ORIGINAL ARTICLE

Comparison of Diagnostic BCG and Mantoux Tests in the Early Detection of Tuberculosis in Children

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ABSTRACT

Objective: To compare the proportion of positive cases detected by BCG diagnostic and Mantoux test in patients scoring ≥7 on modified Keith Edward's criteria.

Patients and methods: This was a Cross sectional study conducted in Paediatric Department Unit-I, Bolan Medical Complex Hospital Quetta from November 2003 to 2004. Two hundred children aged 0-15 years having tuberculosis on the basis of Kenneth Edwards Criteria were included in this study. They were divided into two equal groups of 100. Patients in group A were administered BCG diagnostic and group B Mantoux test and results were read after 48-72 hours.

Results: Out of 200 cases128 (64%) were male and 72 female (36%).BCG diagnostic was positive in 71% and Mantoux test in 24% of cases, so total BCG diagnostic positivity was more than Mantoux. BCG diagnostic was found to be statistically significant. Among males 41 (54.2%) and females 30 (42.3%) were BCG diagnostic positive. BCG diagnostic was positive in 42(59.5%) in 1-5 year, 19 (43.1%) in 6-10 year and 10 (38.4%) in1-15 years old. The sensitivity of Diagnostic BCG was 71 %(95%CI 64-77%) while the sensitivity of Mantoux test was 24% (95% CI 18-30). The odds ratio was 7.75 (95%CI 4.96-12.10) with a p value of <0.01.

Conclusion: BCG diagnostic was more helpful than Mantoux test. This study shows BCG diagnostic was more sensitive than Mantoux in detection of tuberculosis allergy.

Key words: Tuberculosis. Mantoux test. BCG Diagnostic.

INTRODUCTION

Tuberculosis remains an important cause of childhood morbidity and mortality in many parts of the developing world.[1]Nearly 8-20 per cent of the deaths caused by tuberculosis occur in children.[2] Pakistan is ranked 7th among the 22 highest tuberculosis disease burden countries in the world. Pediatric tuberculosis (TB) is different than that in adults because of non-specific or complete absence of symptoms and difficulty in confirming the diagnosis microbiologically.[3] Many scoring systems have been devised for diagnosing tuberculosis.[4-6] One of them is Keith Edward scoring system which has been found to be good for public health purpose.[7]

The two main detection tools for children are tuberculin skin test and chest x-ray. BCG is more reliable and sensitive than the tuberculin test in the diagnosis of tuberculosis.[8] It is still valuable in the diagnosis of tuberculosis especially in developing countries where the disease is still a major public health problem and where sophisticated methods such as rapid culture with BACTEC and demonstration of bacilli with DNA probes are not widely available.[9] BCG test is more sensitive and more specific than PPD in diagnosis of tuberculosis in adults and adolescents.[10-12] This study was conducted to see the diagnostic sensitivity of Diagnostic BCG in relation to Mantoux test.

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SUBJECTS AND METHODS

This Cross sectional comparative study was conducted in the Department of Paediatric Medicine Unit I Bolan Medical Complex Hospital Quetta over a period of one year (November 2003 to 2004). It comprised a total of 200 probable cases of tuberculosis selected by non-probability convenience sampling. All these patients included fulfilled modified Keith Edward's Criteria which was the basis of inclusion. The patients who had respiratory illness lasting <2 weeks, who had immune deficiency, asthma, bronchiolitis, foreign body, viral or bacterial meningitis, malignancies and patients who were already on anti-tuberculous therapy were excluded from the study. They were divided into two sub-groups of 100 patient's group. Informed consent was taken from the attendants and a proforma was used to record history and clinical data. All patients scoring ≥7 on Keith Edward's criteria placed in group A were administered (0.1 ml of fresh solution of freeze, dried

BCG vaccine intradermally in right deltoid region) and results were read after 48-72 hours. Patients scoring ≥ on Keith Edward's criteria and placed in group B was administered Mantoux test (0.1 ml of 5 TU of PPD) and results were read after 48-72 hours. Data analysis was performed through SPSS Vr. 10. Sex was presented by M: F ratio. Sensitivity was determined for diagnostic BCG and Mantoux test. Odds ratio was calculated for Diagnostic BCG and Mantoux test. Statistical significance was taken at P <0.05.

RESULTS

Out of total 200 patients included in this study diagnostic BCG was positive in 71% cases as opposed to Mantoux test, which was positive in only 24%. The sensitivity of Diagnostic BCG was 71% (95% CI 64-77%) while the sensitivity of Mantoux test was 24% (95% CI 18-30). This was found statistically significant P=<0.05. The odds ratio was 7.75 (95% CI 4.96-12.10) with a p value of <0.01. Diagnostic BCG was positive in 41 (57.7%) males and in 30 (42.5%) females, while 13 (54.2%) males and 11 (26.3) females were Mantoux test positive. Diagnostic BCG was most informative in 2-5 years 36 patients (33.6%), 6-10 years age group, 19 (43.1%) patients and 11-15 years, 10 (38.4%) patients, while it was least helpful in 0-12 month's age group 26%. Mantoux test was also found more diagnostic in the age group 1-5years 13%. Out of total 200 patients 123 (61.5%) patients were malnourished and 77 (38.5%) were well-nourished. Diagnostic BCG was positive in 44% of malnourished and 28% of well nourished patients. Mantoux test was found to be a good diagnostic test in well-nourished children where 15% of the cases were diagnosed by it. There were 51 (25.5%) vaccinated and significantly high number of patients 149 (74.5%) were unvaccinated. Among the unvaccinated children the yield of diagnostic BCG was 54% and 6% for Mantoux test while in vaccinated patients it was equal for both i.e. 18%. BCG scar was found present in 35 (17.5%) of patients and was absent in 165 (82.5%) of patients. More patients belonged to immigrant population 39.5 %. The most common presentation was with tuberculous meningitis 80 (40%), pulmonary tuberculosis 80 (40%), abdominal tuberculosis 19 (9.5%), Joint 8 (4%) and lymph node tuberculosis8 (4%) while 3 (1.5%) were in miscellaneous group. The diagnostic BCG was most positive in tuberculous meningitis (28%) and milliary tuberculosis (4%). In patients with pulmonary tuberculosis and abdominal tuberculosis the yield of Diagnostic BCG was lower. As far as musculo-skeletal tuberculosis and nodal tuberculosis are concerned, BCG was not found to be superior to Mantoux test.

Table 1: Children Suspected to have Tuberculosis)

Features	Score		
	0	1	3
Length of illness	Less than 2 weeks	2-4 weeks	More then 4 weeks
Nutrition (weight)	Above 80% for age	Between 60-80 %	Less then 60%
Family tuberculosis past or present	None	Reported by family	Proved sputum positive

Table 2: Score for the features if present

Features	Score
Positive Tuberculin Test/ BCG diagnostic	3
Large painless lymph nodes, firm, soft sinus in neck, axilla, groin	3
Unexplained fever, night sweats, no response to malaria treatment	2
Malnutrition not improving after 04 weeks	3
Angle deformity of spine	4
Joint swelling, bone swelling or sinuses	3
Unexplained abdominal mass or ascites	3
CNS: change in temperament, fits or coma	3

Table 3: Distribution of diagnostic Bacille Calmette Guerin and mantoux test

Diagnostic test	Test positive	-VeTest	Total
Bacille Calmette Guerin diagnostic	71[a] (72%)	29 (28%)	100
Mantoux test	24 (24%)	76[b] (76%)	100
Total	96	104	200

a) Significantly high proportion of test positivity at p <0.05.
b) Significantly high proportion of test negativity at p <005

DISCUSSION

The efficacy of diagnostic BCG was found to be more superior in the diagnosis of childhood tuberculosis, this can be explained due to higher number of patients who were malnourished or suffering from life threatening forms of tuberculosis (TBM, Milliary TB) in which this test has been documented to be more effective.[9] The diagnostic BCG and Mantoux test was positive in majority 38% and 13 % respectively in the preschool age group (0-5 years).This is in contrast with the finding of other workers, Sonmez et al[10] who concluded that BCG test is more sensitive and more specific than PPD in diagnosis of tuberculosis in adults and adolescents.

There was statistically significant difference (P value <0.05) in the frequency of boys and girls with score ≥7 on Keith Edward's criteria. Out of 200 patients 128 were boys and 72 were girls. This is due to the fact that in tribal setup girls are less often brought to medical attention. Two third of the patients

were not vaccinated. This implies the failure of our vaccination program, ineffective vaccine or ineffective technique.[13] It could be due to majority of the study population 39.5 % were Afghan refugees.[14]

BCG scar was also absent in some vaccinated children. This implies decreased uptake of vaccine.[15] The increased number of malnourished children in this study was due to increasing poverty and decreasing socioeconomic status of our population[16,17]. The main difference of this study as compared to other studies[18-20] is that in this study modified Keith Edward's scoring charts were used. These were developed by Keith Edward's and used in Papua New Guinea has been proved very useful[19,21]. These charts are very simple, and can also be used at primary and secondary health care level hospitals in developing countries.

Another variable not present in the previous studies is the immigrant status of the patients. It was included in this study due to the presence of over 2 million Afghan refugees for more than two decades in Baluchistan. It has been observed that the incidence of tuberculosis is increased as a result of large scale immigration[22-24].

CONCLUSION

BCG diagnostic is more helpful than Mantoux test as a diagnostic tool in patients suffering from various forms of tuberculosis.

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