

Screening of Childhood Tuberculosis with Pakistan Pediatric Association Scoring Chart System

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ABSTRACT

Objective: The objective of the study was to determine the sensitivity of Pakistan Paediatric association scoring chart system as a diagnostic tool for childhood tuberculosis (PPASCFSTB) in the admitted children.

Methods: This prospective study was conducted in Government Allama Iqbal Memorial DHQ (Civil) Hospital Sialkot Pakistan from 1st June 2010 to 31st May 2012. All the children admitted in the Department of Paediatrics were enrolled for screening during this period, except neonates admitted in Nursery Neonatal Unit.

Data was collected on a Performa designed according to the PPA Scoring Chart for screening childhood TB (PPASCFSTB).

Results: Out of 11659 admitted cases in 2 years, 240 children scored 7 or more scores on PPASCFSTB. 220 out of 240 (92%) cases were diagnosed as cases of childhood TB on the basis of response to anti tuberculosis drugs giving a sensitivity of PPASCFSTB as 92 % at 7 or more scores. Among 220 cases of tuberculosis 114 (51.8%) cases were male with male to female ratio of (1:1). 121 (55%) cases were from rural area while 99 (45%) cases came from urban area. 186 (84.5%) cases were socioeconomically low (having income < Rs. 7000/month) while only 14 (6.3 %) cases were offspring of the parents having income more than Rs. 30,000/month, rest of the 20 (9.0%) cases belonging to middle socioeconomic status with income in between Rs. 7100 – 30,000. In 88 (40 %) cases BCG scar was absent. The history of whooping cough, mumps, chicken pox and measles was present in 25 (11.36 %) cases in the last three months before the commencement of the disease. History of close contact with TB patient was present in 84 (38.1%) cases and in 76 (34.5%) cases third degree malnutrition was found. The positive radiological finding was found in 117 (53.1%) cases in the form of lymphadenopathy, opacities, consolidation, pleural effusion and millary mottling. Cold abscesses with discharging sinuses were seen in cervical lymph node in 8 (3.6%) cases, in axillary lymph nodes in 6 (2.7%) cases and in Inguinal lymph nodes 1 (0.45%) case. Psoas abscess with caries spine was found in 1 case (0.45 %).

Conclusion: P.P.A Scoring chart system is a simple and effective tool to screen the childhood T.B.

Key words: Pakistan Paediatric Association scoring chart system for screening childhood Tuberculosis; Immuno-compromised; Malnutrition; Childhood tuberculosis; History of contact.

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INTRODUCTION

Tuberculosis (T.B) is responsible for major burden on health and economics low income countries in which Pakistan is also included. Pakistan ranks sixth in the world having 1.5 million TB patients, with 250,000 new cases every year. Internationally the disease is responsible for 26 per cent avoidable deaths. The incidence rate of TB is 181/100000 and out of which 50% are AFB positive cases¹. The exact figures of childhood TB is unknown. In countries worldwide, the reported percentage of all TB cases occurring in children varies from 3% to more than 25%².

Diagnosis of Tuberculosis in children is a difficult task due to non-specific symptomatology. Diagnostic specimens are not easy to obtain from young children and more than 50% have negative TB cultures¹. The diagnostic advancements of adult tuberculosis have not been validated in children³. So the diagnosis is mainly based on various scoring systems⁴. These are mainly based on clinical symptoms, history of contact, chest radiograph (CXR), tuberculin skin test (TST). One such scoring system designed by Pakistan Paediatric Association is called as 'Pakistan Paediatric Association scoring chart system for screening childhood Tuberculosis (PPASCFSTB)' as shown in table-I. It resembles to Modified Kenneth Jones Scoring Chart for diagnosis childhood tuberculosis. There is very little work has been done on the determination of sensitivity of PPASCFSTB in the diagnosis of childhood tuberculosis⁵. The purpose of this study

is to determine the sensitivity of Pakistan Paediatric association scoring chart system as a diagnostic tool for childhood T.B in the admitted children.

MATERIALS AND METHODS

This prospective study was conducted in Government Allama Iqbal Memorial DHQ (Civil) Hospital Sialkot Pakistan from 1st June 2010 to 31st May 2012. All the children admitted in the Department of Paediatrics were enrolled for screening during this period. The infants below one month of age, lost during follow up or expired within one week of admission were excluded.

History, examination and investigations were performed according to the PPA scoring chart for screening childhood TB (PPASCFSTB). Other investigations like CT brain, lumbar puncture etc was done as necessary. The data was collected on a Performa that was based on PPASCFSTB as shown in table-I. Anti tuberculosis drugs were started in those children having scores 7 or more on PPASCFSTB and response to the drugs was observed in the form of 'feeling of well being, increase in weight, return of appetite and improvement in clinical condition'. Those cases who responded to anti tuberculosis drugs were taken as cases of tuberculosis and sensitivity of PPASCFSTB was calculated. The SPSS version 10 was used for the analysis of data.

TABLE 1: Pakistan Pediatric association scoring chart system for diagnosis of TB in Children

| Features | 1 | 2 | 3 | 4 | 5 | Score |
|---------------------------------------|--------------------|----|---|----------------------------|---|-------|
| HISTORY | | | | | | |
| Age | <2 Yrs | | | | | |
| Close Contact in last 2 years | With Patient | TB | | With sputum +ve TB patient | | |
| BCG scar | Absent | | | | | |
| History of measles and whooping cough | Between 3-6 months | | | < 3 months | | |
| Immunocopromise/ Immunosuppressant | Yes | | | | | |

| | | | |
|--------------------------------------|--------------|------------------|---------------------|
| PCM grade 3 # | Yes | Not improving | |
| EXAMINATION AND INVESTIGATION | | | |
| Physical examinations | | Suggestive of TB | Strongly suggestive |
| Radiological findings | Non specific | Suggestive of TB | |
| Tuberculin skin test | 5-10 mm | | > 10 mm |
| Granuloma | Non specific | | Specific for TB |
| TOTAL SCORE | | | |

INTERPRETATION

| | |
|------------------|---|
| 0-2 points | TB unlikely |
| 3-4 points | Keep under observation for three months for possible TB |
| 5-6 points | TB probable investigations may justify therapy |
| 7 or more points | TB "confirmed" |

- Include children with malignancies (leukaemia, lymphomas), immunodeficiencies, and immunosuppressive therapy such as chronic steroids more than 2 weeks'

PCM grade 3: Protein Calorie Malnutrition grade 3 not improving after 4 weeks of "adequate" caloric intake

PHYSICAL EXAMINATION

Suggestive of TB: Pulmonary findings (unilateral wheeze, dullness); hepatosplenomegaly; ascites

Strongly Suggestive TB: Matted lymphadenopathy; abdominal mass; gibbus formation; chronic monoarthritis; CNS findings (bulging fontanelle, irritability, papilledema).

RADIOLOGICAL FINDINGS

Non-Specific

- Ill defined opacity/infiltrates; infiltrates; marked broncho-vascular marking.
Suggestive of TB
- Consolidation not responding to antibiotics therapy; paratracheal, tracheal or mediastinal lymphadenopathy; millary mottling.

Note: Apply this chart in children with unexplained illness of more than 2 weeks. Exclude asthma, foreign body, immunodeficiency states.

RESULTS

Out of 11659 admitted cases in 2 years, 240 children scored 7 or more scores on PPASCFSTB. 220 out of 240 (92%) cases were diagnosed as cases of childhood TB on the basis of response to anti tuberculosis drugs giving a sensitivity of PPASCFSTB as 92 % at 7 or more scores. The

distribution of cases according to PPASCFSTB scoring is shown in table 2. The distribution of cases according to Types of T.B is shown in table 3. Among 220 cases of tuberculosis 114 (51.8%) cases were male with male to female ratio of (1:1). 121 (55%) cases were from rural area while 99 (45%) cases came from urban area.

186 (84.5%) cases were socioeconomically low (having income < Rs. 7000/month) while only 14 (6.3 %) cases were offspring of the parents having income more than Rs. 30,000/month, rest of the 20 (9.0%) cases belonging to middle socio-economic status with income in between Rs. 7100 – 30,000. The various forms of tuberculosis diagnosed are shown in table 4.

TABLE 2: The distribution of cases according to PPASCFSTB scoring

| Score | Cases | Percentage |
|-----------|-------|------------|
| 7 | 38 | 17.20 |
| 8 | 73 | 33.10 |
| 9 | 43 | 19.50 |
| 10 | 30 | 13.60 |
| 11 > more | 12 | 05.45 |

TABLE 3: Distribution of Cases according to Types of T.B.

| Age | Cases | Percentage |
|------------|-------|------------|
| 1 – 6 mo | 27 | 12.2 |
| 7 – 12 mo | 36 | 16.3 |
| 1 – 2 yrs | 32 | 14.5 |
| 3 – 5 yrs | 40 | 18.2 |
| 6 – 12 yrs | 82 | 37.2 |

TABLE 4: Various forms of tuberculosis

| Types | Cases | Percentage |
|---|-------|------------|
| Pulmonary TB | 137 | 62.20 |
| Without Pleural Effusion | 131 | 59.50 |
| With Pleural Effusion | 6 | 02.70 |
| TBM | 46 | 20.90 |
| Stage I (CSF +) | 0 | |
| Stage II (Signs of Meningeal Irritation) | 5 | 02.26 |
| Stage III (Coma) | 41 | 18.60 |
| Abdominal Koch's (G.I – T.B) | 8 | 03.60 |
| TB Arthritis | 3 | 01.30 |
| TB Lymphadenopathy Cervical/Axillary/Inguinal | 26 | 11.80 |
| Milliary TB (Hepatosplenomegaly) (Lymphadenopathy) (X-Ray Findings) | 3 | 01.30 |

History of close contact with TB patient was present in 84 (38.1%) cases and in 76 (34.5%) cases third degree malnutrition was found. The positive radiological finding in the x-rays was found in 117 (53.1%) cases in the form of lymphadenopathy, opacities, consolidation, pleural effusion and milliary mottling.

Cold abscesses with discharging sinuses were seen in cervical lymph node in 8 (3.6 %) cases, in axillary lymph nodes in 6 (2.7 %) cases and in Inguinal lymph nodes 1 (0.45%) case. Psoas abscess with caries spine was found in 1 (0.45 %) case (table 5).

TABLE 5: Various features in tuberculosis cases

| | Cases | Percentage |
|--|-------|------------|
| BCG Scar absent cases | 88 | 40.00 |
| History of viral infection in last three months | 25 | 11.36 |
| History of close contact in last 2 years | 84 | 38.10 |
| Protein Calorie Malnutrition (3rd degree malnutrition) | 76 | 34.50 |
| Positive X-Ray Findings | 117 | 53.10 |
| Hepatosplenomegaly | 56 | 25.45 |
| Lymphadenopathy | 100 | 45.45 |
| Cold Abscesses | 16 | 07.27 |
| Tuberculine test | | |
| Positive (10mm or more) | 9 | 04.09 |
| Positive (5 – 9 mm) | 30 | 13.6 |
| Negative < 5 mm | 181 | |

DISCUSSION

The sensitivity of the Pakistan Paediatric Association scoring chart system for screening childhood Tuberculosis at score ≥ 7 was 92% in our study while its sensitivity was reported as 61.5% in the study done by Bano et al 2011⁵. The greater sensitivity seen in our study may be due to fact that it was conducted in a secondary care centre where most of the patients were having the first medical consultation whereas the study by Bano et al 2011⁵ was conducted in a tertiary care centre and patients visiting this centre would have got multiple consultations including anti tuberculosis drug trial as well. Pulmonary tuberculosis was observed in 62.2% of the patients in our study while 68% in the study by Bano et al

2011⁵. Various features of patients in our study were compared with those of the patients in the study by Bano et al⁵ in table 6

TABLE-6: Various features of patients

| | Percentage | Percentage |
|---|------------|------------|
| BCG Scar absent cases | 40.00 | 63.0 |
| History of viral infection in last three months | 11.36 | 04.0 |
| History of close contact in last 2 years | 38.10 | 60.0 |
| 3rd degree malnutrition | 34.50 | 08.0 |
| Positive X-Ray Findings | 53.10 | 74.0 |
| Tuberculine test | | |
| Positive (10mm or more) | 04.09 | 24.0 |
| Positive (5 – 9 mm) | 13.60 | 35.0 |
| Negative < 5 mm | 82.20 | 40.6 |

The sensitivity of modified Kenneth Jones Scoring Criteria (that resembles to that of PPASCFSTB) showed sensitivity of 93.6% in cases of tuberculous meningitis in the study by Anwar et al 2010⁶.

Malnutrition is a major health hazard and mother of all problems in paediatric infections⁷⁻¹⁰. It not only enhances the morbidity but also increases the mortality rate in children.

The limitations of the study are that it is not population based study and does not assess the specificity. It is, therefore, recommended to conduct case control studies at population level to check sensitivity and specificity of PPASCFSTB.

CONCLUSION

P.P.A Scoring chart system seems a simple and effective tool to screen the childhood tuberculosis but population based studies are needed to assess sensitivity and specificity.

RECOMMENDATIONS

Pakistan Pediatric Association score chart system should be used as an initial tool in all health facilities to screen childhood T.B.

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