

# Study of Practice under Field Condition of the Tracing of the Children Contact of Sputum Positive Pulmonary Tuberculosis Cases in Patiala, Punjab

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## ABSTRACT

**Background:** Tuberculosis, an infectious disease caused by mycobacterium tuberculosis and spread through the air, is the leading infectious cause of death worldwide. Young children living in close contact with a case of smear positive pulmonary TB (PTB) are at higher risk of Mycobacterium tuberculosis infection and TB disease. The present study is being planned to study the proportion of childhood contact of sputum positive cases that were not registered was be collected.

**Methods:** This was a descriptive cross sectional study conducted on household contact child of sputum positive pulmonary tuberculosis patients initiated on the anti tubercular treatment in and around district Patiala enrolled during the time period of one year. Proportion of children <6 years of age, whose house was visited but not examined was noted. Proportion of children who were contact of sputum positive case and whose house was visited, contact trace, data regarding diagnosis latent/active tuberculosis and their management was recorded. **Results:** Out of 400 patients 211 (52.75%) were males and 189 (47.25%) females. Total 358 (69.65%) out of 514 were interviewed by PHW visitors. Out of 514 child contacts, 6 (1.17%) of the contacts were active EPTB, 22 (4.28%) of the contacts were active PTB and 28 (5.45%) of the contacts were LTBI. **Conclusion:** The present study concludes that contact tracing is poorly implemented in the rural areas as compared to urban areas. Child contacts in rural areas were less likely to be evaluated and initiated on IPT due to less home visit by health staff and perception about IPT that drugs were not necessary when child was healthy.

**Keywords:** Sputum, Tuberculosis.

## INTRODUCTION

Tuberculosis, an infectious disease caused by mycobacterium tuberculosis and spread through the air, is the leading infectious cause of death worldwide. Although tuberculosis is curable, diagnostic methods for tuberculosis are imperfect and perform poorly in children because of difficulties obtaining samples and low bacillary loads.<sup>[1]</sup> Infection with *M. tuberculosis* usually results from inhalation into the lungs of infected droplets produced by someone who has pulmonary TB and who is coughing. The source of infection of most children is an infectious adult in their close environment (the household). This exposure leads to the development of a primary parenchymal lesion (Ghon focus) in the lung with spread to the regional lymph node.<sup>[2]</sup> Following exposure, the risk that a child will develop *M. tuberculosis* infection will be influenced by the infectiousness of the source case, the duration of the interaction, the intensity of the

interaction, the infectiousness of the organism, and the immunology of the child.<sup>[3]</sup> Source cases are more infectious if they are sputum smear positive compared to sputum smear-negative. The bacterial load in the sputum influences infectivity, higher bacterial loads are associated with increased risk of transmission.<sup>[4]</sup> The immune response stops the multiplication of *M. tuberculosis* bacilli. However, a few dormant bacilli may persist. A positive tuberculin skin test would be the only evidence of infection. In some cases, the immune response is not strong enough to contain the infection and disease occurs within a few months.<sup>[2]</sup> The diagnosis of TB in children relies on careful and thorough assessment of all the evidence derived from a careful history, clinical examination and relevant investigations, e.g. TST, chest X-ray (CXR) and sputum smear microscopy. The best way to detect TB infection is the TST, and CXR is the best method to screen for TB disease among contacts.<sup>[2]</sup> Routine HIV testing should be offered to all patients with presumptive and diagnosed TB.<sup>[5]</sup>

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### Recommended approach to diagnose TB in children

1. Careful history (including history of TB contact and symptom consistent with TB)

2. Clinical examination (including growth assessment)
3. Tuberculin skin testing
4. Bacteriological confirmation whenever possible
5. Investigations relevant for suspected pulmonary TB and suspected extra-pulmonary TB
6. HIV testing.<sup>[2]</sup>

Young children living in close contact with a case of smear positive pulmonary TB (PTB) are at higher risk of Mycobacterium tuberculosis infection and TB disease.<sup>[6]</sup> The World Health Organization (WHO) recommends screening household contacts of an infectious source case to identify children with TB disease, and enable their prompt treatment, and to provide children who do not have TB disease with Isoniazid Preventive Treatment (IPT). Daily Isoniazid (INH) for at least 6 months given as preventive therapy to young children has been shown to greatly reduce the likelihood of the child developing TB disease during childhood.<sup>[7]</sup> As per India's Revised National Tuberculosis Control Programme (RNTCP) guidelines, all household contacts of sputum smear positive pulmonary tuberculosis patients are to be screened for TB disease. In the absence of active TB disease, contacts aged less than 6 years are eligible for 6 months of daily IPT (with 10 mgs INH per Kg body weight per day).<sup>[8]</sup> Isoniazid Preventive Therapy is the administration of INH to individuals with latent TB infection in order to prevent progression to active TB Disease. Isoniazid is the most effective bactericidal drug currently available. It protects both against progression of latent TB infection (LTBI) to active disease (reactivation) as well as from reinfection when exposed to active TB case.<sup>[9]</sup> Responsibility for contact tracing and subsequent management lay with the same health-care worker who registers and/or supervises treatment of the source case. This health-care worker could then also provide isoniazid preventive therapy or treatment to the children. This is likely to be more convenient for the household or family and to improve compliance by all. As a way of alerting the health worker to request that all eligible children come for screening.<sup>[7]</sup> In case children contact of sputum positive case are not traced or not diagnosed properly to be suffering from latent/active TB Then there is likely hood that those screened children contact who are traced after active surveillance will might lose the opportunity of INH chemoprophylaxis similarly those who are diagnosed as the case of active TB after investigating there may either keeps on getting the wrong INH chemoprophylaxis or may be missed or denied to initiated a proper anti tubercular treatment. Keeping in view of the children may be missed of INH chemoprophylaxis or ATT. The present study is being planned to study the proportion of childhood contact of sputum positive cases that were not registered was be collected. Proportion of children <6

years of age, whose house was visited but not examined was noted. Proportion of children who were contact of sputum positive case and whose house was visited, contact trace, data regarding diagnosis latent/active tuberculosis and their management was recorded.

#### Aims and Objectives

1. To find out total number of contact of children <6 year of age among household sputum positive pulmonary tuberculosis patient.
2. To find out proportion of the contact who were traced by the peripheral health worker.
3. To find out the proportion of cases of the children with latent tuberculosis or suffering from active pulmonary tuberculosis / Extra pulmonary tuberculosis.
4. To find out proportion of the Active Tuberculosis contact cases diagnosed and managed.

### **MATERIALS AND METHODS**

This was a descriptive cross sectional study conducted on household contact child of sputum positive pulmonary tuberculosis patients initiated on the anti tubercular treatment in and around district Patiala enrolled during the time period of one year from 1/6/2017 to 31/5/2018. This study was conducted in the two TU's each catering to the population of about 5 lacs (one urban TU which is attached to the department of Pulmonary Medicine, Govt Medical College, Patiala, and one rural TU situated at district Patiala).

There were 7 Tuberculosis Unit (TU) in the Patiala district. A sampling frame of all TU's both urban and rural TU was prepared and by using simple random sampling technique, 2 TU's (one urban and one rural) were selected by using lottery method from that the list of 7 TU's. In the 2 selected TU's based on previous average of three years data, there were an average 300 new patients per year who were put on ATT on sputum positive basis in the selected urban TU and 100 patients in the rural TU. So approximately 400 new patients per year were put on ATT. Based on this data approximately 400 patient were taken for the study in two selected TU's (urban TU =300 and rural= 100 patients). Since all the patients are taken from two selected TU so whole sampling frame sputum of sputum smear positive patients who were put on ATT based on sputum test were taken in the study period of one year.

The list of sputum positive cases those were registered at urban TU Patiala and rural TU were enrolled for the study after exclusion and inclusion criteria. All the sputum positive patients household contact children below <6 year of age were registered for study after obtaining a valid consent from parents/guardian of the contacts.

Proportion of sputum positive cases contacts that were not registered by the DOTS provider/test

supporter were collected. Proportion of children <6 years of age, whose house was visited but not examined was noted. Proportion of children who were contacts of sputum positive case and whose house was visited, contact traced, data regarding diagnosis latent /active tuberculosis and their management was recorded.

#### **Inclusion Criteria**

- Children <6 year household contacts of sputum smear positive tuberculosis patients.

#### **Exclusion criteria:**

- Parents/guardian of the contacts who did not give consent for the study
- Parents/guardian of the contacts who did not come for evaluation.
- Sputum negative pulmonary tuberculosis patient. All extra pulmonary tuberculosis patients (Pleural effusion, Patient with cervical, axillary, inguinal lymph node, Ascites, Meningitis, Caries Spine, Abdominal Koch's, CECT chest suggestive of mediastinal lymph node).

## **RESULTS**

**Table 1: Age Distribution of the Patients**

Age (in yrs)	No. of Patients	%age
< 19	25	6.25%
20 - 39	197	49.25%
40 - 59	101	25.25%
60 - 79	73	18.25%
80 - 99	3	0.75%
> 100	1	0.25%
Total	400	100%

**Table 2: Gender Distribution of the Patients**

Gender	No. of Patients	%age
Female	189	47.25%
Male	211	52.75%
Total	400	100%

**Table 3: Interview of Child Contacts by PHW during Visit**

Interviewed	No. of Patients	%age
Yes	358	69.65%
No	156	30.35%
Total	514	100%

Out of 400 sputum positive pulmonary tuberculosis patients included in the study, 25 (6.25%) patients were in the age group of <19 years, 197 (49.25%) patients were in the age group of 20-39 years, 101 (25.25%) patients were in the age group of 40-59 years, 73 (18.25%) patients were in the age group of 60-79 years, 3 (0.75%) patients were in the age group of 80-99 years and 1 (0.25%) were in the age group of 100 years and above. The maximum number of patients were in age group 20-39 197 (49.25%). [Table 1]

**Table 4: Mantoux test in Child Contacts**

Mantoux Test	No. of Patients	%age
Yes	165	32.10%
No	349	67.90%
Total	514	100%

Out of 400 patients 211 (52.75%) were males and 189 (47.25%) females. Thus there was male preponderance. [Table 2] Total 358 (69.65%) out of 514 were interviewed by PHW visitors. [Table 3] Out of 514 child contacts the mantoux test was done for 32.10%, [Table 4] Out of 514 child contacts, 6 (1.17%) of the contacts were active EPTB, 22 (4.28%) of the contacts were active PTB and 28 (5.45%) of the contacts were LTBI. [Table 5] Out of 514 child contacts, 28 (5.45%) were taken ATT, 358 (69.65%) were taken isoniazid preventive therapy and 128 (24.90%) child contact did not receive isoniazid preventive therapy. [Table 6]

**Table 5: Diagnosis of Active Extra Pulmonary Tuberculosis, Active PTB and Latent Tuberculosis Infection in Child Contacts**

Diagnosis	No. of Patients	%age
Active EPTB	6	1.17%
Active PTB	22	4.28%
LTBI	28	5.45%
Total	514	100.00 %

**Table 6: Isoniazid Preventive Therapy (IPT) and Antitubercular Treatment (ATT) in Child Contacts**

IPT/ATT	Frequency	Percent
ATT	28	5.45%
IPT Yes	358	69.65%
IPT No	128	24.90%
Total	514	100%

## **DISCUSSION**

In present study sputum smears positive pulmonary tuberculosis cases found in 52.75% of male and 47.25% of female. This fact is concordance with other studies by Kone et al,<sup>[11]</sup> Triasih et al,<sup>[12]</sup> and Pothukuchi et al.<sup>[8]</sup> In the study done by Kone et al,<sup>[11]</sup> (2016) where a total of 412 patients were taken in which 53% were male and 47% were female. In study by Triasih et al,<sup>[12]</sup> (2015) a total of 141 patients were taken in which 62.4% were male and 37.6% were female. In study by Pothukuchi et al,<sup>[8]</sup> (2011) a total of 825 patients were taken in which 76% were male and 24% were female. In this study number of male patient is more than female patients that is similar with our study.

In our study number of child contacts which interviewed was 69.65% (358/514). This fact is in concordance with study by Kone et al (2016),<sup>[11]</sup> a total of 412 child contacts were taken in which 71% (291) were interviewed, that is similar with our study.

In study by Kone et al,<sup>[11]</sup> (2016) a total of 639 child contacts were taken in which 339 examined and IPT was finally administered to 64% of them. In study by

Pothukuchi et al,<sup>[8]</sup> (2011) a total of 172 child contacts were taken. Of them 97(56.39%) contacts were initiated on IPT. In study by Okwara et al,<sup>[13]</sup> (2017) a total of 428 child contacts were taken. Of them 414 (96.72%) contacts were initiated on IPT. In study by Garie et al,<sup>[14]</sup> (2011) a total of 82 child contacts of < 5 year age were taken. Of them 27 (33%) contacts were initiated on IPT. In study by Birungi et al,<sup>[15]</sup> (2018) a total of 94 child contacts of < 5 year age were taken. Of them 84 (89.3%) contacts were initiated on IPT. In study by Singh et al,<sup>[16]</sup> (2017) a total of 59 child contacts of < 6 year age were taken. Among them 51 were contacted and 19 of 51 (37%) were screened for TB. 11 of 50 (22%) children were started IPT. Comparable to above mentioned studies, in our study the number of child contacts which were initiated on isoniazid preventive therapy (IPT) was 69.65% (358/514). In study by Marks et al,<sup>[17]</sup> (2000) a total of 35 (5%) out of 705 children age <5 year were of active tuberculosis. In study by Singh et al,<sup>[16]</sup> (2017) a total of 19 out of 59 children age <6 year were screened for TB and 1 had TB. Total percentage of active tuberculosis in screened child contacts was 5.26%. In study by Hall et al,<sup>[18]</sup> (2015) a total of 255 child contacts were taken among them 9 (3.5%) with active tuberculosis. In study by Singh et al,<sup>[19]</sup> (2005) a total of 281 child contacts were taken among them 9 (3.2%) with active tuberculosis. In study by Okwara et al,<sup>[13]</sup> (2017) a total of 428 child contacts were screened among them 14 (3.2%) had evidence of tuberculosis. In concordance to findings of above studies, in our study 28 (5.44%) out of 514 child contacts were of active tuberculosis, among them 6 (1.17%) of the contacts were active EPTB, 22 (4.28%) of the contacts were active PTB. In the present study, mantoux test was done in 165 (32.10%) out of 514 child contacts, in which 28 (17%) child contacts were positive for mantoux test. This fact is in concordance with studies by Marks et al,<sup>[17]</sup> Sharma et al,<sup>[20]</sup> and Singh et al.<sup>[31]</sup> In study by Marks et al,<sup>[17]</sup> (2000) a total of 148 (21%) out of 705 children age <5 year were positive for mantoux test. In study by Sharma et al,<sup>[20]</sup> (2018) a total of 190 child contacts were taken, mantoux test was positive in 13.7%. In study by Singh et al,<sup>[19]</sup> (2005) a total of 281 child contacts were taken among them mantoux test was positive in 95 (33.8%). In study by Kone et al,<sup>[11]</sup> (2016) a total of 639 child contacts were taken in which 339 (53.05%) were examined. In study by Singh et al,<sup>[16]</sup> (2017) a total of 59 child contacts were taken out of which 51 were contacted. Among them, 19 (37%) out of 51 were examined. In study by Adjobimey et al,<sup>[21]</sup> (2016) did a study to assess the feasibility and results of integrating a programme of isoniazid preventive therapy (IPT) in children aged <5 years exposed to TB from January 2013 to June 2014, 496 children were examined among 499 notified contacts. In our study, comparable results were

found as a total of 397(77.2%) child contacts out of 514 were examined.

## CONCLUSION

The present study concludes that contact tracing is poorly implemented in the rural areas as compared to urban areas. Child contacts in rural areas were less likely to be evaluated and initiated on IPT due to less home visit by health staff and perception about IPT that drugs were not necessary when child was healthy. There is a low TB awareness in case of child contacts among rural health care worker as compare to urban health care worker. For improvement in contact tracing there should be parents counseling, health worker training, simplify screening procedure and regular drug supply. There is a need to improve contact tracing, increase involvement of chest physicians, medical office and pediatric specialists in screening of child contacts of sputum positive pulmonary tuberculosis patients, and use of rapid diagnostic test for ruling out active TB so as to strengthen the national tuberculosis control programme.

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