

Prevalence of tuberculosis in children of sputum positive adult of pulmonary tuberculosis living in same household

Beck P¹, Kurrey VK², Dawale P³

¹Dr P. Beck, Associate Professor, Pt JNM Medical College, Raipur, ²Dr Virendra K. Kurrey, Associate Professor, Pt JNM Medical College, Raipur, ³Dr Prafull Dawale, Associate Professor, Government Medical College Rajnandgaon, CG, India

Address for correspondence: Dr Virendra K. Kurrey, Email: virendra_kurrey@yahoo.com

Abstract

Introduction: Mortality due to tuberculosis can be prevented with proper screening, diagnosis and treatment. Present study is proposed to propagate screening of all children in families of all adult with sputum positive for AFB by relevant test available locally. This will help in early detection childhood infection. Objective of this study was to identify the prevalence of tuberculosis in children of sputum positive adult of pulmonary tuberculosis living in same household. If the findings are statistically significant routine screening should be recommended as part of RNTCP. **Method:** Prospective, hospital plus community based study during a period of February 20013 to November 20014, inclusion criteria includes all children 5-14 year, should have contact with sputum positive adult, exclusion criteria - children who treated with antitubercular, TB with concurrent immunosuppression, Detail history, clinical examination, and investigation done to find out tubercular infection or disease. **Result:** We observed that among 218 children 40% children had tubercular infection out of which 23 children had tubercular disease. Data of different parameter is observed and analyzed which is found statistically significant. **Conclusion:** This study argue strongly in favours of routine screening of all children in contact with sputum positive adult of PTB and identify this group of child at high risk who should be screened on a priority basis if there of resources and time to screen all family contact.

Keyword: Childhood Tuberculosis, Extrapulmonary Tuberculosis, RNTCP, Antitubercular drugs

Introduction

Currently in India more than thousand people die from tuberculosis but this death can be prevented with early anticipation, screening. Tuberculosis is one of neglected health crisis and is out of control in many part of world. High incidence of risk of infection is particularly among close contact of infectious patient, which is usually family member. It is supposed that transmission of tuberculosis to children is typically from parent to children through house hold contact [1,2,3]. One tuberculosis patient can multiply mycobacterium tuberculosis to other 10 person who may living in same house. Childhood tuberculosis is rising because of persisting inability to confirm the diagnosis resulting larger number of children dies of undiagnosed tuberculosis [4,5,6,7]. Diagnosis of tuberculosis in children poses technical and operational challenges because of vague and non specific symptomatology, difficult in getting sputum sample for testing. The

present study is proposed to screen all children in family of adult with sputum positive for AFB by detailed history, clinical examination and relevant test available locally. This will also help to identify incidence of tuberculosis in children living with sputum positive TB cases. The finding may also help to plan and include recommendation in RNTCP for routine assessment of such children, if finding found to be statistically significant.

Material and Methods

This Prospective, hospital plus community based study was conducted during a period of February 20013 to November 20014 total 218 children who were in contact with sputum positive adult of tuberculosis registered with RNTCP include in study. The study was initiated with approval of institutional ethical committee and written informed consent of parent was obtained prior to enrolment and to conduct various invasive procedure and investigation.

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Selection of cases: children 5-14 year, should have contact with sputum positive adult and registered under RNTCP, children from institution and also from community of sputum positive adult.

Exclusion criteria: children who had been previously treated with antitubercular, TB with concurrent immunosuppression and sputum negative contact and extrapulmonary tuberculosis.

All 218 children between 1-14 year were undergone for Detail history which include prolong fever, cough more than 2 weeks, failure to gain weight, loss of appetite, decline in weight and symptom of extrapulmonary tuberculosis such as lymphadenopathy, seizure, abdominal pain were recorded. Socioeconomic status was determined with the help of kuppuswamy classification to categorize families as upper, middle

Result

Table 1 showed among 218 children of age up to 14 year, 94 children (43%) belongs to age group <5years, 124 children 68(31%) belong to age group between 5-10 year and rest 56 children (26%) belongs to 11-14 years age group. Positive tuberculin test reaction was more in 5-14 year age group (47%) as compared to <5 years age group in which only 32% were tuberculin positive. The male (55%), female (45%) ratio was approximately 1.2:1. The tuberculin had no significant correlation with sex of child.

Table 1: sex wise distribution of case								
Sex	Number of cases		Percentage					
Male	120		55					
Female	98		45					
Age wise distribution of cases and its correlation with tuberculin test								
			Tuberculin reaction					
			1-5mm		6-10mm		>10mm	
			No.	%	No.	No.	%	No.
<5 yrs	94	43	60	64	4	4	30	32
5-10 yrs	68	31	58	47	8	6	58	47
11-14 yrs	56	26						
X²-5.04 p<0.05								

Table 2 showed Among 218 children most children have varying degree of malnutrition and on 50% had normal nutrition. On correlation of nutritional status of children with tuberculin reaction it was noted that all type of reaction were recorded in various degree of malnutrition. It was particularly noted that positive reaction were more in children with severe malnutrition (54%) as compared to normally nourished and mildly malnourished children (38%).

Table 2 showed Tuberculin positivity is affected by socioeconomic status of children. Among 218 children majority of them belongs to lower class (65%) and rest belong to upper and middle class (35%). Incidence of positive tuberculin reaction is more in lower socioeconomic group.

and lower economic group [8]. Assessment of nutritional status was done by various anthropometric measurements.

Clinical examination and investigation done to find out tubercular infection or disease i.e mantoux test carried out with 1 TU consider positive if induration more than 10mm, this patient further investigate for chest x-ray and age matched technique to take sample for sputum examination. Few investigation were needed on basis of indication i.e. FNAC, lumbar puncture, lymph node biopsy, pleural fluid microscopy [9,10].

The observation were depicted in tabulated form and correlation with tuberculin test was studies with various factor .the data were subjected to statistically analyzed by mean of chi-square test and probability value (p' value) determined after applying student 't' test.

Table 2: Distribution of cases according to socioeconomic status & its correlation with tuberculin reaction								
Socioeconomic status	No. of cases(n-218)	Percentage	Tuberculin reaction					
			1-5mm		6-10mm		>10mm	
			No.	%	No.	%	No.	%
Upper class	6	3	4	67	0	0	2	33
Middle class	70	32	42	60	4	6	24	34
Lower class	142	65	72	51	8	6	62	43
Total	218		118		12		88	
$X^2-4.43$ p<0.05(significant)								
Distribution of cases according to nutritional status & its correlation with tuberculin reaction								
Nutritional status			1-5mm		6-10mm		>10mm	
			No.	%	No.	%	No.	%
Normal nutrition	110	50	66	60	4	4	40	36
Mild malnutrition	78	36	42	54	4	15	32	41
Severe malnutrition	30	14	10	33	4	13	168	54
Total	218		118				8	
$X^2-28.85$ p<0.001(highly significant)								

Table 3 showed 204 children were vaccinated with BCG. In BCG vaccinated children 39% had tuberculin reaction positive while non vaccinated had 57% tuberculin positivity.

Table 3 showed among study group positive tuberculin reaction were seen in 88(40%) children out of whom 48% showed 10-15mm induration, 18% showed 16-20mm and > 20mm seen in 34% of children. We observed that tuberculin reaction of > 10mm induration were more common in children who had history compatible with tuberculosis, raised ESR, lymphocytosis, abnormal chest X ray, FNAC, CSF suggestive of tubercular disease. Tuberculin reaction of > 10mm induration in children with supportive clinical and investigation finding can be diagnostic criteria for presence of active tuberculosis.

Table 3: distribution of cases according to degree of tuberculin reactivity							
Tuberculin reaction	Number of cases(n-218)	Percentage					
Negative (1-5mm)	118	54					
Doubtful(6-10mm)	12	6					
Positive (10-15mm)	42	16					
Positive (16-20mm)	16	7					
Strongly positive (>20mm)	30	14					
Correlation of tuberculin reaction with BCG vaccination							
BCG vaccination	No. of cases	1-5mm		6-10mm		>10mm	
		No.	%	No.	%	No.	%
BCG scar present	204	112	55	12	6	80	39
BCG scar absent	14	6	43	0	0	8	57
$X^2-3.85$ p<0.05 (significant)							

Table 4 showed among 218 children 68 children were exposed to passive smoking and 150 were not exposed. Among exposed children 38% children had positive tuberculin test. 41% children showed positive reaction among non exposed.

Table 4: Showing distribution of cases according to exposure to passive smoking & its correlation of tuberculin reaction

Exposure	No. of cases	Tuberculin Reaction					
		1-5mm		6-10mm		>10mm	
		No.	%	No.	No.	%	No.
Exposed	68	34	50	8	12	26	38
Not exposed	150	84	56	4	3	62	41
	218	118		12		88	

$\chi^2=0.143$ $p>0.05$ (not significant)

Table 5 showed among 218 children who were having contact in family with sputum positive adult of pulmonary tuberculosis, 88 children (40%) had tuberculin reaction more than 10mm indurations suggestive of tubercular infection. Among 88 children 21(23%) had tubercular disease and among disease 12(57%) children had pulmonary tuberculosis, 8 (38%) children had tubercular lymphadenopathy and 1 children has intestinal tuberculosis.

Table 5: Correlation of tuberculin reaction with clinical feature suggestive of tuberculosis

Clinical feature	No. of cases	Tuberculin test		
		1-5mm	6-10mm	>10mm
Fever	38	18		20
Weight loss	22	10		12
Lymphadenopathy	24	16	2	6

Correlation of tuberculin reaction with x-ray chest finding suggestive of tuberculosis

X-ray chest finding			
Primary complex		0	0
Bronchopneumonia		2	0
Consolidation		4	0
Pleural effusion		0	0
Intestinal stricture			2

Incidence of tubercular disease

Tubercular disease	Incidence	
	No. of cases	Percentage
Pulmonary tuberculosis	12	57
Lymph node tuberculosis	8	38
Intestinal tuberculosis	1	5
Total	21	

Discussion

Tuberculosis is continues to be important cause of morbidity and mortality in children worldwide. Childhood tuberculosis is a result of sputum positive pulmonary tuberculosis in adult. A child obtain infection by prolong close contact with an adult who has positive sputum [11,12,13,14]. Tuberculosis in children is paucibacillary and to large extent not associated with impact on the epidemiological situation in community due to small number of smear positive. Diagnosis of childhood tuberculosis is mainly based on clinical and radiological feature supplemented by a positive history of contact and tuberculin test.

Induration to tubercular antigen more than 10mm more in 5-14 year of age group may be because of longer duration of contact with sputum positive adult but Singh M at el (2004) [15], M. Bansal at el observed high incidence of tubercular infection in younger age group. Similar to this study other authors also found prevalence of tuberculosis and tuberculin reactivity is high among lower socioeconomic and severely malnourished group[16,17].

In present study incidence is more common in less than 5 years of age group and male (statistically not

significant), similar result were also seen in other study [19,20,21].

We have observed that the size of indurations varied with nutritional status. This not coincides with hypothesis that severe malnutrition depresses hypersensitivity response to tuberculin test. Present study observed that, those children who were not vaccinated for BCG had more positive reaction as compared to BCG vaccinated children reflecting infection is cause of positive reaction. Lifschitz et al & Singh M et al also observed that more than 10 mm induration reflects positive tuberculin test for infection in children [22].

In this study we have not found any significant difference in transmission of infection between children exposed and not exposed to passive smoking because of about only one third of sputum positive adult male are smoker [10]. Singh M et al found positive correlation. Among children who had tubercular disease, pulmonary tuberculosis was more common than rest [15].

Our recommendation is routine screening of all children in contact with sputum positive adult of PTB and identify this group of child at high risk who should be screened if there of resources and time to screen all family contact.

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