ORIGINAL ARTICLE

To Test the Applicability of Modified Kenneth Jones Scoring Chart in Early Detection of Tuberculosis in Children

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ABSTRACT

Objective: To test the applicability of Modified Kenneth Jones Scoring Chart (MKJS) in early detection of tuberculosis in children.

Material and methods: This was a Cross sectional study conducted at paediatric department Unit I Bolan Medical Complex, Quetta from Dec 2006- Sep 2007. 100 suspected patients of TB from 6 months to 10 years of age were included in the study. All these patients had either fever for > 2 weeks , cough for > 2 weeks, fits/SOMI >4 weeks plus CSF suggestive of tuberculous meningitis, gibbus or joint swelling not responding to 4 weeks of treatment with antibiotics. The patients of probable or possible tuberculosis on MKJSC were subjected to Diagnostic BCG, AFB and culture for mycobacterium. The sensitivity and specificity of MKJSC was calculated.

Results: A MKJSC Kenneth Jones scoring was fulfilled in 65 patients and false positive in only one patient. Only 12 patients in this study were false negative. The sensitivity was 84.2% (95% CI 73.6-91.2), specificity was 95.8% (95% CI 76.8-.99.7). The positive predictive value was 98.4% (95% CI 90.5-99.9). The negative predictive value was 65.7% (95% CI 47.7-80.3).

Conclusion: MKJSC provides an important tool in the diagnosis of Tuberculosis.

Key words: Tuberculosis, scoring, Kenneth-Jones Modified

INTRODUCTION

Worldwide, there are nearly 10 million new cases of active TB and 1.8 million associated deaths every year. WHO estimates that one-third of the world's population is infected with Mycobacterium tuberculosis[1]. Pakistan has a disease prevalence of 263/100,000 population[2]. Pakistan is ranked 7th among the 22 highest tuberculosis disease burden countries in the world[3]. Of the 9.2 million new TB cases occurring each year, about 10% are in children[4]. Worldwide tuberculosis contributes to 11% of deaths[5]. Diagnosis of childhood tuberculosis remains an enigma despite many recent technological developments[6]. In the absence of a gold standard for diagnosing tuberculosis in children and in view of logistic and financial constraints faced by resource scarce countries, various screening tools have been devised. Kenneth Jones Scoring Chart is a simple cost-effective tool, which can easily be applied to improve the case detection rate in children[7].

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SUBJECTS AND METHODS

The study was conducted at Department of Paediatric Medicine, Bolan Medical Complex Hospital Quetta from December 2006 to October 2007. It was a cross sectional study and included 100 patients suspected of having Tuberculosis who were selected via non probability convenience sampling. The patients included in this study were between the years of 6 months -10 years old and had the following features: fever >2 weeks, cough >2 weeks, fits/ sign of meningial irritation >4 weeks, bone deformity and joint swelling not responding to >4 weeks of treatment. The following patients were excluded: who were had been previously for tuberculosis, who had pneumonia that responded to antibiotic therapy >2 weeks, who had morquio syndrome with spine deformity and patients who had meningitis that responded to antibiotic therapy <4 weeks. Then the patients were classified into three groups as per the modified Kenneth Jones Criteria (positive with >7, probable with 3-7, unlikely having tuberculosis <3). All these three groups were investigated for AFB/culture for mycobacterium to determine the applicability of these criteria in the diagnosis of Tuberculosis. Then the sensitivity, specificity, positive predictive value, negative predictive value of Kenneth Edwards Scoring was calculated using SPSS 10. The quantitative variables studied were age, fever, Diagnostic BCG response in mm, PCM-III while the

qualitative variables were cough, history of contact with tuberculous patient, history of measles and whooping cough, signs of meningial irritation, BCG scar and physical examination findings.

RESULTS

The age distribution is shown in Table 1. The Mean age was 67.01months (median 73.00 months, mode 120 months. The male:female ratio was 1.32. History of fever >2 weeks was present in 100% of the patients while history of cough >2week was present in 69% of the study population. Cough was more common in extreme age groups. Fits and signs of meningial irritation were present in 52%, history of contact with tuberculous patient in 77%, history of measles in 15% and history of whooping cough in 4%. BCG scar was found only in 24% and malnutrition in 52%. Pneumonia on physical examination was the present in 48%, pleural effusion in 8%, and gibbus deformity of thoracic spine was found in 2%. Radiological finding include ill-defined opacity and marked brochovascular markings in 49% of the study population while milliary mottling was present in 14% of the patients (Table 2). Diagnostic BCG response >10mm response was noted in 57% of the study population. Cerebrospinal fluid suggestive of tuberculous meningitis was present in 52% of the study population, acid fast bacilli were positive in 29% of patients while culture for mycobacterium Tuberculosis was positive only in 11% of patients. Modified Kenneth Jones criteria was fulfilled in 65 patients and only in one patient it was found to be false positive (Table 3). Only 12 patient in this study were negative (score <7) on Kenneth Jones and they were found to have tuberculosis on further investigations. The sensitivity was 84.2% (95% CI 73.6- 91.2), specificity was 95.8 % (95% CI 76.8-.99.7). The positive predictive value was 98.4% (95% CI 90.5-99.9). The negative predictive value was 65.7% (95% CI 47.7-80.3).

Table 1: Distribution of study population by age

Age (years)	Number	Percentage
< 2	27	27.0
2 - <4	13	13.0
4 to <6	10	10.0
6 to <8	21	21.0
8 to 10	29	29.0

Table 2: Distribution of study population having cough

Cough >2 weeks	Age group (years)					Total
	<2	2-<4	4-<6	6-<8	8-10	
Absent	8	6	3	6	7	31
Present	18	7	7	15	22	69
Total	27	13	10	21	29	100

Table 3: Modified Kenneth Jones score corsstabulation

Diagnosis	Modified Kenneth Jones Score		Total
	5-6	>7	
TBM	8	44	52
Pulm TB	2	10	12
Lymph node TB	1	5	6
Milliry TB	1	13	14
PI effusion	2	6	8
Abdominal TB	2	4	6
Gobbs	-	2	2

DISCUSSION

Two age groups i.e. infancy and early adolescence comprised > 50% of the total patients. The second peak is consistent with other studies done in the region[8,9]. The high frequency between the age 6 months to 2 years can be explained by the lack of vaccination and poor socio economic status as is also seen in study done by Siddiqi.[10] Both these two age groups were found to have high frequency of contact with tuberculosis patient, this association between contact and age is also shown in studies done as shown by Takamatsu and Sequeira[9,11].

The history of fever >2 weeks was found in 100% (CI 97-100) of the patients and this is consistent with a study done in the this region.[12] Cough for 2 weeks was a consistent feature in same age groups in which disease was more prevalent, this is also reported by Huang[8]. Signs of meningeal irritation for more than 4 weeks were more prevalent in pre adolescent group that is 8-10 years emphasizing the increased frequency of tuberculosis in this age group in the study, this is also shown in other studies[13]. More then 50% of patients of Tuberculosis were Afghan refugees and there are reports of increased incidence among Afghan refugees[14].

The History of contact again was found in infancy and early adolescence age groups, the history of contact has been shown to be important determinant in the development of tuberculosis[10]. BCG scar was found only in 30% of the patients, attributed to lack of routine vaccination in this part of the world[9,15]. Lack of BCG has been associated with the development of tuberculosis disease[16]. None of the patients who came from Afghanistan had BCG scar.[14] PCM was found 36% of patients with the largest number in <2 years age group. Therefore Tuberculosis should be considered in all severely malnourished patients[10].

AFB was positive in 25% with the highest yield in sputum in preadolesant age group (8-10), thus emphasizing the high yield in sputum than the gastric aspirate[17]. Diagnostic BCG (>10mm was taken positive) was found in almost half of the study group.

Mountoux test was not used because of the proven superiority of Diagnostic BCG[18,19].

Our results regarding Kenneth Jones Scoring Chart were found to be more sensitive and specific than the studies conducted in neighbouring countries[20]. This could be explained by the increased frequency of several factors in this study, patients with tuberculous meningitis and malnutrition, contact, refugees, and lack of vaccination.

CONCLUSION

Modified Kenneth Jones criteria is highly sensitive and specific in the diagnosis of tuberculosis in resource poor health care systems.

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