

Comparing Chest Radiograph and Tuberculin Skin Tests in Children

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Abstract- World Health organization (WHO) has reported that out of more than 10,000 of 250,000 tuberculosis afflicted children die annually. Pulmonary tuberculosis is a research priority in our country, and diagnosing this disease especially in children who are known as the major transmitter of the disease is rather difficult. As a result, it was decided to conduct an overall assessment on this age group in order to determine the importance of the findings of chest radiography and skin test in diagnosing the disease. The present descriptive study was carried out based on the findings of a health plan in Fasa, a Iranian town, during 1995 and 1996, on 2 groups: first-grade students of Fasa elementary schools. Among 2263 students, 102 (4.5%) cases had a positive skin test. According to the radiographic findings, tuberculosis was reported in seven (6.9%) of them. The diagnosis of tuberculosis is more difficult in children; this is because taking sputum samples for laboratory examination is rather difficult especially in children lower than 10 years. In this group, diagnosis is made based on the symptoms like cough, weight loss, history of contact with a TB patient and other diagnostic procedures including chest radiographies and skin test.

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Introduction

Tuberculosis is more prevalent in developing countries due to poor diagnosis and treatment (1,2). Normally, children become infected when they are in close contact with a TB adult. Poor hygiene and no administration of isoniazide for prophylaxis are the main reasons of such infection. Children comprise a large number of future transmitters of tuberculosis, so the incidence of tuberculosis in this group is known as an index for annual risk of infection and is calculated following cohort studies usually using tuberculin skin test (3-5).

According to the available statistics, the incidence of tuberculosis in Iran was reported to be 9422 (13.9%) in 2004 (6) and for this reason, it has been placed among the chief priorities of the national treatment plan.

The introduction of DOTS strategy for controlling tuberculosis by WHO in 1993 has lowered the devalued chest radiographies to the extent that in some studies using the said procedure, it was considered as an

unreliable method of diagnosis (4). Due to low yield of sputum smear in children, other methods of diagnosis such as skin test and chest radiography must be considered.

Considering the mentioned fact and as pulmonary tuberculosis is a research priority in our country, it was decided to conduct an overall assessment on the first grade students in order to determine the importance of chest radiography and skin test in diagnosing the disease prior to the emergence of clinical symptoms.

Patients and Methods

The present descriptive, prospective study was carried out based on the findings of a health plan in Fasa (a town near Shiraz)- Iran during 1995 and 1996, aiming at the performance of tuberculin skin test in all cases. As a matter of fact, chest radiography and tuberculin skin test were routinely conducted for all the habitants and the reports were all recorded in their files.

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Table 1. PPD results according to the child's gender

| PPD | Girls (%) | Boys (%) |
|---------|-------------|-------------|
| < 10 mm | 1036 (95.7) | 1125 (95.3) |
| ≥ 10 mm | 47 (4.3) | 55 (4.7) |

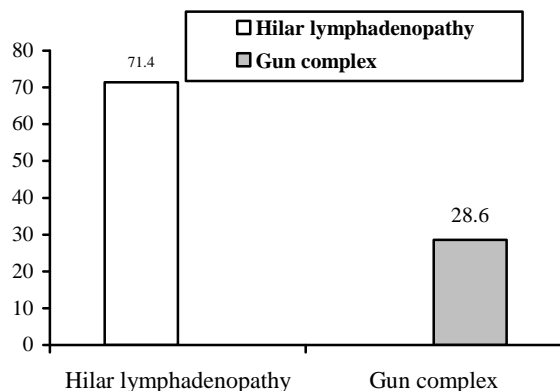


Figure 1. The radiographic findings in regard with the patient's gender

The records of the first-grade students of Fasa elementary schools in the same year were reviewed. Gathered data were analyzed using the chi square test.

Results

Out of 2263 students who referred to the health center, 1083 cases were female. 102 (4.5%) of these cases had a positive skin test. There was no significant relationship between sex and the positivity of the skin test ($P>0.05$) (Table 1).

According to the radiographic findings, tuberculosis was reported in 7 (6.9%) of the elementary students. The main chest radiographic findings included hilar lymphadenopathy (71.5%) and gun complex (28.5%; Figure 1).

Discussion

Tuberculosis has been a major fatality factor since long time ago; the re-outbreak of the disease has turned it into a global consideration. According to the available statistics, the incidence of tuberculosis in Iran was reported to be 9422 (13.9%) in 2004 (1) and for this reason, it has been placed among the chief priorities of the national treatment plan.

The radiographic involvement is mostly reported in the upper lobe among the said patients (2, 3).

World Health organization (WHO) has reported that tuberculosis afflicts 250,000 children annually; according to this report, more than 10,000 children die annually due to tuberculosis (4).

The main source of TB transmission in children is through the adults with positive pulmonary tuberculosis (5, 6).

The diagnosis of tuberculosis is more difficult in children; this is because taking sputum samples for laboratory examination is rather difficult especially in children lower than 10 years. In this group, diagnosis is made based on the symptoms like cough, weight loss, positive history of contact with a TB patient and other diagnostic procedures including chest radiographies and skin test (7).

The presence of cavity in the chest radiography, which is a sign of tuberculosis in its progressive stages in positive cultured patients, may lead to a higher susceptibility and exclusiveness of the test. According to the mentioned point, the susceptibility rate of the CXR with exclusive tuberculosis findings was 68% while the susceptibility of the very test was 48% for the negative cultured patients.

Chest radiographies can be categorized into 4 groups:

1. no pathology in accordance with Tuberculosis
2. non-exclusive pathology for tuberculosis
3. exclusive tuberculosis pathology
4. absolute exclusive tuberculosis pathology

Findings like individual shadows in hilar area or mediastinum, scattered nodular view or plural effusion are exclusive for tuberculosis; while findings including patchy or nodular lesions, cavities and calcified lesions are the absolute exclusive tuberculosis findings (8). According to the results obtained from the current study, hilar lymphadenopathy and gun complex in pediatric radiographies are more prevalent and specific for the disease. In conclusion, considering the great number of TB suspicious cases in Saharan countries, examining sputum samples for confirming the final diagnosis of tuberculosis is difficult and time consuming. Therefore, using other diagnostic procedures like chest radiography in the first phase can be useful; and thus, the need for examining sputum samples will be restricted to cases with positive radiographic views. This procedure can also be helpful in Iran due to the high prevalence of tuberculosis. Since a more rapid treatment can be provided following the early diagnosis of TB using radiographies, it can reduce many of the costs resulting from TB complications.

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