

Original Article

Correlation between clinical and radiological presentation of pulmonary tuberculosis in children

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Abstract

Pulmonary tuberculosis may be easily confused with other chest diseases during its initial presentation. This study was carried out to identify presenting clinical and laboratory features that differentiate pulmonary tuberculosis from other diseases and to correlate clinical features and radiological findings. This study was conducted in department of pediatrics and Radiology in Bangabandhu Sheikh Mujib Medical University and Dhaka Shihsu Hospital from July 2005 to June 2006. A total fifty Children below 18 were included in the study after being clinically diagnosed as pulmonary tuberculosis. These patients were subjected to detailed history and, clinical examination. Each patient was evaluated by blood CBC, ESR, Mantoux test, Chest X-ray posterior anterior/lateral view, BCG test and gastric lavage. Statistical analysis was performed by SPSS 8 computer program. Fever, cough, weight loss, night sweats and raised ESR were the most common findings in PTB children. No correlation was found between clinical and laboratory parameters in establishing a confident diagnosis of the disease. The study highlights the importance of further research to pinpoint stronger and more reliable criteria for diagnosis.

Key words: Pulmonary tuberculosis, clinical, radiological, children

Introduction

Tuberculosis is the major cause of human death by single bacterial pathogen- mycobacterium tuberculosis. Eight million new cases and three million deaths occur every year worldwide.¹ This burden is increased by human immunodeficiency virus infection. World Health Organization reports that about two billion of the world's populations currently infected with mycobacterium tuberculosis. It is estimated that about 9% of the TB cases globally occur among children less than 15 years of age. The same proportion in low-income countries is 15%.²

Tuberculosis remains an important public health problem in South-East Asia region.³ Countries in this region bear the considerable burden of Tuberculosis which is the leading infectious cause of mortality among adults and children.³ The problem is further aggravated by the increasing population density, rapid urbanization, overcrowding, poverty, malnutrition, immunosuppression, and illiteracy. Tuberculosis is also a major public health problem in Bangladesh.⁴ Based on current estimates, approximately 300,000 people become ill due to tuberculosis and 70,000 die every year.⁴

Pediatric clinical feature is variable in tuberculosis. Many cases of primary TB infection in children are asymptomatic, self-healing and remain completely unnoticed or accidentally discovered at a later stage. It will present with vague symptoms like malaise, fatigue, anorexia, weight loss, failure to thrive and low grade fever. Radiology has great role in diagnosis of tuberculosis. Aim of this study was to find out the clinical presentation in children with pulmonary tuberculosis and to find out the various radiological presentations in children with pulmonary tuberculosis.

Methods

This descriptive study was conducted in department of Pediatrics and Radiology in Bangabandhu Sheikh Mujib Medical University and Dhaka Shihsu Hospital from July 2005 to June 2006. A total fifty children below 18 years fulfilling modified Kenneth John's criteria is included in the study. Those who were clinically suspected but did not fulfill the modified Kenneth John's criteria and cases of TB lymphadenitis, disseminated TB, tubercular meningitis, bone TB, Potts's disease, intestinal tuberculosis were not included in this study. Detailed history and, clinical examination were done. Each patient was evaluated by blood CBC, ESR, tuberculin test, chest X-ray posterior-anterior/lateral view, BCG test and gastric lavage.

Results

Age ranged from 0-18 years. Majority of the cases (42%) were within 0-5 years. Among them 62% were male child and majority were from 74% were from rural area. Based on the nutritional status 64% study subjects had 3rd degree malnutrition. Duration of symptoms varied from 1 to 12 month. But majority of the patients 58% presented with symptoms of 1-3 month. Majority of the patients presented with constitutional features like fever, cough, weight loss and loss of appetite (Table-I).

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Table-I: Distribution of patients by presenting complaint

Presenting complaints	Number of the patients percentage
Fever	50 (100%)
Cough	39 (78%)
Weight loss	24 (48%)
Loss of appetite	18 (36%)
Night sweat	15 (60%)
Chest pain	4 (8%)
Respiratory distress	4 (8%)
Haemoptysis	4 (8%)

Considering the findings of clinical examination, 64% had respiratory rate within 20-40 / minute, 30% had asymmetrical chest movement. 10% had mediastinal shifting, 6% had chest deformity, 34% had increased vocal fremitus, 56% had resonant percussion note, 10% had diminished breath sound, 14% and 6% had crepitation and rhonchi (Table-II).

Table-II: Distribution of patients on chest findings (n=50)

Parameter	Findings	Number of the patients & percentage
1. Respiratory rate	20-40 /m	32/64%
	41-60 /m	12/24%
	>60 /m	6/12%
2. Chest movement	Symmetrical	35/70%
	Asymmetrical	15/30%
3. Tracheal/ mediastinal shifting	Central	45/90%
	Shifted	5/10%
4. Crowding of ribs	Present	4/8%
	Absent	46/92%
	Absent	47/94%
5. Deformity / fullness of chest	Present	3/6%
	Normal	28/56%
6. Vocal fremitus	Increased	17/34%
	Decreased	5/10%
	Resonant	28/56%
7. Percussion note	Hyper resonant	0
	Dull	22/44%
	Vesicular	28/56%
8. Breath sound	Bronchial	17/34%
	Diminished	4/8%
	Absent	0
	Absent	40/80%
9. Added sound	Crepitation	7/14%
	Pleural rub	0
	Rhonchi	3/6%
	Normal	28/56%
10. Vocal resonance	Increased	17/34%
	Decreased	5/10%

86% patients had raised ESR >50 mm in 1st hour. 72% had positive tuberculin test. BCG acceleration test was done to those patient who were MT negative or doubtful. 84% patients had positive BCG test.

Chest radiographic findings were variable. Bronchopneumonic patchy shadow and Segmental consolidation were most common findings (34% patients each) followed by hilar lymphadenopathy and calcified shadow. Pleural effusion was found only in 10% of cases (Table-III).

Table-III: Distribution of the patients on x-ray chest finding

X-ray chest findings	Number of the patients (percentage)
Normal finding	2 (4%)
Calcified shadow	4 (8%)
Bronchopneumonic patchy shadow	17 (34%)
Segmental consolidation	17 (34%)
Hilar lymphadenopathy	5 (10%)
Plural effusion	2 (10%)

Discussion

Several clinical studies have previously been carried out in our country in adult as well as in children.⁵ Most of the patient in this study were within 0-5 years (42%) which is similar to other studies where most of the patients were below 5 years of age.⁶ Study showed that there was slight preponderance of male (about 1.63:1). In other study there was female preponderance.⁷ 60% and 74% patient of this series came from poor socioeconomic condition and rural area respectively. These findings are consistent with the other study done in our country.⁸ Poor socioeconomic condition leads to malnutrition which in turn leads to immunodeficiency that predisposes to tuberculosis.^{8,9}

Fever was reported to be 100% in this study. This is concordant with Singh J¹⁰ and Akbar MS.¹¹ It was comparatively less (55%) in Khan NA series¹² and this was most probably due to the chronicity of the cases and that they were undergoing treatment. As a rule every case of active pulmonary tuberculosis exhibits some degree of pyrexia, which is one of the important clinical criteria of activity.¹³ Cough was the second most complaint in this study (68%) which was similar to the series by Khan NA¹² and Akbar MS¹¹ (about 62% and 47% respectively). In Singh J series it was top of the list (100%).¹⁰

About 48% of our patients reported loss of weight and 30% had loss of appetite. These findings were in harmony with those of other researcher.^{10,11} Chest pain was not uncommon and varied from dull ache or tightness to pleuritic pain. In this study we found chest pain in 8% cases. Difficulty in breathing was observed in 8% in our study which is close to 14% in Khan NA¹² series. Pulmonary tuberculosis is the commonest cause of haemoptysis and is a classical feature of the disease. In our series it was 8% and in Khan NA¹² and Singh J¹⁰ series it was 30%. About 64% had respiratory rate within 20-40/minute, 70% had symmetrical chest movement,

10% had mediastinal shifting, 6% had chest deformity, 34% had increased vocal fremitus, 56% had resonant percussion note, 10% had diminished breath sound, 14% and 6% had crepitation and rhonchi, 34% had increased vocal resonance.

Regarding investigation findings, about 62% patients had mild to moderate anemia which is probably due to malnutrition. 86% patients had raised ESR more than 50 mm in this series.

Demonstration of AFB is the gold standard for diagnosis of pulmonary tuberculosis which is usually not possible in case of children due to their failure to produce sputum. Thus the diagnosis of tuberculosis in children is mostly clinical, and depends on scoring system even in developed countries.¹³ Mantoux test (MT) is a commonly used diagnostic tool. In most of the studies of childhood tuberculosis MT was used as a diagnostic criteria.¹⁴

In our series 72% had positive MT, 22% had negative and 6% had doubtful results. Negative Mantoux test also does not exclude tuberculosis in presence of severe PEM, measles, millitary TB, etc. In this series 84% patient had positive BCG test. In Shirin M series it was about 93% probably due to more malnourished patient in her series.¹⁵ No patients in this study had sputum positive for acid fast bacilli but only one patient had positive AFB in gastric lavage. This finding correlates well with finding of other investigator.¹⁴ It is well known that bacteriological confirmation of tuberculosis is difficult in children with primary disease. There are few sources of culture material and the yield of positive culture is low.¹⁶ It has already been mentioned that diagnosis of pulmonary tuberculosis in children can be difficult. Isolation of AFB is often impossible in children from sputum, isolation from gastric aspirate is very low and there is some fallacy of MT test. So radiography is still more useful method where there is clinical suspicion of intrathoracic tuberculosis. Pulmonary tuberculosis produces a broad spectrum of radiological abnormalities.

In our series we found normal chest x-ray in 4%, calcified shadow in 8%, bronchopneumonic patchy shadow in 34%, segmental consolidation in 34%, hilar lymphadenopathy in 10% and pleural effusion in 10% among the chest radiographs. The radiological features of pulmonary tuberculosis in 273 Nigerian children are presented by Aderle WI.¹⁷ The commonest presentation was lymphadenopathy in 79%, consolidation in 29%, parenchymal infiltration in 28%, pleural effusion in 12%, millitary mottling in 10%, calcification in 6%, cavitations in 5% and tuberculous bronchopneumonia in 2% of cases.

Woodring JH et al¹⁸ series showed that primary phase of the disease includes pulmonary consolidation 50%, cavitation 29%, pneumatocele 12%, segmental or lobar atelectasis 18%, pleural effusion 24%, hilar and mediastinal lymphadenopathy 35%, disseminated disease 6% and normal chest x-ray 15% among the study population.

During the post primary phase of the disease common abnormalities include exudative and/or fibroproductive parenchymal densities in 100%, predominantly in the apical and posterior segments of the upper lobes (91%), cavitations in 45% with bronchogenic spread of disease in 21%, marked fibrotic response in the lungs in 29% and pleural effusion, empyema and fibrosis (18%, 4% and 41% respectively). In Wong KS et al¹⁹ series, out of ten cases of pulmonary TB, consolidation, micronodular and millitary lesions were found in 4, 3 & 1 patients respectively. Two patients showed non-specific bronchopneumonic infiltration. Taking all the aspects of our study into perspective it is quite clear that there is no single and accurate diagnostic method or criteria for diagnosis of childhood tuberculosis. Still various clinical and radiological presentations are quite helpful for diagnosis of pulmonary tuberculosis.

Clinical and radiological presentation is variable in different pathological state of pulmonary tuberculosis. Limited cases may not represent the actual clinical and radiological presentation of childhood pulmonary tuberculosis but definitely it gives as an idea about the presentation of pulmonary tuberculosis in the context of our country.

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