


Research Article

An Assessment of KAP Towards LTBI in Under-5 Children among Physicians Treating Adult/Adolescent TB Patients in Dhaka City

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Abstract

Introduction: LTBI is the precursor to TB, making early detection and treatment of infected children vital to preventing pediatric morbidity and mortality. This study assesses the knowledge, attitudes, and practices of physicians treating adult and adolescent TB patients in managing LTBI among under-5 children in Dhaka. **Aim of the study:** The aim of the study was to evaluate the knowledge, attitude, and practices of physicians treating adult and adolescent tuberculosis patients in Dhaka City regarding the diagnosis and management of latent tuberculosis infection (LTBI) in under-5 children. **Methods:** This six-month cross-sectional, semi-qualitative study was conducted from January to June 2020 at the Department of Paediatrics in five Dhaka hospitals, involving 50 physicians treating adult and adolescent TB patients. Data were collected through standardized questionnaires, with consent obtained, and qualitative responses categorized and scored using SPSS Version 25.0. **Result:** Among 50 physicians, most were aged 30-39, and 62% had recent TB training. Knowledge of latent tuberculosis infection (LTBI) was limited, with only 14% accurately defining it, while 88% acknowledged isoniazid preventive therapy (IPT) availability. Only 12% inquired about family members of pulmonary TB patients, and 10% asked about under-five children. A significant 80% had no involvement in managing LTBI in children, with just 6% prescribing IPT. Additionally, 84% believed IPT could cause drug resistance, and those with recent training scored higher in knowledge. **Conclusion:** This KAP study identifies key barriers to LTBI tracing and IPT/TPT implementation in children under five, emphasizing the need for structured training to enhance physician practices.

Keywords

Latent Tuberculosis Infection (LTBI), Knowledge, Attitude, Practices (KAP), Under-5 Children, Physicians, Tuberculosis (TB) Management

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1. Introduction

After decades of being relegated to the shadows, the childhood tuberculosis (CTB) epidemic is now in the global spotlight. Infection with *Mycobacterium tuberculosis* (M. tb) is the precursor to TB disease, responsible for 1.5 million deaths each year—more than any other infectious disease. [1] The WHO and UNHLM (United Nations High Level Meeting on Tuberculosis) have targeted to provide 30 million people with TB preventive treatment from 2018 to 2022, including 4 million children under 5 years of age and 20 million people in other age groups, who are household contacts of people affected by TB. [2] Once infected, individuals are at the highest risk of developing TB disease within the first two years of infection but can remain at risk for their lifetime. [3] As the global community looks to meet ambitious targets for reduction—aiming for a 90% reduction in TB incidence by 2035 and the elimination of TB by 2050 [4]—addressing the latent TB infection (LTBI) reservoir will be critical to our success. Same falls for Bangladesh.

LTBI is defined as a persistent immune response to stimulation by *Mycobacterium tuberculosis* antigens, with no evidence of clinically manifest active TB. [5] Children and adolescents are at a higher risk of progressing from infection to TB disease (which can potentially lead to deadly disseminated disease) compared to adults. [6]

Studies consistently show that most cases of TB in children occur in those with a known contact diagnosed with TB, often a parent or another close relative. It is likely that the overwhelming majority of TB cases in children are due to the reactivation of LTBI acquired through these household contacts. This could be prevented by screening children who are contacts of individuals diagnosed with TB and providing preventive therapy for children younger than five years of age at that time. [5]

Treatment for LTBI is effective in preventing the development of active TB. Either a tuberculin skin test (TST) or an interferon-gamma release assay (IGRA) can be used to detect LTBI. LTBI testing by TST or IGRA is not a requirement for initiating preventive treatment in child household contacts aged under five years. [5]

Isoniazid monotherapy for 6 months or Rifampicin plus Isoniazid daily for 3 months is recommended for the treatment of LTBI in both adults and children in countries with high and low TB incidence. Current policy of NTP Bangladesh is to provide TPT to all children (under-15 years) having contact with bacteriologically positive pulmonary TB. In children aged 0-5 years, INH is the drug to be given for 180 days and for 5-24 years children INH-Rifampicin combination for 90 days has been approved by NTP, Bangladesh.

To start IPT/TPT, the first step is to screen children with contact with an adult/adolescent TB patient for confirming that the child is not currently suffering from TB. The first opportunity to ask and advice regarding LTBI screening is during the initiation of TB treatment in an adult patient by

the concerned physician.

For Bangladesh, UNHLM key targets aim to provide preventive therapy to an estimated 185,560 people in 2021, increasing to a total of 185,600 in 2022, and a target of 349,340 has been set for 2023. [7]

The increasing number of latent TB cases has led to a growing tendency to involve GPs to screen contact cases of sputum-positive pulmonary tuberculosis in under-5 children.

Knowledge, attitudes and practices (KAP) studies are used worldwide in public health to identify knowledge gaps, cultural beliefs, and behavior patterns that may act as barriers to disease control, [8] helping design relevant awareness campaigns [4] and providing baseline data for planning and evaluation. KAP surveys have also been utilized in studying rabies. [9] However, prior to the research presented here, no such studies had been conducted in Bangladesh. The motivation for this study was to provide baseline data to identify knowledge gaps affecting tuberculosis control in Bangladesh. To eliminate TB, it is essential that physicians treating adult TB patients possess the knowledge and skills for early detection and prevention. These physicians, as the first point of contact, play a key role in screening household child contacts and guiding preventive measures. The purpose of the study was to fill this gap by evaluating the knowledge, attitudes, and practices of physicians regarding the diagnosis and management of LTBI in under-5 children, ultimately contributing to improved TB control efforts in Bangladesh.

Objectives

The aim of the study was to evaluate the knowledge, attitude, and practices of physicians treating adult and adolescent tuberculosis patients in Dhaka City regarding the diagnosis and management of latent tuberculosis infection (LTBI) in under-5 children.

2. Methodology & Materials

This cross-sectional observational semi-qualitative study was conducted at the Department of Paediatrics of Shaheed Suhrawardy Medical College and Hospital, Dhaka Medical College Hospital, National Institute of Chest Diseases Hospital, Mohakhali, Uttara Adhunik Medical College, and Dhaka Central International Medical College over a period of six months, from January 2020 to June 2020. The study included 50 physicians treating adult and adolescent TB patients at purposively selected hospitals in Dhaka.

2.1. Inclusion Criteria

Medical practitioners treating adult and adolescent TB patients in Dhaka.

2.2. Exclusion Criteria

- 1) Medical practitioners who do not treat adult TB patients.
- 2) Physicians who did not provide consent.

Informed consent was obtained from all participants, ensuring confidentiality and voluntary participation, with a thorough history taken and data collected using a standardized questionnaire. Data were analyzed using IBM SPSS Statistics for Windows, Version 25.0, with numerical data edited and cleared for entry, and qualitative data analyzed using specific scoring systems and categorized whenever possible. Ethical approval was secured in compliance with the Helsinki Declaration for medical research involving human subjects, ensuring that participants were informed of the study's design, purpose, and their right to withdraw at any time. The data collection process was closely supervised, with initial interviews conducted in the presence of the guide, who provided feedback on the quality of data collection and interview techniques. Only subjects who provided informed consent were included in the study.

3. Result

Table 1. Demographic Characteristics of the Study Physicians (n=50).

Characteristics		Frequency	Percent- age
Age	< 30 years	5	10.00%
	30-39 years	26	52.00%
	40-49 years	12	24.00%
	> 50 years	7	14.00%
Gender	Male	34	68.00%
	Female	16	32.00%
Graduation & Postgraduation	MBBS	17	24.00%
	FCPS	17	28.00%
	MD	12	14.00%
	Diploma	5	34.00%
Dealing with adult TB patient	Yes	50	100.00%
	No	0	0.00%
Receive TB train- ing in last 5 years	Yes	31	62.00%
	No	19	38.00%

Table 1 presents the demographic characteristics of 50 physicians treating adult TB patients from five hospitals in Dhaka. The average age was 35.1 years (range: 28–60 years). Most physicians were aged 30–39 years (26, 52%), followed

by 40–49 years (12, 24%), >50 years (7, 14%), and <30 years (5, 10%). The male-to-female ratio was 2.1:1, with 34 males (68%) and 16 females (32%). Regarding qualifications, 17 (34%) held diplomas, 17 (34%) had MBBS degrees, 12 (14%) completed MD, and 17 (28%) had FCPS. All physicians (50, 100%) reported treating adult TB patients. Furthermore, 31 (62%) had received TB-related training in the past five years, while 19 (38%) had not.

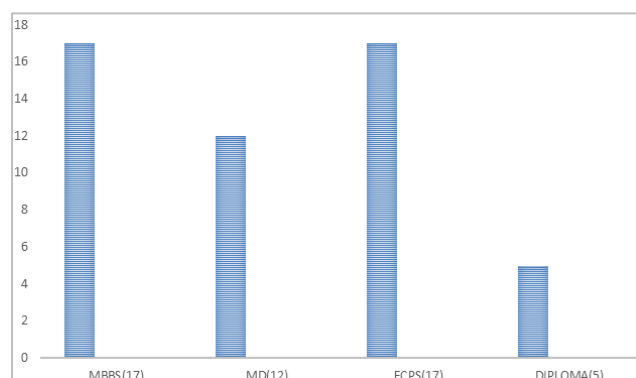


Figure 1. Qualifications of Doctors (N=50).

Figure 1 shows the distribution of qualifications among 50 doctors. MBBS and FCPS are the most common, with 17 doctors each (34%), followed by MD with 12 doctors (24%) and Diploma with 5 doctors (10%).

Table 2. Knowledge of LTBI Among Physicians Regarding TB (n=50).

Knowledge question	Good (%)	Fair (%)	No (%)
LTBI definition	7 (14%)	30 (60%)	13 (26%)
Can MTB spread from LTBI persons to others?	20 (40%)	26 (52%)	4 (8%)
Which types of patients infect others with LTBI?	35 (70%)	10 (20%)	5 (10%)
Symptom of LTBI	15 (30%)	23 (46%)	12 (24%)
What Investigations are done to detect LTBI?	6 (12%)	11 (22%)	33 (66%)
Does the BCG vaccine prevent LTBI?	4 (8%)	32 (64%)	24 (28%)
Is there any treatment of LTBI?	40 (80%)	6 (12%)	4 (8%)
Benefit of treating LTBI?	7 (14%)	23 (46%)	20 (40%)
What is the treatment/chemoprophylaxis of LTBI?	7 (14%)	36 (72%)	8 (16%)

Knowledge question	Good (%)	Fair (%)	No (%)
Is IPT available in Bangladesh?	44 (88%)	5 (10%)	1 (2%)
Side effect of IPT?	45 (90%)	4 (8%)	1 (2%)
Chance of resistance of IPT?	3 (6%)	11 (22%)	36 (72%)

Table 2 shows the knowledge of 50 physicians regarding latent tuberculosis infection (LTBI). Only 7 (14%) accurately defined LTBI, while 30 (60%) had fair knowledge and 13

(26%) had none. Regarding transmission, 20 (40%) believed MTB does not spread from LTBI individuals, with 26 (52%) saying it never transmits. Most (35, 70%) recognized that LTBI is linked to confirmed pulmonary TB patients, and only 6 (12%) correctly identified the diagnostic methods. Concerning BCG vaccination, 4 (8%) knew it does not prevent LTBI, while 32 (64%) had fair knowledge. Although 40 (80%) were aware that treatment exists, only 7 (14%) knew the specific options. Furthermore, 44 (88%) acknowledged IPT availability in Bangladesh, and 45 (90%) were aware of isoniazid side effects. Lastly, 3 (6%) believed IPT could cause drug resistance, with 11 (22%) showing fair knowledge.

Table 3. Attitudes of Physicians Regarding LTBI (n=50).

Attitude statement/question	Good (%)	Fair (%)	No (%)
Enquire about family members when dealing with BCPTB patients	6 (12%)	7 (14%)	37 (74%)
Ask about children living in the same house	6 (12%)	5 (10%)	39 (78%)
Specifically ask about under-5 children of a BCPTB patient	5 (10%)	5 (10%)	40 (80%)
Suggestion given if children are symptomatic	5 (10%)	7 (14%)	38 (76%)
Advice given if children are asymptomatic	4 (8%)	7 (14%)	39 (78%)
Advice to a lactating mother who has BCPTB	9 (18%)	14 (28%)	27 (54%)

Table 3 presents the attitudes of 50 physicians regarding latent tuberculosis infection (LTBI). Most physicians prioritized adult patients, with only 12% inquiring about family members of patients with bacteriologically confirmed pulmonary TB (BCPTB). While 74% asked about family members for index case tracing, only 6% (12%) asked about children living in the same household, and just 10% specifically inquired about under-5 children's health. Additionally, 10%

provided suggestions for symptomatic children, while 8% offered advice for asymptomatic ones. Notably, 18% of physicians provided guidance for lactating mothers with BCPTB, and among those, some referred infants to pediatric care. The overall tendency reflects a limited focus on contact tracing and pediatric considerations among physicians dealing primarily with adult patients.

Table 4. Practice Variation for IPT Among Physicians (n=50).

Practice Segment Question	N (%)
Number of physicians ever prescribed IPT to LTBI children (per year)	3 (6%)
Number of physicians referred LTBI children to DOT centers (per year)	5 (10%)
Number of physicians referred LTBI children to pediatricians (per year)	2 (4%)
Number of physicians with "zero" activity with LTBI children	40 (80%)

Table 4 shows the practice variation regarding isoniazid preventive therapy (IPT) among physicians for under-5 children with latent tuberculosis infection (LTBI). The findings indicate a significant lack of engagement, with 80% of phy-

sicians reporting no activity related to LTBI in children. Many expressed that managing pediatric cases was not within their responsibilities due to heavy workloads. Only 6% of physicians prescribed IPT directly, with one physician re-

calling two instances of IPT prescription for under-5 children whose parents had pulmonary TB. Furthermore, 10% referred children to directly observed therapy (DOT) centers but did not ensure follow-up, with one physician admitting uncertainty about whether these children received IPT. Only 4% referred LTBI children to pediatricians, though they too did not follow up on these referrals. Overall, the data highlights a critical gap in the management of LTBI among young children in clinical practice.

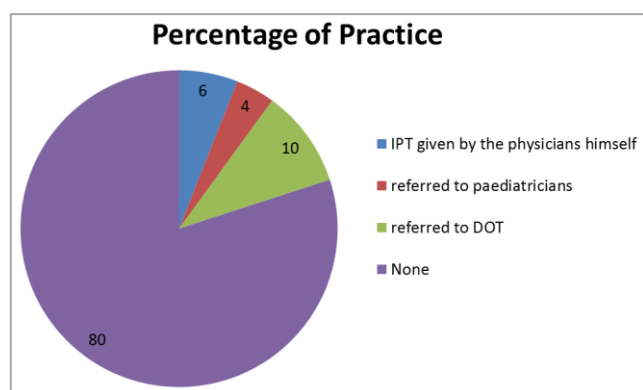


Figure 2. Percentage of Practice of IPT by Physicians.

Figure 2 shows the practice of IPT by physicians. Most (80%) do not engage in IPT, 10% refer to DOT, 6% administer IPT themselves, and 4% refer to pediatricians.

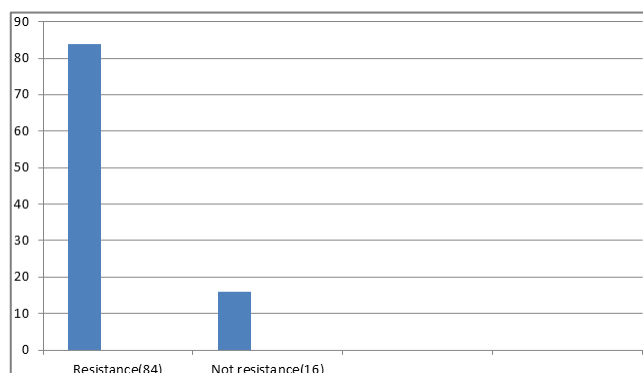


Figure 3. Percentage of Physicians Who Believe IPT/TPT Could Cause Resistance to INH/Rifampicin.

Figure 3 shows the percentage of physicians who believe that IPT (Isoniazid Preventive Therapy) or TPT (Tuberculosis Preventive Therapy) could lead to resistance to INH (Isoniazid) or Rifampicin. The majority of physicians (84%) express concern about the potential for these therapies to cause resistance, while a smaller proportion (16%) do not share this belief.

Table 5. Knowledge Score Difference Based on Participation in TB Training (n=50).

TB training status in last 5 years	Number of physicians	Average knowledge score
Yes	31	15.20%
No	19	12.10%

Table 5 shows the difference in knowledge scores based on physicians' participation in TB training over the last five years. Physicians who attended training had a higher average knowledge score (15.20%) compared to those who did not (12.10%). This suggests that recent TB training positively impacts physicians' knowledge about latent tuberculosis infection (LTBI), highlighting the importance of continuous professional development in enhancing clinical understanding.

4. Discussion

This semi-qualitative study was conducted among 50 physicians treating adult and adolescent TB patients across five different hospitals in Dhaka city. The study assessed the knowledge, attitudes, and practices regarding LTBI in children under five among physicians treating adult and adolescent tuberculosis patients. A semi-structured mixed-model questionnaire was utilized to gather both qualitative and quantitative data. The main findings of this study were: a) A significant knowledge gap regarding LTBI in children under five among the physicians. b) Disagreement in attitudes regarding the tracing of LTBI in the families of sputum-positive pulmonary TB patients. c) Only a few physicians adhered to national guidelines in their practice.

About 92% of physicians stated that, as they primarily treat adult and adolescent patients, they screen for LTBI only in patients eligible for immunosuppressive therapy. They expressed that child LTBI is not within their area of concern.

In this study, only 8% of physicians correctly recognized that the BCG vaccine does not prevent LTBI, while the majority mistakenly believed it could protect children from *M. tuberculosis* infection. According to Bangladesh's national childhood TB management guidelines, BCG is not fully protective but provides some defense against severe forms of TB, offering 73% protection against TB meningitis and 77% against miliary TB. Despite routine vaccination, many children still develop TB. [10]

It is concerning that 80% of physicians were aware of IPT/TPT for LTBI, yet only 14% knew the correct dose and duration. Furthermore, only 6% of physicians were practicing IPT/TPT in under-5 children. All close contacts and family members, including children, should be screened and provided with appropriate diagnosis and treatment for LTBI. [10]

Physicians showed poor attitude towards LTBI diagnosis and contact tracing, with 80% not screening family members, especially under-5 children, of bacteriologically positive TB cases. Many felt it was not their responsibility, as they treat adult patients, while others cited workload and overcrowded outpatient departments as barriers. Only 12% properly screened families during TB treatment initiation. Some physicians believed family screening was handled by DOT centers, leading to missed opportunities for starting IPT early without additional cost.

There was a lack of IPT knowledge, with 84% of physicians fearing that 6-month Isoniazid use would cause resistance, leading to reluctance in prescribing it. This aligns with other studies showing that doctors' attitudes and beliefs are major barriers to IPT implementation. [11] A study in Thailand highlighted fear of poor patient adherence as a key challenge, [12] while in South Africa, adherence was not a concern for healthcare workers. [13] Addressing these barriers through training and effective program implementation could improve IPT adoption in our country.

The *National Guidelines for the Management of Tuberculosis in Children, Bangladesh, 2nd Edition, 2016* state that there is minimal to no risk of developing Isoniazid resistance in children receiving IPT, even if active TB is missed. Additionally, a meta-analysis of studies on IPT since 1951 found no increased risk of INH resistance. [10]

We reviewed journals on the role, knowledge, attitude, and practices of physicians treating adult/adolescent TB patients regarding LTBI/IPT, but found limited studies focused on healthcare workers. A cross-sectional KAP survey on TB transmission and prevention among 135 auxiliary healthcare workers in three high-burden Brazilian cities revealed that, although 66% had received TB training in the past decade, only 19% were trained in TB prevention. Additionally, 64% could not distinguish LTBI from active TB, 63% lacked knowledge on diagnosing LTBI, and 52% did not know how to prevent its progression. Most recognized the importance of investigating adult (99%) and child (96%) contacts for LTBI, yet not all invited children (81%) or adults (71%) to the clinic, despite only 24% perceiving barriers to investigation. [14]

To reduce the TB burden, healthcare workers must possess adequate knowledge and a positive attitude toward LTBI. This issue was reflected in the comment of an Indonesian healthcare worker: "My understanding of IPT is limited. There is no guideline for IPT available. I have no confidence to explain IPT to the patient." [15] Emphasizing staff education and training on IPT can enhance patient outcomes by equipping caregivers to provide accurate information, outline medication strategies, address doubts, and encourage adherence. However, education is not the only barrier healthcare workers face in delivering IPT to children in TB-endemic settings.

Successful diagnosis of LTBI in children requires knowledge of LTBI, targeted screening, appropriate referral,

timely treatment initiation, and adherence to the full treatment regimen. Our findings align with barriers identified in other studies, including a significant lack of awareness about the severity of LTBI among physicians treating adult TB patients. [16] One participant in our study suggested creating a data collection sheet for TB patients to record family composition, the presence of under-5 children, and any symptoms observed. Physicians could review these sheets to aid in community-based LTBI tracing. A study in Pakistan also highlighted that mass media, advertisements, and mobile phones can play a role in promoting TB prevention. [17]

Our findings indicate that traditional clinical practices have been ineffective in preventing TB in children within our population. Efforts should focus on modifying patient-provider interactions and counseling to improve treatment completion and ensure contact tracing among children living with TB patients. This can be achieved through proper training of physicians. Ongoing education is essential for doctors to implement screening and treatment policies effectively. Public health experts, healthcare providers, and TB prevention specialists should refine guidelines, incorporating telemedicine and physician assistants to create a more practical, effective, and safe system.

5. Limitations of the Study

The current study had the following limitations:

- 1) The study was semi-qualitative; a full qualitative approach could provide deeper insights into the KAP of physicians treating adult TB regarding LTBI.
- 2) Conducted in selected institutions, the study population may not represent the broader community of physicians.
- 3) The absence of focus group discussions, a critical component of qualitative research, limits the depth of information gathered.

6. Conclusion

This KAP study identified several important barriers to LTBI tracing and IPT/TPT implementation in children under five among physicians treating adult and adolescent TB patients. These barriers include gaps in LTBI knowledge, an indifferent attitude among physicians toward tracing, treating, and/or referring suspected LTBI cases, poor practices, and a failure to apply knowledge into practice for household children with TB contacts. This situation creates missed opportunities for contact tracing at the initial contact when treatment for a bacteriologically positive pulmonary TB patient is initiated. A structured approach through orientation and training of adult physicians would help overcome these barriers, thereby facilitating the achievement of national targets for IPT/TPT implementation.

Abbreviations

BCG	Bacillus Calmette-Guérin
BCPTB	Bacteriologically Confirmed Pulmonary Tuberculosis
CTB	Childhood Tuberculosis
DOT	Directly Observed Therapy
FCPS	Fellow of the College of Physicians and Surgeons
GPs	General Practitioners
IGRA	Interferon-Gamma Release Assay
INH	Isoniazid
IPT	Isoniazid Preventive Therapy
KAP	Knowledge, Attitude, and Practices
LTBI	Latent Tuberculosis Infection
M. tb	Mycobacterium tuberculosis
MD	Doctor of Medicine
MBBS	Bachelor of Medicine, Bachelor of Surgery
NTP	National Tuberculosis Program
TB	Tuberculosis
TPT	Tuberculosis Preventive Therapy
TST	Tuberculin Skin Test
UNHLM	United Nations High Level Meeting on Tuberculosis
WHO	World Health Organization

Author Contributions

Umme Qulsum Sonia: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

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Farjana Afroze Jui: Investigation, Project administration, Resources, Software, Visualization, Writing – review & editing

Shakil Ahmed: Conceptualization, Project administration, Resources, Validation, Writing – review & editing

Sadia Tabassum: Conceptualization, Project administration, Resources, Validation, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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