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## ORIGINAL ARTICLE

## Childhood Tuberculosis In A Community Hospital From A Region Of High Environmental Exposure In North India

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## ABSTRACT

Data on the spectrum of childhood tuberculosis at community hospitals in north India is lacking. We conducted a prospective observational study on children attending an outpatient department of a community level hospital in north India to determine the prevalence of tuberculosis in children, and highlight the spectrum of the disease at this level. All consecutive children attending out-patient department (January 15 to June 15, 2004), and diagnosed as probable or confirmed tuberculosis using World Health Organization (WHO) and Indian Academy of Pediatrics (IAP) guidelines were enrolled. The prevalence of tuberculosis, out of total attendances, was found to be 3.5% (95% CI 2.5%- 4.0%). Sixty-seven out of seventy-eight (86%) children were diagnosed to have highly probable tuberculosis while eleven (14%) cases were confirmed (bacteriological or histological) to harbor the disease. The prevalence of extra-pulmonary TB was very high (47.6%). Median duration of symptoms at the time of presentation was 4.5 months. Prevalence of tuberculosis in children at community level hospitals is high (3.5%). Spectrum of disease appears to be the same as that reported from the tertiary level institutions in north India, with almost half of the children presenting with extra-pulmonary tuberculosis, and long delays between onset of symptoms and eventual diagnosis. This highlights the need for strengthening of community hospitals, and more public awareness campaigns, especially in the vulnerable sections of society to control tuberculosis in this part of India.

**Key words:** Children, tuberculosis, community, hospital

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### Introduction

Tuberculosis in children poses major challenges in diagnosis, collection of epidemiological data and serious implications in children less than 5 years by affecting their growth potential, and associated significant morbidity [1], [2], [3]. A literature search of four electronic databases (PUBMED, EMBASE, CINAHAL, Psyc Info) using the key words “childhood tuberculosis” and

India, did not reveal any study on childhood tuberculosis from community hospitals in north India. Spectrum of manifestations of tuberculosis in children at rural and community level hospitals is thus lacking, and only data from the tertiary level care centers and medical schools, or community level surveys on prevalence of infection due to *Mycobacteria tuberculosis* is available [4–16]. We hypothesized that the prevalence of tuberculosis in children attending a community hospital is very high, and studied the epidemiological profile of tuberculosis in children attending out-patient department of a community hospital.

### Setting

The study was based at a 150-bed-registered public trust hospital, in the town of Agra in the

northern state of Uttar Pradesh. The region is known to have a high contact with environmental Mycobacterium [17]. The study hospital caters to people from the vulnerable sections of the society, and adjoins many slums and rural areas. Around 6000 children utilize the outpatient services of the hospital in a year.

## Materials & Methods

All consecutive children and infants attending the out-patient department between January 15 to June 15 with clinical symptoms and signs suggestive of tuberculosis or failure to thrive were investigated for Koch's disease. A detailed clinical history, family history of contact with Koch's disease, and physical examination for each child was recorded in a standardized format. Complete blood count, Mantoux test, and chest skiagram was done for all the cases. Interpretation of Mantoux test and chest skiagram was done using the standardized methods [16], [18], [19]

Fine needle aspiration cytology (FNAC), ultrasound abdomen, hip and spine radiology, abdominal paracentesis, computed tomography (CT) (of relevant systems), lumbar puncture, and other relevant investigations were done to substantiate the diagnosis of tuberculosis. Sputum and gastric aspirate for acid fast bacilli staining (AFB), and culture of FNAC for AFB were also done, whenever possible. Diagnosis of tuberculosis was based on the WHO and IAP guidelines into suspected, probable and confirmed tuberculosis. [20], [21].

## Results

A total of 2424 children excluding newborns attended pediatric out-patient department during the study period. Seventy-eight children had evidence of tuberculosis and received anti-tubercular therapy. Seventy five were diagnosed to have probable tuberculosis while three were confirmed bacteriologically. Four infants had evidence of Koch's disease. The overall prevalence of tuberculosis in the present study was 3.5% (84/2424) [95% CI 2.5%-4.0%]. 65 children (77.3%) were males. There were long delays between the onset of symptoms and presentation (Median 4.5 months, IQR 1 month - 6.5 months). Maximum numbers of children were seen in the age groups 3-5 years 48.8% (38/78) followed by 21.4% (16/78) in the 5-7 years age group. History of contact with family member was present in only 11 cases (13.1%). Only 21 children (25%) had BCG scar. Mantoux test was positive in 73.8% (62/84). Children with BCG

scar had smaller transverse diameters with tuberculin test [Median (range) = 11 mm (5-15 mm) Vs Median (range) 15 mm (11-28 mm)]. AFB could be demonstrated in only three children with lymphadenitis. The only hematological abnormality noticed was normocytic anemia [Mean Hb=9.8 g% (6.2-12.1 g %)]. FNAC revealed granulomatous lymphadenitis in eleven children (62%). All children followed up (78/84) showed clinical improvement, except in two (2.38%) who after initial improvement revealed clinical and radiological deterioration. Maximum numbers of children presented with non-specific symptoms (95%) followed by weight loss (63%) and cough (44%). A significant number of children had short stature (29.7%) (Table/Fig 1). Pulmonary and extra-pulmonary tuberculosis accounted for almost equal number of cases (52.4%, 47.6%). Primary pulmonary complex (26.2%) was the commonest manifestation followed by tuberculous lymphadenitis (16.7%) (Table/Fig 1). Three children with post measles state developed Koch's disease. The commonest type of abdominal Koch's disease was the Ascitic type (4/5), and one child underwent colostomy for intestinal obstruction.

## Discussion

We evaluated the prevalence of tuberculosis in children to be 3.5%, out of total attendances at a community level hospital in north India and highlighted the spectrum of tuberculosis. This is a first report making such an assessment from north India. This information is useful for resource planning and need for availability of better diagnostic tools at community hospitals for effective control of tuberculosis in the region. The higher prevalence in the current series may be because the hospital caters to predominant lower social classes, and it is well known that the prevalence of tuberculosis is higher in lower income groups [22]. Earlier community surveys conducted in the rural areas of south India from 1984-86 has shown a prevalence of infection due to Mycobacteria to be 1.2% in 0-4 yrs, 5.3% in 5-9 yrs and 9.2% in 10-14 years of age [23]. Recent surveys have also shown a similar prevalence [24]. The concerning feature in the present study was the younger age group of children affected. Median age was noted to be 45 months as compared to 84 months from a tertiary institution in north India ( $p < 0.0001$ ). This may be because most of the children were malnourished. However, the age profile was similar to studies from South India [4], [15]. Bacteriological or

histological confirmation has been reported to be in 10-35% in studies at tertiary centers [4], [5], [5], [15]. We could be certain of the diagnosis in 11% of children (three AFB positive and rest had granulomatous lymphadenitis histologically). Mantoux positivity was seen to be very high in the current series (73.8%). This is significantly different from other studies where it is reported in 30-50% [4], [5]. This could be explained by a high level of initial sensitization to Mycobacterium in the region [17]. Transverse diameters were seen to be smaller in BCG vaccinated individuals. This has been well documented in the Meta-analysis done earlier by Wang et al [25].

A history of contact with tuberculosis was given by only 13.1% relatives. This may be because of the non-acceptance by the family members, due to the social stigma attached to the disease. Contact survey for establishing a definite evidence of Koch's in the family members could not be done due to logistic issues. The diagnosis of tuberculosis was established in most cases on the basis of epidemiological knowledge and corroborative evidences. FNAC was a highly useful tool showing granulomatous lymphadenitis in 62% children of tuberculous lymphadenitis. Most common hematological abnormality noted was normocytic normochromic anemia that is consistent with earlier studies. [26].

Spectrum of Tuberculosis was similar to recent studies from tertiary centers with a significant proportion (51-78%) of children presenting with extra-pulmonary tuberculosis [4], [5], [15]. However, workload from a tuberculosis clinic (1966-99) of a major tertiary centre in north India reported extra-pulmonary tuberculosis in only 17% of total cases [20]. A comparison of spectrum of tuberculosis in the present study from studies at tertiary centers is highlighted in Table/Fig 2. Though no data for comparison is available from

community hospitals in India, extra pulmonary tuberculosis has been reported among 37% of newly diagnosed cases of tuberculosis from a 522-bedded community hospital in America. [27].

There were long delays between the onset of symptoms and eventual diagnosis in the present study. An interview with family members of each child was carried out (qualitative research) to gain insight into the long delays between the onset of disease and diagnosis. Various reasons given were, poverty, ignorance, misled by non-qualified rural doctors, female child, neglect due to many children, apprehension of expensive treatment and no faith in primary and secondary health centers.

The present study thus concludes that (i) Prevalence of tuberculosis in children attending OPD at a community level hospital is high (3.5%) (ii) Spectrum of disease appears to be similar from recent studies at tertiary level institutions with almost half of the children presenting with extra-pulmonary tuberculosis with long delays between onset of symptoms and eventual diagnosis.

**Contributions:** PG conceived the study, collected the data, managed the patients, reviewed the literature and drafted the manuscript.

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**Competing interests:** none stated

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**Table/Fig 1**  
**Clinical presentation of children with tuberculosis**

<b>Presenting feature</b>	<b>Symptom</b>	<b>N (%)</b>	<b>Sign</b>	<b>N (%)</b>
<b>Non-Specific</b>	Anorexia	80(95)	Lymphadenopathy	26(31)
	Fever	71(84)	Malnourished	51(61)
	Weight Loss	53(63)	Short Stature	25(30)
	Phlyctenular conjunctivitis	2(2.4)		
<b>Abdominal</b>	Pain abdomen	15(18)	Ascites	4(4.8)
	Chronic Diarrhea	8(9.5)	Doughy Abdomen	3(3.6)
	Diarrhea/Constipation	5(5.9)	Hepato-splenomegaly	5(5.9)
	Abdominal Distension	5(5.9)		
<b>Respiratory</b>	Chronic Cough	37(44)	Chest Signs	20(24)
	Breathing Difficulty	4(4.8)		
<b>Others</b>	Limping Gait	3(3.5)		
	Unconscious	1(1.2)		

**Table/Fig 2**  
**Spectrum of tuberculosis in children in comparison to studies from tertiary centers**

<b>Type of TB</b>	<b>Present study(n=78) N (%)</b>	<b>Kabra* 2004(n=459) N (%)</b>	<b>Vijaysekaran† 2006(n=605) N (%)</b>
<b>Pulmonary</b>	<b>44 (52)</b>	<b>270 (59)</b>	<b>122(20.2)</b>
Symptomatic Mantoux Positive	4 (5.9)	-	-
Post-Primary Lesion	3 (3.6)	-	21(3.5)
Primary Pulmonary complex	22 (26.1)	103(22.4)	101(16.7)
Progressive Pulmonary disease	12 (14)	134(29)	-
Pleural effusion	1 (1.2)	20(4.3)	-
Cavitation	-	5(1.1)	-
Miliary Bronchopneumonia	2 (2.4)	8(1.7)	-
<b>‡Extra-pulmonary</b>	<b>40 (48)</b>	<b>189 (41)</b>	<b>483(79.8)</b>
Tuberculous Lymphadenitis	15 (16.7)	122(26.5)	117(19.3)
Disseminated tuberculosis	6 (7.1)	23(5.0)	-
Neuro-tuberculosis	6 (5.9)	12(2.6)	245(40.4)
Osteo-articular	6 (7.1)	12(2.6)	99(16.4)
Phlyctenular & Mantoux positive (Symptomatic)	2 (2.4)	-	-
Abdomen Koch's	5 (5.9)	10(2.1)	22(3.6)
Others	-	10(2.1)	-

- Ref No.5, Experience from north India, † Ref No.4, Experience from south India, ‡ 2 children with normal chest X-ray, Mantoux negative, on clinical symptoms were given trial of ATT, and showed significant clinical improvement

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