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Screening of Tuberculosis in Symptomatic Close Contact Children

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ABSTRACT

Background: *Tuberculosis in children is one of the major causes of mortality in the third-world countries. Source of tuberculosis transmission to the children is infected adult patients with positive pulmonary smear who are in close contact with these children. This study conducted to reveal the rate of active tuberculosis among symptomatic close contact in children.*

Materials and Methods: *We reviewed 124 children with symptoms and history of close contact with active tuberculosis between March 2000 and March 2002 in National Research Institute of Tuberculosis and Lung Disease (NRITLD). Diagnostic criteria used for detection of childhood tuberculosis consisted of having at least three out of five following criteria: clinical symptoms, history of close contact, radiological findings, positive PPD test, and positive bacteriological or pathologic findings.*

Results: *Of 124 cases, 65(52%) were female and 59(48%) were male. 68(55%) were Afghan refugees and 56(45%) were Iranian. All patients had positive clinical symptoms. 65(53%) of children had a PPD induration more than 10mm. Positive radiological findings (Chest-X-ray or Computed Tomography) were detected in 56(46%) cases. Mycobacterium tuberculosis was isolated from gastric washing fluid in 25(20%). Considering aforementioned criteria, 56(45%) patients were diagnosed as active tuberculosis while 68(55%) were received chemoprophylaxis. Among those with active disease, 23 had three positive criteria, 21 had four positive criteria, and 12 fulfilled whole criteria.*

Conclusion: *Our results are important for the setting of priorities and rationalization of screening, chemoprophylaxis and early treatment measures, particularly among symptomatic close contacts in children. Multidisciplinary and multi-level approaches both by the government and private health care providers will have a positive impact on the childhood tuberculosis status in Iran.* ***(Tanaffos 2003; 2(5), 51-56)***

Key words: *Tuberculosis, Children, Close contact, Symptom, Screening*

INTRODUCTION

Tuberculosis in children is one of the major causes of mortality in the third-world countries. Despite the success rate of about 100% of chemotherapy in childhood tuberculosis, most of these cases are not diagnosed and treated appropriately. The major reasons for delaying in diagnosis of tuberculosis in children are low prevalence of clinical manifestations

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as well as low number of bacilli in the patient's pulmonary secretion. According to the epidemiological studies, tuberculosis involvement in children are 15-39% in developing countries comparing to 6% or less in the United States which relates to the high population of children and poor socioeconomic situation in developing countries (1).

Source of tuberculosis transmission to the children is infected-adult patients with positive pulmonary smear who are in close contact with these children. According to the results of different investigations, the risk of infection in people in close contact with active tuberculosis patients is 41% in which 6% have been infected before the diagnosis of tuberculosis. Infection and tuberculosis can be prevented in these cases by performing chemoprophylaxis (2).

Results of the study that was performed in the United States in the year, 2000 showed that there were 6 cases of contact for each case of active tuberculosis; besides among these cases, tuberculin test was positive in 36% of cases in contact (3).

In another study which was performed in India during 7 years on cases in contact, new case appearance was 64% in first year, 22% in next three years, and 13% in the following years (4). Undoubtedly, treatment of patients is one of the most important methods in preventing tuberculosis, but screening the cases in contact and preventing the disease in this group by chemoprophylaxis, especially in children less than 6 years old, have the essential role in case finding and controlling the tuberculosis (5).

In this study, children in contact with positive sputum pulmonary tuberculosis cases were evaluated, and chemoprophylaxis or tuberculosis treatment was prescribed for them. The main goal of this study is estimation for the percentage of tuberculosis infection in children who are in close contact with tuberculosis patients.

MATERIALS AND METHODS

This prospective study was performed on 124 children with age range of 1-15 years old who had clinical symptoms and positive history of close contact with tuberculosis patient from March 2000 to March 2002 in National Research Institute of Tuberculosis and Lung Disease (NRITLD).

In all cases, history and physical examination, history of contact with tuberculosis patient, history of receiving BCG vaccine; as well as, bacteriological and radiological findings were assessed and collected in the special questionnaires. PPD test was performed for each case in anterior part of forearm by injection the 0.1ml of 5-unit Tuberculin solution. The results were checked after 48 to 72 hours based on the diameter of induration.

Diagnostic criteria for definite diagnosis of tuberculosis in the studied children were designed based on observing at least 3 of 5 following characteristics:

1. positive clinical manifestations
2. history of close contact with infected patient
3. positive radiological findings
4. positive Tuberculin test
5. positive pathological or bacteriological findings for tuberculosis

RESULTS

From 124 children, 65(52%) were female and 59 (48%) were male. 68 (55%) of them were Afghan and 56(45%) were Iranian .All children had one or all of the following symptoms: fever, chronic cough, weight loss, hemoptysis and night sweat. Fig-1 illustrates the diagnostic findings in children in close contact with tuberculosis patient

According to the mentioned diagnostic criteria in 56 (46%) of cases active tuberculosis was diagnosed. Of those, 32 (57%) were Afghan and 24(43%) were Iranian, 29(52%) were female and 27 (48%) were male. Figure-2 shows the diagnostic findings according to mentioned criteria.

From 24 patients with positive bacteriological findings, 15 (62%) were Afghan, 9(38%) were Iranian, 18 were placed in the age group of 10-14 years old, 5 were 5-9 years old, and one patient was under 5 years old (4 years old).

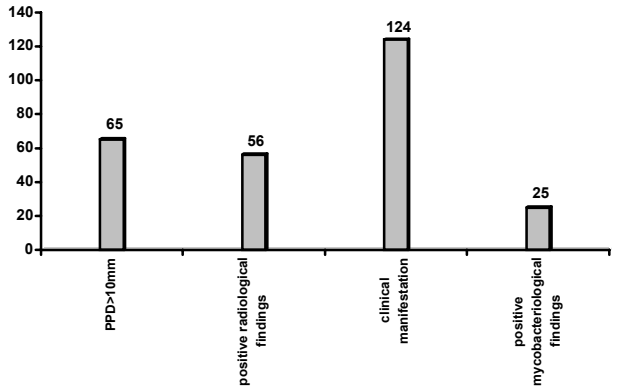

Fig-1. Diagnostic findings in children in close contact with tuberculosis patient

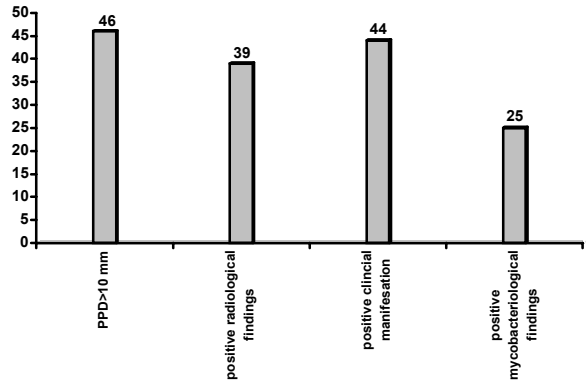

Fig-2. Diagnostic findings among children with active tuberculosis

Among 39 patients who had positive radiological findings, 23 patients (59%) were Afghan and 16(41%) were Iranian. The diameter of PPD induration among 35 (76%) Afghan patients, and 11(24%) Iranian patients were more than 10mm. From 56 children with confirmed diagnosis of tuberculosis, 23 patients had 3 positive criteria, 21 had 4 positive criteria, and 12 children had all five positive criteria.

DISCUSSION

Screening of tuberculosis patients along with prophylactic treatment is the essential key for controlling this disease. Based on this study, prevalence of tuberculosis among symptomatic close contacts in children is 56(45%) that is similar to the results of studies in Italy (40%) and the United States (6,7,8).

According to the study which performed in Malawi, 64% of children in close contact with tuberculosis patient caught the active tuberculosis, which is higher than the result of our study, and it shows that socioeconomic factors, family population, and racial factors are also involved in the rate of transmission and infection (9).

Rapid diagnosis of tuberculosis in children is critical. In adults, infection with mycobacterium tuberculosis changes to the active disease in only 5-10% of cases during their life, but in children the risk of changing the silent infection to the active tuberculosis is higher and depends on age. Untreated tuberculosis infection in 43% of infant cases, 24% of children in the age range of 1-5 years old and 15% of older cases lead to pulmonary tuberculosis, that in 30% of cases, it coexists with extra pulmonary tuberculosis (2,10,11).

In this study, the minimum age of tuberculosis patients was 7 months old and the maximum was 14 years old with no significant difference in disease tendency between girls and boys. According to the mentioned diagnostic criteria in childhood tuberculosis in these patients, Tuberculin test showed the highest positive percentage (53%) comparing to other criteria that represents the importance of this test as a diagnostic test for tuberculosis in children. The next important criterion was the radiological

findings (Chest X-ray and/ or pulmonary CT-scan) that in 46% of children were positive. Chest x-ray was helpful in only 5% of cases and in 41% of children, pulmonary CT along with simple chest x-ray showed positive results of tuberculosis involvement that reveals the importance of CT in diagnosis of tuberculosis in children (12).

In 20% of children, bacteriological studies of gastric fluid or sputum were positive. All of these cases were considered as the positive smear pulmonary tuberculosis patients and received anti-tuberculosis treatment. Because the sputum smear is positive for AFB in about 70% of adults and 10-12% of children (maximum 40%), using the other diagnostic tests along with the bacteriological tests is important for preventing the progression of disease and accurate treatment of tuberculosis in children. The results of this study confirm the results of the previous studies regarding the efficacy and importance of history of close contact, clinical symptoms, tuberculin test, and radiological findings in conjunction with bacteriological tests in diagnosis of tuberculosis among children (13).

Considering the age group, most of the smear positive tuberculosis patients are in the age group of 10-14 years old that verifies the puberty and hormonal factors as the predisposing factors for tuberculosis. In the age group of 5-9 years old (Favorable school age) the risk of tuberculosis is lower than two other age groups (14). Based on the results of this study, tuberculosis rate in symptomatic close contact children with active tuberculosis patients is 45% that if remains undiagnosed, it will lead to high morbidity and mortality rate. This study illustrates the importance of tuberculosis screening in children, especially with clinical symptoms as a major key for diagnosis and prophylaxis of tuberculosis and consequently controlling of this disease in the community.

REFERENCES

1. Eamranond P, Jaramillo E. Tuberculosis in children: reassessing the need for improved diagnosis in global control strategies. ***INT J Tuberc Lung Dis*** 2001; 5(7): 594-603.
2. Zellweger JP. Tuberculosis in households of index patients: is there another way to control tuberculosis? ***INT J Tuberc Lung Dis*** 2002; 6(3): 181-2.
3. Marks SM, Taylor Z, Qualls NL, Shrestha-Kuwahara RJ, Wilce MA, Nguyen CH. Outcomes of contact investigations of infectious tuberculosis patients. ***Am J Respir Crit Care Med*** 2000; 162(6): 2033-8.
4. Krishna Murthy VV, Nair SS, Cothi GD, Chakraborty AK. Incidence of tuberculosis among newly infected population and in relation to the duration of infected status. ***India J tuberc*** 1976; 33: 3-7.
5. Noertjojo K, Tam CM, Chan SL, Tan J, Chan-Yeung M. Contact examination for tuberculosis in Hong Kong is useful. ***Int J Tuberc Lung Dis*** 2002; 6(1): 19-24.
6. E1- Hamad I, Casalini C, Matteelli A, Casari S, Bugiani M, Caputo M, et al. Screening for tuberculosis and latent tuberculosis infection among undocumented immigrants at an unspecialised health service unit. ***Int J Tuberc Lung Dis*** 2001; 5(8): 712-6.
7. Scolari C, E1-Hamad I, Matteelli A, Signorini L, Bombana E, Moioli R, et al. Incidence of tuberculosis in a community of Senegalese immigrants in Northern Italy. ***Int J Tuberc Lung Dis*** 1999; 3(1): 18-22.
8. DeRiemer K, Chin DP, Schecter GF, Reingold AL. Tuberculosis among immigrants and refugees. ***Arch Inter Med*** 1998; 158(7): 753-60.
9. Devadatta S, Dawson JJ, Fox W, Janardhanam B, Radhakrishna S, Ramakrishnan CV, et al. Attack rate of tuberculosis in a 5-year period among close family contacts of tuberculous patients under domiciliary treatment with

isoniazid plus PAS or isoniazid alone. ***Bull World Health Organ*** 1970; 42(3): 337-51.

10. Osborne CM. The challenge of diagnosing childhood tuberculosis in a developing country. ***Arch Dis Child*** 1995; 72(4): 369-74.
11. Starke JR, Jacobs RF Jereb J. Resurgence of tuberculosis in children. ***J pediatr*** 1992; 120(6): 839-55.
12. Kim WS, Moon WK, Kim IO, Lee HJ, Im JG, Yeon KM, et al. Pulmonary tuberculosis in children: evaluation with CT. ***AJR*** 1997; 168(4): 1005-9.
13. Starke JR. Childhood Tuberculosis: diagnostic dilemma. ***Chest*** 1993; 104(2): 329-330.
14. Miller FJW, Seale RME, Taylor MD. Tuberculosis in children. Boston: Little Brown, 1963.