COMPARISON OF MANTOUX'S TEST WITH DIAGNOSTIC BCG IN PEDIATRIC PATIENTS WITH PULMONARY TUBERCULOSIS

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Background: Pulmonary tuberculosis is a common problem in all age groups in our country. Different tests are performed for diagnosis of this disease. This study was carried out with an objective to compare Mantoux's test with diagnostic BCG in pediatric patients known to have pulmonary tuberculosis. **Methods:** This study was conducted on one hundred children of either sex, age upto 15 years, suffering form pulmonary tuberculosis. Mantoux's test and diagnostic BCG test were carried out on each patient simultaneously. Response of the patient to each test was recorded on a proforma. Both the tests were compared regarding their positivity. **Results:** Both Mantoux's and BCG tests were found negative in about 26% cases, and positive in about 40% cases. BCG alone was positive in 34% cases in which Mantoux's test was negative. **Conclusion:** It is concluded that in paediatric age group, diagnostic BCG test has a definite edge over Mantoux's test in diagnosis of tuberculosis.

Keywords: Mantoux, BCG, Pulmonary Tuberculosis

INTRODUCTION

Tuberculosis is a very common infectious disease in Pakistan. Annual infection rate of this disease in Pakistan is 1-2.5%.[1] Various diagnostic tests can be performed for this disease. Mantoux's test is a simple screening test which can be used for selection of patients for further testing. However it has been found that this test is negative or not reliable in conditions like malnutrition, postmeasles infection and immunodeficiency states.[2]

BCG is basically a vaccine used to immunize children against tuberculosis. During immunization programmes it was found in India that it can be used as a screeining test like mantoux's test. The same thing was later observed in Pakistan.[3,4] In non immunized individuals, skin response to intradermal injection of 0.5 ml BCG is completed in about 12 weeks time with following sequence of events.

2 - 3 weeks → Induration

4 – 6 weeks → Pustule formation

8 – 2 weeks → Healing

In some individuals an accelerated response with following sequence of events has been reported. This was due to Koch's phenomenon.

48-72 hours → induration

1-7 days → pustule formation

14 – 21 days → Healing

This accelerated response to BCG was reported to be a more useful screening test in children as well as adults.[5]

Like other parts of the country tuberculosis is very common in Hazara Division. The present study was carried out to compare Mantoux's and diagnostic BCG tests for diagnosis of tuberculosis in tuberculous paediatrics patients.

MATERIAL AND METHODS

One hundred consecutive tuberculous children were selected using convenience (non-probability) sampling form children ward of District Head Quarter Hospital, Abbottabad over a period of two years. Paediatric patients upto age 15 years of either sex and all the ethnic groups belonging to different areas of Hazara division and suffering from pulmonary tuberculosis were included in the study. Non tuberculosis children or those with nonpulmonary tuberculosis were excluded from the study. Children having some immuno-deficiency or taking immunosuppressive drugs were also not included in the study. Patients information and results of Mantoux's and diagnostic BCG test were recorded on a proforma for each patient.

Pulmonary tuberculosis was diagnosed in these children on the basis of history, physical examination and nonspecific lab tests like ESR. The diagnosis was confirmed by chest X-Ray and positive sputum samples. The chest X-Ray was performed by 100 MA X-Ray machine (siemens). Posterioanterior view was taken in older children while in younger or seriously ill children anterioposterior view was considered enough. Three consecutive early morning samples of sputum were examined for Acid fast bacilli using Ziehl Nelson stain (All chemicals from sigma diagnostic). Erythrocyte sedimentation rate was determined on 2.5 ml anticoagulated blood by Westergen method.

After confirmation of pulmonary tuberculosis every child was subjected to Mantoux's test and diagnostic BCG test simultaneously. For mantoux's test 0.1 ml of purified protein derivative (equivalent to 5 tuberculin units) was injected 4 cm below the right elbow on a relatively vein free area of the volar surface of the arm intradermally, with the help of tuberculin syringe.

Table-1: Interpretation of Mantoux's test

Duration	Response	Interpretation
48-72 hours	0-5 mm indurations	Nonspecific (Negative)
48-72 hours	5-9	Weak positive
48-72 hours	> 10 mm indurations	Positive

For diagnostic BCG 0.1 ml of standard BCG vaccine was given intradermally over the left deltoid using tuberculin syringe. In both mantoux's and BCG tests the inoculated area was encircled and date and time of inoculation were recorded. In case of BCG test, results were recorded as under

Table-2: Interpretation of BCG Test

Duration	Response	Interpretation
48-72 hours	5-9 mm indurations	Mild positive (Non specific)
48-72 hours	10-20 mm indurations	Moderate Positive (+2)
48-72 hours	21-30 mm indurations	Severe Positive (+3)
05-08 days	Pustule formation	Positive test
10-15 days	Healing with scar formation	Positive

RESULTS

Results of this study are shown in tables 3-6.

Out of the 100 chidren included 49 were males and 51 females. Mantoux's and BCG test results are shown table 4. Total BCG positive versus Mantoux positive is shown in table -5. It shows that 74% cases were BCG positive while only 40% cases were Mantoux's positive. Majority of the cases (50%) belonged to two backward districts of Hazara division i.e District Batagram and Kohistan (table - 6).

Table-3: Age and Gender Distribution of Patients (n=100)

Age in years	Sex		Total
	Male	Female	
< 3	05	03	08
3-6	10	12	22
6-9	09	15	24
9-12	15	13	24
12-15	10	13	28
Total	49	51	100

Table-4: Mantoux's and BCG Positivity (n=100)

Test Result	No of cases (%)
BCG Positive, Mantoux's Negative	34 (34 %)
Mantoux's & BCG Positive	40 (40%)
None Positive	26 (26%)
Total	100 (100%)

Table-5: Comparison of Mantoux's test and diagnostic BCG (n=100)

Test	No. of positive cases (%)	No. of negative cases (%)
BCG	74 (74%)	26 (26%)
Mantoux	40 (40%)	60 (60%)

Table-6: District wise Distribution of Cases (n=100)

District	No of cases%)
Abbottabad	15 (15%)
Mansehra	20 (20%)
Haripur	15 (15%)
Batagram	25 (25%)
Kohistan	25 (25%)

DISCUSSION

Tuberculosis is a common problem of poor communities like Hazara and other backward areas of our country. Poverty, ignorance, malnutrition and repeated infections decrease immunity in growing children making them more vulnerable to tuberculosis.[7] Our study showed that tuberculosis is more prevalent in relatively more backward areas of Hazara division. These findings are in accordance with findings of earlier researchers.[7]. This study also revealed that a positive diagnostic BCG test is more significant than a positive Mantoux's test, regarding their screening efficacy in pulmonary tuberculosis. Our findings are in accordance with those of the earlier studies.[1,3,4] Further more it has an additional advantage of vaccinating those who have not been previously exposed or vaccinated. More studies are required on larger samples to highlight the importance of superiority of diagnostic BCG over Mantoux's test.

The major limitation of our study was that we could not calculate sensitivity or specificity, due to the reason that we took only confirmed disease positive cases.

RECOMMENDATIONS

Our recommendations are that:

1. BCG can be used as a preferred screening test in paediatric patients compared to Mantoux's test.

2. BCG is safe and can be given to any age group.

3. BCG can be given to at risk children without prior Mantoux's test.

4. BCG can be given to vaccinated children safely as diagnostic test to look for accelerated allergic response.

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