Spectrum of Tuberculosis in BCG Vaccinated and Unvaccinated Children

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Abstract

Background: To study the clinical spectrum of tuberculosis in BCG vaccinated and unvaccinated children.

Method: In this descriptive study patients aged 0-15 years who presented with signs and symptoms suggestive of tuberculosis were included. BCG scar was taken as sole indicator of BCG vaccination. All the data was subjected to Pakistan Paediatric Association Scoring Chart for diagnosis of TB in children and recorded on a proforma. Score seven or more indicated confirmed Tuberculosis (TB).

Results: Total of 108 patients showed score more than seven. More than half (57.4%) patients were BCG vaccinated. Close contact with TB patients was found in 76 (70.4%) patients. Strongly suggestive physical findings were present in 46 (42.6%) while suggestive radiological findings were appreciated in 76(70.4%) patients. Mantoux test was positive (induration more than 10 mm) in 37(34.3%) patients. Pulmonary TB was present in 62(55.6%), tuberculous meningitis (TBM) in 27(25%), tuberculous lymphadenitis in 10(9.3%) and miliary TB in 6(5.6%).

Conclusion: No statistical significance was found in pulmonary and extra pulmonary TB among vaccinated and unvaccinated children. Younger children were found to be more affected by their close contacts inspite of being vaccinated.

Introduction

Tuberculosis (TB) still exists as one of the deadliest diseases in the world. According to WHO an estimated 13.7 million population has active TB with 9.3 million new cases and 1.8 million deaths. Pakistan ranks sixth among the 22 countries and has 44% TB burden in Eastern Mediterranean Region of WHO. There are 4% registered cases of TB in children in Pakistan. 2.5% are at risk of getting infection. Only 5-10% of infected children will progress to primary progressive disease while 80-90% will get latent TB. It accounts for 8-20% of all deaths in children.

Childhood TB has various presentations ranging from primary complex, progressive primary disease, lymphadenitis to more severe forms like miliary and tuberculous meningitis. It affects all ages and both sexes. Poverty, overcrowding, close contact with tuberculous patient and severe malnutrition play significant role in spread of the disease. The vaccination with Bacille Calmette Guerin (BCG) has not made the impact in prevention of the disease that was expected; however it modifies the course of the disease. Its efficacy for all types of tuberculosis is 50% while for tuberculous meningitis (TBM) is 64%. Being a treatable condition with challenging diagnosis due to scary clinical findings and costly laboratory investigations, simple screening tools like Modified Kenneth John criteria can be used for diagnosing TB.

Patients and Methods

This descriptive study was conducted from January 2009 - December 2009 in Department of Paediatrics Benazir Bhutto Hospital. All patients aged 0-15 years who presented with suggestive signs and symptoms suggestive of TB were included. Detailed history was taken especially regarding history of close contact in last two years, vaccination status, and history of measles, whooping cough, malnutrition, and immunosuppressant or immunocompromised conditions. In examination suggestive (pulmonary findings like unilateral wheeze and dullness, hepatosplenomegaly, as cites) and strongly suggestive (matted lymphadenopathy, abdominal mass, gibbous formation, chronic monoarthritis, central nervous system findings like bulging fontanelle, irritability, papilloedema) were noted. Relevant Radiology, neuroimaging, ultrasonography, cerebrospinal fluid examination, mantoux test, lymph node fine needle aspiration / excision biopsy were undertaken when required. Attempts were made to detect acid fast bacilli from sputum and serous body fluid of the body. Various presentations of TB were reported in these patients. BCG scar was taken as sole indicator of BCG
vaccination. All the data was subjected to Pakistan Paediatric Association Scoring Chart for diagnosis of TB in children and recorded on a proforma. (Table 1) Score seven or more indicated confirmed TB.

Table 1: Pakistan Paediatric Association Scoring Chart For Diagnosis of Tuberculosis in Children

<table>
<thead>
<tr>
<th>Features</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Close contact in last 2 years</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>BCG scar Absent</td>
<td>Absent</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>History of measles and whooping cough</td>
<td>Between 3-6 mons</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Immunocompromise / Immunosupressant*</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Physical examinations</td>
<td>-</td>
<td>Suggestive</td>
<td>Strongly suggestive</td>
<td>TB</td>
<td></td>
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<tr>
<td>Radiological findings¶</td>
<td>Non specific</td>
<td>Suggestive</td>
<td>of TB</td>
<td></td>
<td></td>
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<tr>
<td>Tuberculin skin test</td>
<td>5-10 mm</td>
<td>&gt;10mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Granuloma</td>
<td>Non-specific</td>
<td>Specific for TB</td>
<td></td>
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</tbody>
</table>

TOTAL SCORE

0-2 points: TB unlikely
3-4 points: Keep under observation for three months for possible TB
5-6 points: TB probable, investigations may justify therapy 7 or more points TB “confirmed”
*Include children with malignancies (leukaemias, lymphomas), immunodeficiencies and immunosuppressive therapy such as chronic steroids more than 2 weeks
#PCM grade 3: Protein Calorie Malnutrition grade 3 not improving after 4 weeks of “adequate” caloric intake

S Physical Examination

Suggestive of TB

• Pulmonary findings (unilateral wheeze, dullness);

• hepatosplenomegaly; as cites

• Matted lymphadenopathy; abdominal mass; gibbous formation; chronic monoarthritis: CNS findings (bulging fontanelle, irritability, papilloedema)

• III defined opacity/infiltrates; marked bronchovascular marking suggestive of TB

• Consolidation not responding to antibiotic therapy; paratracheal, tracheal or mediastinal lymphadenopathy; miliary mottling

Results

Total 108 patients with confirmed TB were included in the study. There were 54 male and 54 female with ratio of 1:1. Patients were from 0 -15 years of age with mean age of 6.72 ± 4.19 years (Fig 1). More than two third of the patients scored upto nine on PPA scoring chart (Fig 2).

Figure 1: Age of the Patients in Years

More than half 62 (57.4%) patients were BCG vaccinated (BCG scar present). Close contact with TB patients was found in 76 (70.4%) patients. Out of them, 43 (56.6%) contacts were sputum positive. Strongly suggestive physical findings were present in 46 (42.6%) while Suggestive radiological findings were appreciated in 76(70.4%) patients. No statistical significance was appreciated between vaccinated (BCG scar present) and unvaccinated (BCG scar absent) children for findings of physical examination and radiological data. Mantoux test was positive (induration more than 10 mm) in 37(34.3%) patients. Among them 23 (62%) were vaccinated children

Pulmonary TB was present in 62(55.6%), tuberculous meningitis (TBM) in 27(25%), tuberculous lymphadenitis in 10(9.3%), miliary in 6(5.6%) Seven out of ten patients with tuberculous lymphadenitis
had caseating granuloma on histopathology. Patients younger than two years of age were found to be significantly more susceptible to tuberculosis after contact with sputum positive cases in this study (p value 0.032). Statistically significant relationship was not found between the age, BCG vaccination and type of TB (p>0.05).

Tuberculosis is more prevalent in younger age group. In this study, more affected groups were found from 0-5 years (40.7%) and 10-15 years (39.8%). Most affected age group in a study by Qazi et al was between 2-5 years. Saleem et al noted abdominal TB in older children aged above 10 years while we found pulmonary TB to be commonest in this age group. In present study both sexes were equally affected, same was reported by Iqbal et al. Close contact with TB patient in last two years was present in 76 patients and out of them 43(56.6%) were BCG vaccinated children. This is similar to an Indian study. Mantoux test, is a useful supportive evidence of active TB in patients with pulmonary and extrapulmonary TB, in BCG vaccinated children as well. In our study 62% of vaccinated children had positive Mantoux test.

Pulmonary TB was found the most common form which is similar to other national studies. There was no statistically significant difference in type of tuberculosis among vaccinated and unvaccinated children. It is consistent with an Indian study and contrary to Butt et al who described extra pulmonary TB as more common form of tuberculosis in unvaccinated children. In present study, statistical significance was found in patients younger than two years of age with sputum positive contact. Many studies had defined the same. It is important to identify and treat the adult in prevention of childhood tuberculosis.

**Conclusion**

High prevalence, delay in diagnosis and management issues related with pulmonary smear positive contacts enhance the risk of tuberculosis in children.

**References**