

Original Research Article

# Interpretation of Mantoux test in children

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	International Archives of Integrated Medicine, Vol. 3, Issue 6, June, 2016. Copy right © 2016, IAIM, All Rights Reserved. Available online at <a href="http://iaimjournal.com/">http://iaimjournal.com/</a> ISSN: 2394-0026 (P)                      ISSN: 2394-0034 (O)	
	Received on: 23-05-2016 Source of support: Nil	Accepted on: 31-05-2016 Conflict of interest: None declared.
<b>How to cite this article:</b> Radha Mohan M, Alimelu M, Sudershan Reddy P, Shyam Sunder M. Interpretation of Mantoux test in children. IAIM, 2016; 3(6): 88-92.		

## Abstract

Tuberculosis is the most common infectious cause of death worldwide. Young children especially infants usually are more susceptible to tuberculous infection. Disease usually develops within 1 year of infection. The present study has been conducted upon 41 children in whom Mantoux test was positive (n=41). These children were coming to our outpatient department, in a Teaching Hospital, Nizamabad, Telangana State with mild fever, cough, night sweats, anorexia, and loss of weight. The age group selected for this study was 1 to 12 year, and the period of study was from August, 2013 to December, 2015. Among the 41 children under study 13 children were 1 to 4 year and 28 were 5 to 12 year. Among the total 41 cases of Mantoux positive, 16 (39%) were found to be suffering from tuberculous disease and anti tuberculous drugs were started. In these cases 7 were 1 to 4 year (n=13), and 9 were 5 to 12 year (n=28). After 3 months follow up, all the children who were on ATT became free from their symptoms. It shows association between mantoux positivity and tuberculosis is more in children between 1 and 4 year than children between the age of 5 and 12 year. Most of the other children needed antipyretics, other symptomatic drugs and antibiotics only. But in 3 cases symptoms were not relieved either with antibiotics or with trial ATT. The factors for deciding tuberculosis are history of contact, clinical picture, CBP, ESR, chest- x- ray, Mantoux test, sputum for AFB, antibiotic trial, follow up, trial ATT. All these factors are put together and then only we will decide whether to start ATT or not.

## Key words

Tuberculosis, Mantoux test, Tuberculin, PPD, Induration, DTH, AFB, Antibiotics, Follow up, ATT, Association, Interpretation.

## **Introduction**

Tuberculosis is caused by *Mycobacterium Tuberculosis*, an aerobic or microaerophilic, acid fast, non spore forming, non motile, slow growing bacillus. The actual global disease burden of childhood tuberculosis is not known, but it has been assumed that 10% of the actual total TB caseload is found among children. A global estimate of 1.5 million new cases and 130,000 deaths due to TB per year among children is reported [1, 2]. Our primary aim of the present study was to determine the association between the Mantoux test and tuberculosis in children.

## **Materials and methods**

This is a cohort study conducted upon 41 children (n=41) with positive Mantoux test who were attending to our outpatient department with various symptoms like mild fever, cough, night sweats, anorexia, and loss of weight. The age group included was 1 to 12 year. Among the 41 children under study 13 children were 1 to 4 year (n=13) and 28 were 5 to 12 year (n=28). This study was conducted from Aug, 2013 to Dec, 2015 in a Teaching Hospital in Nizamabad, Telangana State.

Children below 1 year and above 12 year were excluded from the study. Children with previous history of tuberculosis were also excluded. Before commencing the study the institutional Ethics Committee clearance was taken. Informed consent from the parent or guardian of each and every child enrolled in this study was obtained.

### **Mantoux test**

0.1 ml of 5 TU (Tuberculin Units) PPD (Purified Protein Derivative) should be injected intradermally into the volar aspect of the fore arm using a 27 –gauge needle [3]. A wheal should be raised and should measure approximately 6-10 mm in diameter. The test is read at 48-72 hours. The reaction consists of erythema and induration. The diameter of the induration is measured. We selected the cases for

this study if the diameter of the induration was 15 mm or more.

### **Study procedures**

Children, attending to our outpatient department with the above symptoms for more than 3 weeks or repeatedly suffering from these complaints have been advised to undergo Mantoux test along with CBP, CUE, ESR, Chest X Ray, and sputum for AFB after taking detailed history including contact history of tuberculosis, clinical examination.

For selected cases, initially symptomatic treatment and antibiotics only were prescribed and were kept under observation. Most of the children were relieved from the symptoms and ATT was not required for them. But for the children who were not relieved or partially relieved from these symptoms, ATT was prescribed after considering all the deciding factors to start ATT like history of contact, clinical picture, and other investigations (repeated investigations were done whenever required), opinion of faculty from other departments like radiology, pathology, microbiology. In some cases trial ATT was prescribed for 3 weeks and if symptoms subsided, ATT was continued. In whom trial ATT showed no improvement, were undergone for other investigations or referred to higher centre.

## **Results**

Out of 41 cases under study, 16 (39%) were found to be suffering from tuberculous disease. 22 (53.66%) were improved with symptomatic and antibiotic treatment. 3 (7.31%) of them were not relieved by either symptomatics and antibiotics or ATT (**Table – 1** and **Graph - 1**).

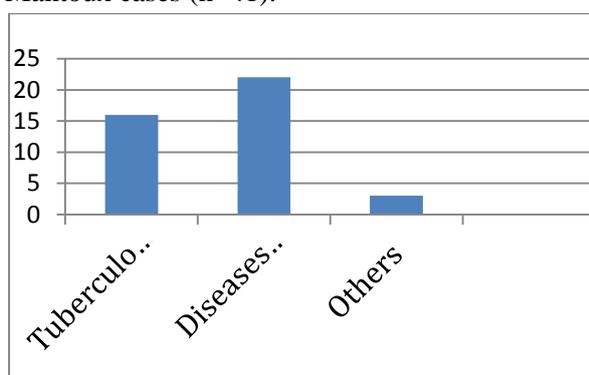
According to age these cases were divided into 2 groups again i.e. 1 to 4 year and 5 to 12 year (**Table – 2** and **Graph – 2**). It showed association between Mantoux test and tuberculosis was more in the age group between

1 and 4 year when compared to the age group between 5 and 12 year.

**Table – 1:** Disease wise distribution of Positive Mantoux cases (n=41).

Tuberculosis	16
Diseases relieved by symptomatics and antibiotics	22
Others	3

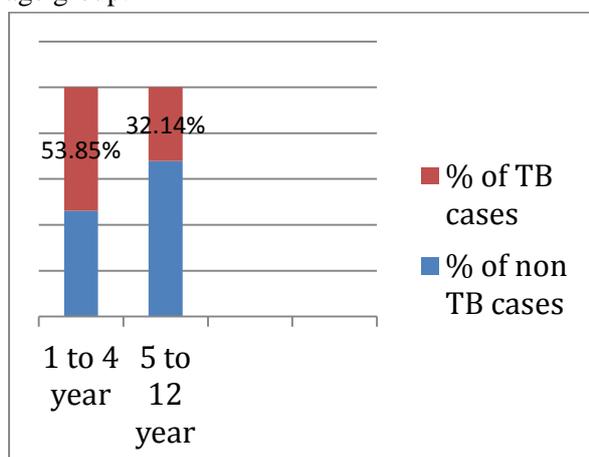
**Graph – 1:** Disease wise distribution of positive Mantoux cases (n=41).



**Table – 2:** Distribution of cases according to age group.

Age group	Total No. of cases	No. of TB cases	% of TB cases
1 to 4 year	13 (n=13)	7	53.85 %
5 to 12 year	28 (n=28)	9	32.14 %
Total	41 (n=41)	16	39 %

**Graph – 2:** Distribution of cases according to age group.



After 3 months follow up children who were under ATT, became healthy and increased in weight and were advised to continue ATT till 6 months.

## Discussion

Mantoux test interpretation is difficult. It is neither sensitive nor specific with high false positive and false negative results. That is why in this study care was taken while performing Mantoux test. Diameter of induration was measured correctly. Regarding ATT, decision was taken considering all the factors together.

Wenli Pan, et al. in 2009 found that Mantoux test was positive in 430 children (28.4%) in their study. A positive culture, suggestive chest radiograph, and proximity of TB contact were risk factors for a positive test [4]. Henrik Aggerbeck, et al. Study in 2013, showed the specificity of PPD was 63% using a cut-off of 5 mm induration and 92% using a cut-off of 15 mm [5]. TB Incidence in an Adolescent Cohort in South Africa; Hassan Mahomed, et al. noted in their study in 2013 a positive baseline TST was significant predictor of TB disease [6]. Rekha Bansal and Parveen K. Sharma mentioned in their article that Mantoux has to be interpreted carefully and one should also be aware of unusual presentations like Exaggerated Mantoux Reaction. Patient should be kept under observation [7].

Our study is similar when compared to the above studies. Among the total 41 cases of Mantoux positive, 16 (39%) were found to be suffering from tuberculous disease and anti tuberculous drugs were started (**Table – 1** and **Figure - 1**). According to age these cases were divided into 2 groups again i.e. 1 to 4 year and 5 to 12 year. Association between Mantoux test and tuberculosis is more in the age group between 1 and 4 year when compared to the age group between 5 and 12 year (**Table – 2, Figure - 2**).

ATT was prescribed after considering all the deciding factors to start ATT like history of

contact, clinical picture and other investigations (repeated investigations were done whenever required), opinion of faculty from other departments like radiology, pathology, microbiology. After 3 months follow up children who were under ATT, became healthy and increased in weight and were advised to continue ATT till 6 months. However, this study was conducted in children, who were attending to our hospital. Thus our findings may not represent the etiology of hypertension in the population.

### Recommendations

Making a diagnosis of tuberculosis in children is extremely challenging. A definite diagnosis of tuberculosis requires the isolation of the organism from secretions or biopsy specimen. But a presumptive diagnosis of tuberculosis can be made from the following features.

- Positive tuberculin skin test (Mantoux test)
- Clinical and radiological features suggestive of tuberculosis
- Known contact with an adult case of tuberculosis

Although Mantoux test will be positive in latent TB infection, it is not specific. Detection of interferon- $\gamma$  (IFN-  $\gamma$ ) or T-cells producing IFN-  $\gamma$  is employed for the diagnosis of latent TB infection or active disease.

- Quantiferon TB Gold test [8]
- T SPOT TB test

If the AFB smear is negative but clinical suspicion is high, nucleic acid amplification may be done.

- MTD (amplified *M. tuberculosis* direct test) [9]
- AMPLICOR system-amplification of characteristic fragment of bacillary DNA by PCR (polymerase chain reaction).

### Conclusion

Childhood tuberculosis is an indirect index of the prevalence of tuberculosis in the community. Clinical presentation may be atypical and leads

to delay in diagnosis. Children can present with TB at any age, but the majority of cases present between 1 and 4 years. Disease usually develops within 1 year of infection—the younger, the earlier and the more disseminated. A positive tuberculin test does not indicate the presence or extent of tuberculosis; it only indicates infection. Mantoux has to be interpreted carefully. A careful history, complete physical exam, and focused laboratory evaluation are essential for determining the cause and initiating treatment. Occasionally A positive Mantoux test may be the only evidence of disease.

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