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Original Article

Paediatrics Section

Screening for Latent and Active Tuberculosis in Paediatric Contacts of Tuberculosis Patients: A Cross-sectional Study

GURSHARAN SINGH NARANG[1], PREETI MALHOTRA[2], RAHUL PURI[3], ASHWANI KUMAR[4]

ABSTRACT

Introduction: Globally, World Health Organisation (WHO) estimate suggests that, one million cases of Tuberculosis (TB) occur among children (approximate 10% of the total 9.6 million TB cases). As per Revised National Tuberculosis Control Programme (RNTCP), high importance and priority is given to the household contacts and paediatric age group (especially <6 years). Since, transmission can happen at any time from index case to the contact (before diagnosis or during treatment), all contacts of TB patients should be screened.

Aim: To focus on the screening of paediatric contacts of TB positive patients by Mantoux test and to find out active and latent TB.

Materials and Methods: A cross-sectional study was conducted in the Department of Paediatrics at Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar, Punjab, India. The duration of the study was 16 months, from February 2020 to June 2021. Participants, who were proven cases, either sputum positive or clinically diagnosed and were less than 18 years of age were included. Contacts in whom Isoniazid Preventive Therapy (IPT) had been started were excluded. The candidates who tested Mantoux positive and had symptoms of TB were further screened by following test chest X-ray, Ultrasonography (USG) abdomen, Microscopy for Acid Fast Bacilli (AFB), Cartridge Based Nucliec Acid Amplification Test (CBNAAT), Cerebrospinal Fluid (CSF) analysis and contrast Magnetic Resonance Imaging (MRI). The data collected was analysed statistically with Statistical Package for Social Sciences (SPSS) version 26.0 and the level of significance was determined p-value <0.05 as insignificant, p-value >0.05 as significant and p-value <0.001 as highly significant.

Results: A total of 82 contacts were included. Out of these, 60 children had no organ system involvement, whilst 11 had lymphadenopathy, five had respiratory involvement and six had abdominal involvement. Out of 82 contacts, 23 children tested Mantoux positive and 59 tested negative. Out of 23 Mantoux positive contacts 16 (19.51%) had latent TB and only 1 (2.44%) had active TB.

Conclusion: A significant number of children in contact with TB positive patients were found to have latent TB, and it is possible that, there can be activation from latent to active TB later on in these children.

Keywords: Extrapulmonary, Isoniazid, Mantoux, Paucibacillary, Pulmonary

INTRODUCTION

The tuberculosis is a communicable disease, that is a major cause of ill health, one of the top10 causes of death worldwide and the leading cause of death from a single infectious agent (ranking above Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) [1]. It is caused by the bacillus Mycobacterium Tuberculosis (MTB), which is spread when people who are sick with TB expel bacteria into the air; for example, by coughing. It typically affects the lungs (pulmonary TB) but, can also affect other sites (extrapulmonary TB). About a quarter of the world's population is infected with MTB and thus, at risk of developing TB disease [1]. Globally, WHO estimated that one million cases of TB occur among children (approximate 10% of the total 9.6 million TB cases) with 233,000 deaths based on an extrapolation from estimates of adult TB [1]. In India, an estimated 2.2 lac children become ill with TB each year (22% of global TB burden) [2]. It is also known that, about 10% of the cases reported to RNTCP are from children under 14 years of age [3]. Recently, childhood TB is gaining more attention as it contributes considerably to childhood morbidity and mortality and there have been several research agendas and calls to action for childhood TB [3]. Following inhalation to the lungs, MTB bacilli may disseminate to other organs via haematogenous spread, causing Extra Pulmonary TB (EPTB) [3].

Children often have an atypical clinical presentation (including extra-pulmonary disease) and the classical triad of adult TB: cough, night sweats and weight loss is often absent [2]. Constitutional symptoms may include failure to thrive and reduced playfulness, absenteeism from school; low grade or intermittent fever is less frequently seen [2]. For children with suspicion of pulmonary TB, the usual presenting symptoms are a persistent, non remitting cough or wheeze that is unresponsive to the treatment for an alternative cause (e.g., bacterial pneumonia) [2]. Secondly, collection of good quality specimens for diagnosing childhood TB is challenging [2]. For Pulmonary Tuberculosis (PTB) suspects, expectorated sputum is not always available in young children because, they may not produce sputum or swallow their sputum [2]. A gastric aspirate is therefore, recommended for those who are unable to expectorate sputum, but the gastric aspiration procedure requires overnight fasting, hospital admission and is invasive [2].

With current diagnostics, even with optimal conditions, the TB confirmation rate is extremely low, due to the difficulty to collect the appropriate specimen and the low bacterial load (paucibacillary) in paediatric specimens [4]. Therefore, childhood TB treatment is often empiric without laboratory evidence, resulting in both over and under-diagnosis [4]. In RNTCP, screening of contacts has been an important function with programmatic monitoring [4]. The national strategic plan for TB elimination 2017-2025 has bold strategies where in contact tracing will be made more rigorous, expansive and accountable [4]. The expected end results are that, contacts of most of the TB patients will be screened with more secondary cases being detected and treated [4]. They gave high importance and priority to the household contacts and paediatric age group (especially <6 years) [4]. Since, transmission can happen at any time from index case to the contact (before diagnosis or during treatment), all

contacts of TB patients should be screened [4]. Accurate and rapid diagnosis are the keys to control the disease, yet, the traditional tests for TB produce results that are either inaccurate or take too long time to be definitive [5]. A fast and reliable diagnostic method that would differentiate between active and Latent TB Infection (LTBI) is also lacking, especially in case of paediatric population [5]. Currently, diagnosis of pulmonary TB in India is primarily based on smear microscopy results, with provision for clinical and radiography based diagnosis for those whose sputum smear results are negative [5].

The risk of infection with TB {as measured by Tuberculin Skin Test (TST)} is greatest if the contact is close and with a case of sputum smear-positive disease [3]. This illustrates that child contact screening is important especially for close contacts of sputum smear-positive cases because, they have such a high risk of infection [3]. Contact history (including closeness and type of source case of TB disease) is important for children with suspected TB disease [3]. In resource-limited settings, the focus of contact screening is on contacts of smear-positive cases because of greater risk and limited capacity for screening [3]. However, cases of smear-negative pulmonary TB can also transmit infection [3]; study suggest that, increased grades of smear positivity of source case is associated with increased risk of infection in child contacts [3]. Children upto five years of age, who are close contacts of a microbiologically confirmed pulmonary TB patient within the past three months, should be evaluated for active TB by a medical officer/paediatrician [3]. After excluding active TB he/she should be given Isoniazid preventive therapy (INH) irrespective of their BCG or nutritional status [3]. Persistent bacterial viability is seen in LTBI, however, there is no proof of clinically active TB and the host stays asymptomatic [6]. Therefore, one of the ways to control TB is to consider treating all LTBIs [6]. Children are prone to acquire tubercular infection while living with adult TB patients, who are sputum smear-positive making contact tracing is an important tool to control tubercular infection in the community [7]. The present study focussed on the screening of paediatric contacts of TB positive patients for active and latent TB.

MATERIALS AND METHODS

A cross-sectional study was conducted in the Department of Paediatrics at Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar, Punjab, India. The duration of the study was 16 months, from February 2020 to June 2021. Approval of Institutional Ethics Committee was taken prior to the study (SGRDU/cont/thesis/20826).

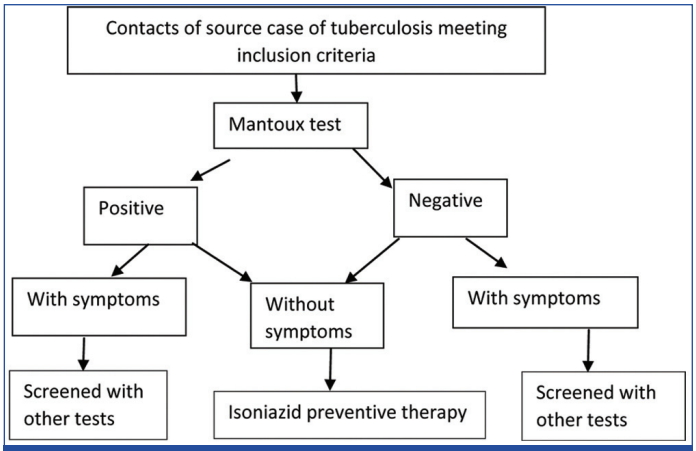
Inclusion criteria: Paediatric contacts of TB positive patients (proven cases either sputum positive or clinically diagnosed) registered in chest and TB department who were less than 18 years of age included in the study.

Exclusion criteria: Contacts in whom IPT had been started were excluded.

Sample size was not calculated and it was a duration based study. All patients reporting during the study period were considered as source cases.

Study Procedure

The candidates who tested Mantoux positive and had symptoms of TB were further screened by following test chest X-ray, USG abdomen, microscopy for AFB, CBNAAT, CSF analysis and contrast MRI [Table/Fig-1]. Mantoux test also called Tuberculin skin tests (TST) is an intradermal injection of Purified Protein Derivative (PPD). It is an immunological test that elicits delayed type hypersensitivity. A standard dose of 2 Tuberculin Units (2TU) was administered intradermally and induration was noted in 48-72 hours later. An induration of atleast 10 mm was considered positive. In HIV co-infected cases, severe malnourished and immune compromised cases 5 mm might be taken as the cut off [3]. The candidates who tested Mantoux positive and had symptoms of TB were further screened by following test:



[Table/Fig-1]: Method of selection.

- Chest X-ray PA view was done for finding such as military pattern, hilar and/or paratracheal lymphadenopathy with or without parenchymal involvement and fibrocavitary lesions. Specificity of these radiological findings increases in a child with TB symptoms and positive TST. All presumptive TB cases with these radiological patterns were considered probable TB and subjected to microbiology to confirm the diagnosis. In a case, microbiological investigations come out to be negative these children were considered cases of clinically diagnosed TB [8].
- USG abdomen was done and features like lymphadenopathy, peritoneal thickening, omental thickening, bowel wall thickening and ascites were looked for [8].
- Microscopy for Acid Fast Bacilli (AFB)- two samples of at least 1 mL gastric lavage or induced sputum were sent for microscopy 24 hours. Sputum smears after Ziehl-Neelsen staining was examined under oil immersion microscopy [8]. A minimum of one slide positive even for single AFB/100 fields was taken as positive for MTB and a minimum of two sputum samples negative for AFB evaluated for 100 fields were declared as negative [8].
- Cartridge Based Nucliec Acid Amplification Test (CBNAAT)- 1 mL of sputum or gastric lavage sample was collected in sterile container. The sample was diluted with three times the reagent (lysis buffer-NaOH+isopropyl alcohol), incubated at room temperature and loaded into the cartridge for automated analysis with results in 100 minutes. Detection of mycobacteria and rifampicin resistance were carried out in the same setting [8].
- Cerebrospinal Fluid (CSF) analysis (wherever necessary)- CSF was checked for leucocyte counts ranging from 10 to 500 cells/mm^3 (occasionally higher) (majority lymphocytes), glucose below 40 mg/dL (CSF glucose/blood glucose below 0.5 and protein (more than 100 mg/dL) [8].
- Contrast MRI (wherever required)- MRI could be done for finding the abnormalities such as, meningeal enhancements, infarcts and tuberculomas especially of lesions involving the brains stems [8].

Latent Tuberculosis (LTB)- Persons with LTBI do not feel sick and do not have any symptoms. They are infected with MTB, but do not have TB disease. The only sign of TB infection is a positive reaction to the tuberculin skin test or TB blood test. Persons with LTBI are not infectious and cannot spread TB infection to others [2].

Active Tuberculosis (ATB)- In some children, TB bacteria overcome the defences of the immune system and begin to multiply, resulting in TB disease [9].

A close contact is defined as living in the same household or in frequent contact with a source case (e.g., care giver) with sputum smear-positive TB. Source cases, who are sputum smear-negative but culture-positive are also infectious, but to a much lesser degree [9].

These contacts were screened and were subjected to detailed history taking, clinical examination and investigations. At the end of the study, all the data was collected and statistically analysed.

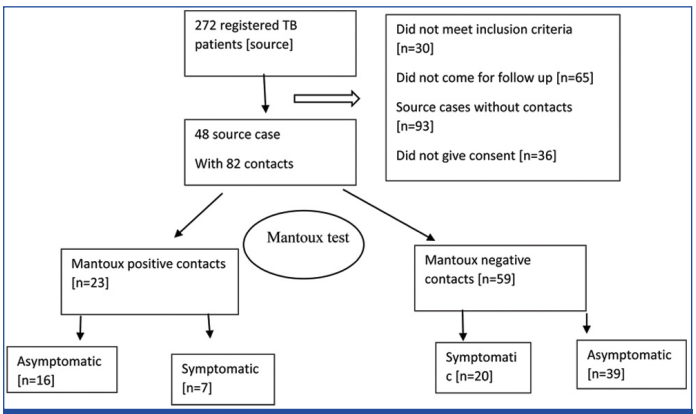
STATISTICAL ANALYSIS

The data collected was analysed statistically with SPSS version 26.0 to draw relevant conclusions. For non parametric data, Chi-square test was applied. The level of significance was determined as its 'p-value' with p-value >0.05 as insignificant, p-value <0.05 as significant and p-value <0.001 as highly significant.

RESULTS

A total of 272 TB positive patients were registered in Directly Observed Therapy (DOTS) centre for TB treatment. Among these only 48 source cases met the inclusion criteria (93 source cases did not have any contacts, 30 did not have any paediatric contacts, 65 did not come for follow-up, 36 did not give consent) [Table/Fig-2].

A total of 82 contacts of these source cases were included in the study [Table/Fig-2].



[Table/Fig-2]: Flowchart showing case distribution in different steps of the procedure.

Mantoux test was performed on contacts who fit in inclusion criteria and 23 (28.05%) were found to be positive and 59 (71.95%) were found to be negative [Table/Fig-2]. Out of 23 Mantoux positive contacts 13 had an induration of 10 to 15 mm, nine contacts had induration of >15 mm, while only one contact had a reaction of 10 mm. The mean size of induration was 14.1±4.45 mm. Out of Mantoux positive contacts males constituted 14 (60.89%) and females constituted 9 (39.13%), while in Mantoux negative contacts 28 (47.54%) were females and 31 (52.54%) were males. Maximum number of Mantoux positive contacts belonged to age group <5 years (10, 43.47%) followed by 6-11 years (9, 39.13%) and least number belonged to 11-18 years (4, 17.39%) age group. While in Mantoux negative contacts maximum number belonged to 11-18 years (25, 42.37%) age group, while 19 (32.2%) belong to 6-10 years age group and 15 (25.42%) belonged to <5 years age. Mean age of all contacts was 8.51±4.55 years. Out of 23 Mantoux positive contacts 17 (73.91%) belonged to rural area while 6 (26.08%) belonged to urban area. In 59 Mantoux negative contacts 33 (55.93%) belonged to rural area while 26 (44.06%) belonged to urban area. Difference was statistically insignificant (p-value=0.133) [Table/Fig-3].

Variables	MANTOUX			p-value
	Positive n (%)	Negative n (%)	Total	
Rural	17 (73.91%)	33 (55.93%)	50	0.133
Urban	6 (26.08%)	26 (44.06%)	32	
Total	23	59	82	

[Table/Fig-3]: Demographic profile of Mantoux positive and negative contacts.
Statistical test: Chi-square test (χ^2) p-value >0.05 as insignificant, <0.05 as significant and <0.001 as highly significant

A 2 (28.6%) out of 7 symptomatic Mantoux positive contacts had chest radiograph suggestive of TB while, 6 (37.5%) out of 16 asymptomatic Mantoux positive contacts had a chest X-ray suggestive of TB. Out of 20 symptomatic Mantoux negative contacts chest X-ray was done of seven contacts and five were suggestive of TB [Table/Fig-4].

Chest X-ray	Mantoux positive (n=23)		Mantoux negative (n=59)	
	Symptomatic	Asymptomatic	Symptomatic	Asymptomatic
Not done	0 (0.0%)	0 (0.0%)	13 (65%)	39 (100%)
Suggestive	2 (28.6%)	6 (37.5%)	5 (25%)	0 (0.0%)
Not suggestive	5 (71.4%)	10 (62.5%)	2 (10%)	0 (0.0%)
Total	7 (100%)	16 (100%)	20 (100%)	39 (100%)
p-value	0.848		<0.001**	

[Table/Fig-4]: Chest radiograph findings in contacts (n=82).
Statistical test: Chi-square test (χ^2) p-value >0.05 as insignificant, <0.05 as significant and <0.001 as highly significant

Out of 23 Mantoux positive contacts CBNAAT of gastric lavage/induced sputum sample was done for 19 (82.6%) patients MTB was detected in only 1 (4.3%). Out of 20 symptomatic Mantoux negative contacts CBNAAT of gastric lavage/induced sputum sample was done for only 6 (30%) and MTB was detected in only 1 (5%) contact [Table/Fig-5].

CBNAAT	Mantoux positive		Mantoux negative	
	Asymptomatic number (%)	Symptomatic number (%)	Asymptomatic number (%)	Symptomatic number (%)
Not done	4 (25.0%)	0 (0.0%)	39 (100.0%)	13 (65.0%)
Not detected	12 (75.0%)	6 (85.7%)	0 (0.0%)	6 (30.0%)
Detected	0 (0.0%)	1 (14.3%)	0 (0.0%)	1 (5.0%)
Total	16 (100.0%)	7 (100.0%)	39 (100.0%)	20 (100.0%)
p-value	0.128		<0.001**	

[Table/Fig-5]: CBNAAT in Mantoux positive contacts.
Statistical test: Chi-square test (χ^2) p-value >0.05 as insignificant, <0.05 as significant and <0.001 as highly significant

Out of 23 Mantoux positive contacts, 4 (17.39%) contacts had lymphadenopathy. Out of seven symptomatic Mantoux positive contacts one had left-sided cervical lymphadenopathy while two had right-sided cervical lymphadenopathy. Only one asymptomatic Mantoux positive contact presented with bilateral cervical lymphadenopathy. In all the screened contacts, respiratory system involvement was in 6 (7.31%), abdominal involvement was in 5 (6.09%), lymphnode involvement was in 11 (13.4%). None of the contacts had involvement of CNS, skeletal system [Table/Fig-6].

Systemic examination	MANTOUX			Percentage (%)
	Positive	Negative	Total	
Abdomen	2	3	5	6.09
Respiratory	2	4	6	7.31
CNS	0	0	0	0
Lymph nodes	4	7	11	13.4
Bone/skeletal system	0	0	0	0
No organ system involved	15	45	60	73.17
Total	23	59	82	100.0
p-value	0.551			

[Table/Fig-6]: Organ system involvement in contacts.
Statistical test: Chi-square test (χ^2) p-value>0.05 as insignificant, <0.05 as significant and <0.001 as highly significant

Ultrasound abdomen was done of all symptomatic Mantoux positive contacts out of which all were normal. Out of 20 symptomatic Mantoux negative contacts USG abdomen was done for five out of which three came out to be normal. One had mesenteric lymphadenopathy while one had ilial wall thickening. USG abdomen was also performed in contacts [Table/Fig-7].

USG abdomen	Mantoux positive		Mantoux negative	
	Asymptomatic	Symptomatic	Asymptomatic	Symptomatic
	Number (%)	Number (%)	Number (%)	Number (%)
Not done	16 (100.0)	0	39 (100.0)	15 (75.0)
Lymphadenopathy	0	0	0	1 (5.0)
Peritoneal/omental thickening	0	0	0	0
Bowel wall thickening	0	0	0	1 (5.0)
Normal/non significant	0	7 (100.0)	0	3 (15.0)
Total	16 (100.0)	7 (100.0)	39 (100.0)	20 (100.0)
p-value	<0.001**		0.013*	

[Table/Fig-7]: USG abdomen in contacts.
Statistical test: Chi-square test (χ^2) p-value >0.05 as insignificant, <0.05 as significant and <0.001 as highly significant

Out of seven symptomatic Mantoux positive contacts 4 (57.14%) had grandparents as source case and 2 (28.57%) had parents as their source, while in symptomatic Mantoux positive contacts 8 (50%) had parents and 3 (18.75%) siblings as their source case. Out of 20 symptomatic Mantoux negative contacts maximum had parents 10 (50.0%) as source case followed by siblings 5 (25.0%). Also, in asymptomatic Mantoux positive contacts maximum had parents 20 (51.2%) followed by siblings 13 (33.4%) as their source case [Table/Fig-8]. In the present study, out of 23 Mantoux positive contacts 16 (19.51%) had latent TB and only 1 (2.44%) had active TB.

Relation with contact	Montoux positive		Montoux negative	
	Asymptomatic	Symptomatic	Asymptomatic	Symptomatic
	Number (%)	Number (%)	Number (%)	Number (%)
Siblings	3 (18.75)	0	13 (33.4)	5 (25)
Parents	8 (50.0)	2 (28.57)	20 (51.2)	10 (50)
Grandparents	3 (18.75)	4 (57.14)	6 (15.4)	4 (20)
Uncle	2 (12.5)	1 (14.3)	0	1 (5)
Total	16 (100.0)	7 (100.0)	39 (100.0)	20 (100.0)
p-value	0.240		0.489	

[Table/Fig-8]: Relation of source with contacts.
Statistical test: Chi-square test (χ^2) p-value >0.05 as insignificant, <0.05 as significant and <0.001 as highly significant

DISCUSSION

In developing countries like India, TB is an important cause of morbidity and mortality among children [10]. Because of the paucibacillary nature of collected specimens in children, there is difficulty in diagnosing the recent infection and active disease [10]. Non specific symptoms and delayed diagnosis often make the exact estimation of the disease burden difficult in the paediatric population [10]. This was a cross-sectional study which included 82 paediatric contacts (0-18 years) of registered patients for TB treatment in DOTS centre. The results were comparable to a study by Karthik AN et al., in which out of 104 screened contacts 31 (29.8%) contacts were Mantoux positive [11], while in a study by Sharma KR et al., among 190 contacts, only 26 (13.7%) were positive which was less compared to the present study [12].

Out of 23 Mantoux positive contacts 13 had an induration of 10 to 15 mm (57%), nine contacts had induration of >15 mm (39%), while only one contact had a reaction of 10 mm (4%). The mean induration was 14.1 mm. This was similar to study by Singh M et al., out of 95 contacts who tested tuberculin positive, 45% had induration of 10-15 mm, 33% had an induration of 15 to 20 mm and 17% had an induration of >20 mm [13]. Out of 23 Mantoux positive contacts 14 (60.89%) were males and 9 (39.13%) were females, while in Mantoux negative contacts 28 (47.54%) were females and 31 (52.54%) were males. This was contrasting to study by Dhoble S et al., where females (60%) contacts were more than males (40%) [14]. In the study by Anuradha G et al., also showed contrasting results were female (57.3%) patients were more than males (42.7%) out of 124 contacts [15]. This might be due to the reason that, in present study number of male and female contacts were not comparable, infact males were higher in number than females.

In the present study, 32 (39%) contacts were from urban area while 50 (61%) contacts were from rural area. Whereas, in a study by Sarker NR et al., out of 384 contacts most of them belonged to urban area (44.8%), urban slum area (42.2%) and only 13% were from rural area which was contrasting to the present study, where most of the contacts belonged to rural area [16]. Out of 23 Mantoux positive contacts, 4 (17.39%) contacts had lymphadenopathy and the results were similar as of the study conducted by Hatwal D et al., wherein, lymph node involvement was the commonest (41.3%), presenting mostly as cervical lymphadenopathy (70.8%) [17]. In the present study, among the screened contacts 6 (7.31%) contacts had respiratory system involved, 5 (6.09%) had abdomen involved, 11 (13.4%) had lymphnodes involved. None of the contacts had CNS, skeletal system involved. In a study, conducted by Srivastava G et al., to find tubercular infection in children living with adults receiving DOTS, 29 children had pulmonary TB, 23 children had cervical lymphadenopathy and one child each suffered from tubercular meningitis (<6 years) and abdominal TB [7].

Out of 23 Mantoux positive contacts, 8 (34.8%) contacts had a positive chest radiograph finding. This was in contrast to study by Triasih R et al., for evaluation of chest X-ray in the context of community based screening of child TB contacts out of 265, 19% of contacts having Mantoux positive had a positive chest radiograph finding [18]. The difference is statistically significant. Concepcion NDP et al., remarked that although, chest radiography is a screening tool in children suspected of TB, however, it has sensitivity of 39% and specificity of 74% with high intra and interobserver variability. They also derived that a normal chest radiograph can be seen in a case of TB [19]. In the present study, out of seven symptomatic Mantoux positive contacts 4 (57.14%) had grandparents as their source case while in asymptomatic Mantoux positive contacts 8 (50%) had parents as their source case. However, among Mantoux negative contacts maximum had parents as source case followed by siblings. But, in a study by Batra S et al., to find childhood TB in household contacts of newly diagnosed TB patients the commonest relationship of source cases to diagnosed children was the mother 51 (42.1%) followed by sister 31 (25.6%), brother 27 (22.3%) and father 18 (14.9%) [20]. Nair D et al., found that, household contacts had child 281 (44.2%) followed by spouse 174 (27.6%) and parents 84 (13.2%) and sibling 52 (8.3%) in a study to find household contact screening and yield of TB cases in Chennai, South India [21]. In present study, out of all the screened contacts 16 (19.51%) had latent TB and only 1 (2.44%) contact had active TB. Similar finding were seen in a study by Srivastava G et al., in which out of 159 contacts latent TB was detected in 23.4% (n=30) [7]. But, in the same study number of active TB were much larger 32 (21.1%). The results were also contrasting to a systematic review and meta-analysis by Fox GJ et al., for contact investigation for TB, in which the prevalence of active TB in all contacts was 3.1% and LTBI was 51.5% which was higher than the present study [22]. Also, a study by Ghanaie RM et al., where out of 230 children enrolled, 104 (45.2%) children were identified with LTBI the yield was much higher [23]. This might be due to use of masks and improved sanitary habits during the Coronavirus Disease-2019 (COVID-19) pandemic. The higher number of latent TB cases in present study might be because of increased exposure to MTB in India. Due to good coverage by the Bacille Calmette-guerin (BCG) vaccination the volume of active TB is relatively less. However, the children who are immmunocompromised are vulnerable to activation of TB.

The diagnosis of paediatric TB is very challenging because of varied symptomatology, difficulty in laboratory diagnosis, as well as, detection of latent TB cases. A sizable number of children with latent TB are likely to develop active disease subsequently. Identification of LTBI in the household contacts of index adult patients and IPT can go a long way in reducing the burden of paediatric TB. Though, the current national guidelines recommend to offer IPT to household contacts <5 years age after ruling out active TB [3] but, there is a strong case for offering IPT to children and adolescents between 5 to 15 years age also. Education and counselling of patients about child contact tracing and need for initiation and completion of IPT should be highly emphasised.

Limitation(s)

Sample size was not calculated and it was a duration based study. The number of participants should have been more. Follow-up of the contacts was not done.

CONCLUSION(S)

In the present study, a significant number of children below 15 years of age in contact with TB positive patients were found to have latent TB, and it is possible that, there can be activation from latent to active TB later on in these children. Therefore, to minimise this risk, it is desirable that isoniazid prophylaxis should be given to children upto 15 years age instead of current recommendation to give isoniazid only upto five years of age.

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PARTICULARS OF CONTRIBUTORS:
1. Professor, Department of Paediatrics, SGRDUHS, Amritsar, Punjab, India.
2. Professor, Department of Paediatrics, SGRDUHS, Amritsar, Punjab, India.
3. Junior Resident, Department of Paediatrics, SGRDUHS, Amritsar, Punjab, India.
4. Associate Professor, Department of Paediatrics, SGRDUHS, Amritsar, Punjab, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Ashwani Kumar,
Associate Professor, Department of Paediatrics, SGRDUHS, PO Vallah, Mehta Road, Amritsar-143501, Punjab, India.
E-mail: docashwani82@gmail.com

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