) children had a monthly family income between 10,000-20,000 BDT. These children were poor nutrition, having poor sanitation, lower family education level and residence in an overcrowded area of the city.

**Table 1:** Distribution all patient dividing into pediatric and adult age group

| Age Groups | No of Patient (%) |
|------------|-------------------|
| Pediatric  | 41 (20.20)        |
| Adult      | 162 (79.80)       |
| Total      | 203 (100.00)      |

Table-I shows that total 203 Patient were found to have spinal tuberculosis, among them 41(20.20%) were of pediatric age group.

**Table 2:** Distribution pediatric patient suffering from spinal TB (n=41) by age

| Age Groups (Years/days) | No of Patient (%) |
|-------------------------|-------------------|
| 0-2 years               | 2 (4.87)          |
| 2-5 years               | 16 (38.98)        |
| 6-10 years              | 6 (14.63)         |
| 11-15 years             | 17 (41.46)        |
| Total                   | 41 (100.00)       |

Table-II shows that most common age group of pediatric patient suffering from spinal tuberculosis belongs to age group 11-15 years.

**Table III:** Distribution of Patient on the basis of clinical presentation (n=41)

| Clinical presentation                              | No of Patient (%) |
|--|-------------------|
| Evening rise of temperature and weight loss        | 22 (53.6)         |
| Localized pain with malaise and loss of appetite   | 10(24.39)         |
| Spinal deformity along with Constitutional symptom | 4(9.75)           |
| Paraplegia   | 3(7.31)           |
| Along with pulmonary tuberculosis                  | 2(4.87)           |
| Total  | 41 (100.00)       |

Table-III shows that majority of the pediatric patient (53.65%) were presented with evening rise of temperature and weight loss.

**Table IV:** Distribution pediatric patient suffering from spinal Tuberculosis (n=41) by their sex

| Sex    | No of Patient (%) |
|--------|-------------------|
| Male   | 23 (56.00)        |
| Female | 18 (44.00)        |
| Total  | 41 (100.00)       |

Table-IV shows that 56% of pediatric patient in this study were male.

**Table V:** Distribution pediatric patient suffering from spinal Tuberculosis (n=41) by income group

| Monthly Family Income (in Taka) | No of Patient (%) |
|---------------------------------|-------------------|
| Up to 10000                     | 21 (51.21)        |
| 10001-20000                     | 10 (24.39)        |
| 20001-30000                     | 6 (14.63)         |
| More than 30000                 | 4 (9.75)          |

Table V shows that 21(51.21%) children came from very low income group family with monthly family income below 10,000 BDT

### 4. Discussion

In this study there were 203 patient diagnosed as spinal tuberculosis in total, among them 41 (20.20%) patients were belonging to pediatric age group. This observation is compatible with other study which reflects that pediatric spinal tuberculosis is a significant health problem in developing countries like Bangladesh Incidence of spinal tuberculosis by different studies are variable. The incidences of spinal tuberculosis in children as reported by MRC (British) are 58% of all spinal tuberculosis patient in Korea, one third of patient in Chennai, India and 26% in Hong Kong<sup>14,15</sup>. Among the pediatric patient in this study 41.46% patient were in the age range between 11-15 years and another 38.98% between 2-5 years. There were two peak age group of incidence in pediatric spinal tuberculosis as revealed by this study. In one study by Moon MS et al found that infant and younger children suffer more commonly than older children and adolescent<sup>14</sup>. Spinal tuberculosis usually results from hematogenous dissemination from pulmonary or genitourinary system.

Secondary hematogenous seedling can also occur from a silent focus elsewhere in the body. There is a minimum lag of 2-3 years between the development of primary focus and manifestation of spinal disease<sup>16</sup>. This might be the explanation of first peak revealed in this study. Children are

not the miniature of the adults. Anatomically and physiologically there are a lot of differences. Bone in children grow longitudinally and appositionally and model during growth. The destruction of bone in children is rapid and severe by infection than that of adults. However bone lesions in children heals and model faster than those of adults. The growth cartilage is relatively well preserved in tubercular lesions<sup>17-20</sup>. Children with spinal tuberculosis are generally diagnosed or presents late due to short fall in health care system and lack of awareness and ultimately presents at advanced stage of the disease. This is also revealed by second peak incidence of this study. Children represents high risk group for acquiring the disease and still remain a leading cause of paraplegia in developing nations<sup>21-22</sup>. Regarding sex there is a male predominance, 56% of the pediatric patient in this study were male. Approximately 75.6% of pediatric patient in this study were belonging to family having monthly income below 20,000 BDT. Only 4 (9.75%) patient had monthly family income above 30,000 BDT. In a study done in Bangalore Mohanagar Palike area, India shows that about 65% of Pediatric tuberculosis patient belong to lower income group families<sup>23</sup>. Spinal tuberculosis are likely to be predisposed among the poor family suffering from malnutrition, poor sanitation and other contributing factors responsible for vicious cycle of poverty. The vicious cycle of poverty also act as predisposing factor for spinal tuberculosis. It is not easy for pathogens to produce disease in healthy individual and virulence factors are required to escape host defense to continue infection. Malnutrition and other concomitant factors which reduces the host defense favours clinically evident infection<sup>24</sup>. In this study data were collected from hospital records which were not in detail and structured, the sample size was also small. Further multicentre study with larger sample size is recommended.

## 5. Conclusion

In this study incidence of pediatric spinal tuberculosis was 21% of all patients of spinal tuberculosis. There were two peak age group of incidence among the pediatric patients with predisposing factors similar to those for vicious cycle of poverty.

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