Isoniazid Preventive Chemotherapy in Children Contact with Adult Open Pulmonary Tuberculosis

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ABSTRACT

Background: To investigate importance of INH preventive chemotherapy among the children age above 5 years who were contacted with adults having open pulmonary tuberculosis, as well as the effectiveness of INH prophylaxis among the children age under 5 years regarding Bangladeshi context.

Objectives: This prospective observational study was carried out to detect the frequency of tuberculosis and also effect of isoniazid preventive chemotherapy in children contact with adult open pulmonary tuberculosis.

Methods: This study was conducted in the department of Pediatrics, Shaheed Suhrawardy Medical College and Hospital, Dhaka for duration of three (3) years, from July 2015 to July 2018. About 384 population under 12 years children who were close contacted with adult open pulmonary tuberculosis patients, were taken as study sample. There prospectively document adherence to six months of INH chemoprophylaxis and outcome in children with household exposure to an adult open pulmonary tuberculosis index case on purposive sampling technique. All the children were followed up and evaluated after 6 and12 months with monthly monitoring. Ethical issues were maintained accordingly.

Results: In current study subjects, the mean age was 6.27±3.08 years and gender distribution were near about equal (Male: 49.5% vs. Female: 50.5%).Among the ≤5 years children, only 52.7% of them received INH prophylaxis and nobody developed TB. But TB was noticeably found in 21.3% of children aged ≤5 years those who didn't take INH prophylaxis. The majority of tuberculosis patients was found stayed in urban slum in comparison to LTBI and healthy contact (81.25% vs. 30.77% vs. 39.26%). More than 90% of tuberculosis patients were severe underweight in this study.

Conclusion: INH preventive chemotherapy is an important factor in children contact of adult tuberculosis. It is recommended to provide INH chemoprophylaxis in children up to 12 years age. So it should be consider in national policy making of Bangladesh to reduce tubercular burden in childhood age.

Keywords: Isoniazid Preventive Chemotherapy, Adult Open Pulmonary Tuberculosis, LTBI, INH Chemoprophylaxis.

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INTRODUCTION

Tuberculosis (TB) is a communicable, air borne bacterial infection caused by Mycobacterium Tuberculosis. The most important source of infection is a person with smear-positive Pulmonary Tuberculosis (PTB). This infection is responsible for morbidity and mortality which varies from region to region. Mostly it infects lungs by inhalation of droplet nuclei containing virulent human strains, but it can also infect any part of body, such as intestine, genitourinary organs, lymph nodes, nervous system, bone and joints. Any person presenting himself with persistent cough lasting for more than three weeks, is a suspected case of pulmonary tuberculosis. Associated sign and symptoms found are nocturnal pyrexia, body aches, chest pain, anorexia, weight loss and hemoptysis.[1] Tuberculosis is a disease of great antiquity. As early as 3700BC, tuberculous lesion has been found in the vertebrate of Neolithic man in Europe and on Egyptian mummies. Today TB has been the most important communicable disease in the world.[2]

Tuberculosis which is caused by a complex group of microorganisms, namely Mycobacterium tuberculosis, Mycobacterium bovis and Mycobacterium africanum, is an ancient human disease.[3]

One-third of the world's population has been infected with M. tuberculosis, and new infections occur at a rate of one per second. According to WHO, the estimates of the global burden of disease caused by TB in 2011 are as follows: 8.7 million incident cases of tuberculosis; incident rate of 125 cases per 100,000 population; 12 million prevalent tuberculosis cases; 1 million deaths among HIV-negative people and additional 0.43 million tuberculosis deaths occurred in HIV-positive people. TB is the second leading cause of death from an infectious disease after HIV. More than 90% of global TB cases and deaths occur in the developing world, where 75% of cases are in the most economically productive age group (15-54 years). Regionally, Asia carries 59% of the TB cases (South-East Asia 39% and the Western Pacific 20%), 26% in the African region, 7% in the Eastern Mediterranean region, 5% in the European and 3% in the American region (WHO, 2012).TB is a leading killer of HIV-positive people in 2015, 35% of HIV deaths were due to TB. In 2015, 10.4 million people fell ill with TB and 1.8 million died from the disease (including 0.4 million among people with HIV). Over 95% of TB deaths occur in low- and middle-income countries. Globally in 2015, an estimated 480 000 people developed multidrug-resistant TB (MDR-TB). Tuberculosis is a major health problem in Bangladesh. Among the 22 highest TB burden countries in the world, Bangladesh ranked 6th in that list. Estimates suggest that in Bangladesh about 880 new TB cases and 176 TB deaths occur daily. The estimated prevalence of all forms of TB and incidence rate in Bangladesh was 425 and 225 per 1, 00,000 per year respectively. The mortality rate of TB in Bangladesh was 51 per 1, 00,000 per year.[4,5]

In 2007, Bangladesh was ranked sixth on the list of 22 highest TB burden countries. TB is a bacterial disease caused by Mycobacterium (M). The genus Mycobacterium is divided in to two main groups: M. tuberculosis complex and environmental Mycobacteria or non-tuberculosis Mycobacteria (NTM). M. tuberculosis infection occurs through inhaling an aerosol droplet that is generated when patient with PTB coughs, talks, sneezes, spits and sings. For M. bovis, it can be transmitted through drinking of raw milk that may infect the tonsils presenting as scrofula (cervical lymphadenitis), or the intestinal tract, causing abdominal TB (Smith, 2003; WHO, 2004). In the context of Bangladesh, the incidence rate of all forms of TB for all age groups was 225/100,000 population in 2012, while the prevalence rate was 411/100,000 population (MOHFWB, 2012).

On the other hand MOHFWB (2012) stated in their National Guidelines for the Management of Tuberculosis in Children, NTP report that in 2010 total 4,236 cases occurred in children among the 158,252 newly reported cases of TB which was 2.7% of the total detected cases. This is most likely due to poor detection throughout the country.

Moreover, study conducted by Tahmeed et al. (2010) in Madhupurupa zilla in the Tangail district during 2008-2009, showed an incidence of childhood TB of 52 per 100,000 among all eligible children 0-14 years of age. Although this does not represent national incidence of child TB, this figure indicates that there is a gap between NTP-reported child TB and actual disease burden in the community. The NTP in 2007 and Damien

Foundation in 2009 reported detection rates of only 9 and 8.6 per 100,0000, under14 year old children respectively.[6]

The risk for developing TB disease following infection with M. tuberculosis is mainly determined by the following factors.

I. Household or close contact with a smear positive or culture positive pulmonary TB

II. Age < 5 years: The risk of developing TB disease is highest in very young children, who is immune immature.

III. Severe malnutrition or other immunosuppressive conditions like measles in the previous 3 months, whooping cough, HIV infection, being on drugs like steroids, immunosuppressive agents.

IV. The time since exposure or infection: The vast majority of children who develop TB disease do so within the first year after Mycobacterium tuberculosis exposure or infection.

Currently, the World Health Organization (WHO) and the International Union against Tuberculosis and Lung Disease (IUATLD) and NTP, Bangladesh recommend that all children under 5 years of age who are in household contact with a sputum smear positive index case, should be actively traced and screened for tuberculosis.[7] Six months of isoniazid (INH) is recommended as preventive chemotherapy once active tuberculosis has been excluded, because with good adherence, 6 months of INH monotherapy has proven efficacy to prevent tuberculosis in children infected with a susceptible strain of M. tuberculosis.[8] If early treatment is good, earlier treatment might be better. This is the rationale for giving isoniazid to persons who do not have active tuberculosis: for the uninfected, to prevent infection; for the recently infected, to prevent progression to clinical disease; for those with dormant infections, to prevent future activation of disease. Successful prophylactic use of isoniazid in any of these situations would also reduce the sources of tuberculous infection, a most important consequence. Isoniazid has four requisites of the ideal prophylactic agent for tuberculosis: it is extremely effective in treatment, safe, cheap, and easy to take. These attributes were enough for some persons to advocate the prophylactic use of isoniazid in populations with a high incidence of tuberculosis. At this circumstance, this study was designed to investigate importance of INH preventive chemotherapy among the children age above 5 years who were contacted with adults having open pulmonary tuberculosis, as well as the effectiveness of INH prophylaxis among the children age under 5 years regarding Bangladeshi context.

OBJECTIVES
General Objectives
To find out whether INH preventive chemotherapy necessary in both <5 and >5 years children contacts with adult open pulmonary tuberculosis.

Specific Objectives
- To find out whether development of tuberculosis in >5 years children close contacts with adult open pulmonary tuberculosis without INH prophylaxis.
- To evaluate the adherence to a six-month INH prophylaxis and outcome in <5 years children with household exposure to an adult open pulmonary tuberculosis index case.

METHODOLOGY

Study Design: It was a prospective observational study.

Place of Study: The study was conducted in the department of Pediatrics, Shaheed Suhrawardy Medical College and Hospital, Dhaka.

Duration of Study: The duration of this study was three (3) years, from July 2015 to July 2018.

Study Population: The study population of this study was the under 12 years children close contacted with adult open pulmonary tuberculosis patients.

Sample Size: To determine the sample size of this study in a community, the following formula was used- n= z2pq/d2, where, n= desired sample size; z= standard normal deviation usually set at 1.96 which corresponds 95% of confidence interval; p= proportion in the target population estimated to have particular characteristics, there was no reasonable estimation so50% (.50) was used in this study; and degree of accuracy desired usually set at 0.05. So the total sample size was 384 for this study.

Inclusion Criteria

Under 12 years children close contacts with adult open pulmonary tuberculosis patients

Exclusion Criteria

I.   Children close contacted with non-open case of pulmonary tuberculosis

II. Those were not willing to enroll in the study

Sampling Technique: Purposive sampling technique was used to reach the respondents. Patients with open case of pulmonary tuberculosis (Index case) those who attended at DOTS Corner of Shaheed Suhrawardy Medical College Hospital were traced, and then their contacted children were identified as the final respondents.

Data Collection Methods: Data of tubercular cases was collected through questionnaire, examination and laboratory investigations of children of household contacts.

Recommended approach to diagnose TB in children were-
1. Careful history(including history of TB contact and Symptoms suggestive of TB)
2. Clinical assessment through examination
3. Investigations
   a. Mantoux Test (MT)
   b. Chest X-ray
   c. CBC and ESR

Data Collection Technique

Respondent's identification, socio-demographic data and clinical history were collected by face-to-face interview. Physical examinations were performed by trained physicians. History, clinical examination and laboratory investigation medication information was recorded. Anthropometric measurements were taken maintaining the standard methods. Bathroom weighing scale was used to measure the body weight considering the nearest 0.1 kg with patients wearing light clothing, no shoes. Laboratory investigations were done in Shaheed Suharawardy Medical College Hospital.

Data Processing and Analysis

After collection, all the data was checked for completeness and consistencies by the investigators. Complete and consistent data were entered into the Statistical Package for Social Science (SPSS) for windows version 17, and analyzed. Normality of data was done by Kolmogorov-smirnov test. Descriptive statistics were used to describe the population by age, sex, educational, disease related factors etc. and were presented as frequency and percentage. Statistical significance was calculated by doing Chi-square test and independent t-test. All of the rates were calculated at the 95% confidence interval level. A binary logistic regression was done to detect OR (odds ratio) and 95% confidence interval. A p-value <0.05 level was considered as the level of statistical significance.

Table 1: Socio-demographic characteristics of study participants (n=384)

Variables		Frequency (n)	Percentage (%)
Gender	Boy	190	49.5
	Girl	194	50.5
Age group	≤5 years	148	38.5
	>5 years	236	61.5
Age (years)		Mean±SD= 6.27±3.08	
Age of TB patients# (n=32)	≤5 years	20/384	13.5
	>5 years	12/384	5.1
Religion	Muslim	376	97.9
	Hinduism	8	2.1
Use of Sanitary Latrine	Yes	158	41.1
	No	226	58.9
Residence	Urban	172	44.8
	Urban slum	162	42.2
	Rural	50	13.0
Socioeconomic status	Poor	126	32.81
	Middle class	130	33.85
	Upper class	128	33.33

#Here sample, n=384 except # where n=32

Table 2: Distribution of the Respondents by Educational Status (n=384)

Educational status	Frequency	Percent
No education	120	31.3
Incomplete primary education	42	10.9
Primary education	196	51.0
Incomplete secondary education	10	2.6
Continuing Secondary education	16	4.2
Total	384	100.0

Table 3: Distribution of the Respondents by INH Chemotherapy

INH Chemotherapy Taking	Frequency (n)	Percentage (%)
Taken INH aged ≤5 years child	78	20.3
Taken INH aged 6-12 years child	0	0

Table 4: Distribution of the Respondents by the reasons of Not Providing INH to Their Children (n=306)

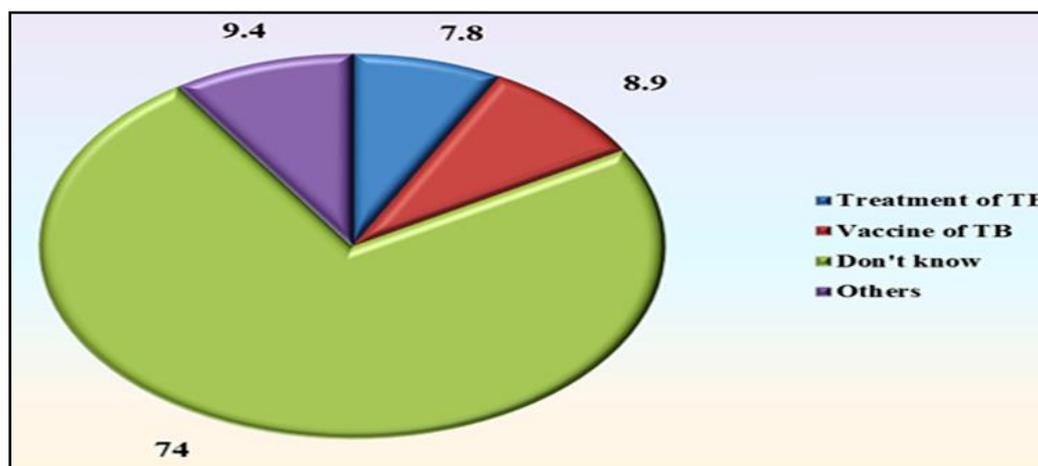| Reasons of Not Providing INH to Their Children	Frequency (n)	Percentage (%)
Lack of counseling	216	70.6
Forgotten	24	7.9
Economic problem	2	0.6
Religious belief	4	1.3
Unwilling/Uncooperative	44	14.4
Others	16	5.2
Total	306	100.0

Figure 1: Distribution of the Respondents According to the Knowledge Regarding INH (n=384)

Table-5: Distribution of the Respondents According to the Symptoms of TB (n=384)

Children Had Having Symptom of TB	Frequency (n)	Percentage (%)
Yes	80	20.8
No	304	79.2
Total	384	100.0

Table-6: Symptom/sign of TB (n=80)

Symptom of TB	Frequency (n)	Percentage (%)
Fever	42	52.5
Cough	32	40.0
Weight loss	18	22.5
Loss of appetite	20	25.0
Malnutrition	30	37.5

Malnutrition: Moderate to severe underweight (According to weight for age)

Table 7: Investigations (N=80)

Blood test

Investigations	Mean ± SD	Min - Max
WBC count	9494±2151	5000 – 12700
ESR	32.57±14.01	10 – 66

Tuberculin skin test (Montoux Test)

Investigations	Number (%)
MT (+ve)	58(72.5%)
MT (-ve)	22(27.5%)

Radiological test

Diagnosis	Frequency (n)	Percentage (%)
Tuberculosis	32	8.3
Healthy contact	326	84.9
LTBI	26	6.8
Total	384	100.0

Table 8: Prevalence of TB according to gender (n=384)

Gender	Category	Frequency	Percentage
Boy	**Tuberculosis**	18	9.5
	LTBI	14	7.4
	Healthy contact	158	83.2
Girl	**Tuberculosis**	14	7.2
	LTBI	12	6.2
	Healthy contact	168	86.6

Table 9: Follow up of contacts

	Frequency (n)	Percentage (%)
PTB diagnosed		
Before follow up	26	81.3
After follow up	6	18.8
LTBI diagnosed		
Before follow up	14	53.8
After follow up	12	46.2

Table 10: Distribution of TB among the Respondents in grouping by INH taking in age group

Gender	Category	Frequency	Percentage
Boy	**Intake of INH (<5 years)**	26	13.7
	Not taken INH (<5 years)	46	24.2
	Not taken INH (5 – 12 years)	118	62.1
Girl	**Intake of INH (<5 years)**	28	14.4
	Not taken INH (<5 years)	48	24.7
	Not taken INH (5 – 12 years)	118	60.8

Table 11: Gender wise distribution of respondents according to INH intake (n=384)

Diagnosis	Group			Total	Chi-square value	p-value
	Group 1	Group 2	Group 3			
Tuberculosis	0 (0.0)	20 (21.3)	12 (5.1)	32 (8.3)		
Healthy contact	52 (96.3)	62 (66.0)	212 (89.8)	326 (84.9)		
LTBI	2 (3.7)	12 (12.8)	12 (5.1)	26 (6.8)	38.592	<0.0001***
Total	54 (100.0)	94 (100.0)	236 (100.0)	384 (100.0)		

***highly significant

Table 12: TB according to the location of residence in different age groups

Location of residence		TB	Non-TB	Chi-square value	p-value
≤5 years	**Urban**	4 (20.0)	64 (50.0)		
	Urban slum	16 (80.0)	44 (34.4)		
	Rural	0 (0.0)	20 (15.6)	16.28	<0.001**
>5 years	**Urban**	2 (16.7)	102 (45.5)		
	Urban slum	10 (83.3)	92 (41.1)		
	Rural	0 (0.0)	30 (13.4)	22.24	0.014*

Chi-square test was done to measure the level of significance. Star (*) mark represents significant difference

RESULTS

A total of 384 children contact with adult open pulmonary tuberculosis were recruited into the study after meeting the inclusion criteria. The hospital record of tuberculosis patients were done including information on patient demographic, sputum smear result, chest X radiograph and duration of symptoms. All subjects were required to complete a structured questionnaire. An information regarding children contacts were done by child's parent or care-taker.

Table 1 shows, boy and girl respondents were almost equal in number (49.5% vs. 50.5%) in this study which represented male-female ratio as 1:1.02. The overall mean ± SD of age of all the respondents was 6.27±3.08 years within range of 1 month to 12 years. Major proportion (61.5%) of the respondents was aged more than 5 years. Within the age group, among the children aged less than or 5 years 13.5% were diagnosed as having TB whereas this prevalence was 5.1% among the children aged above 5 years. Almost all the respondents (97.9%) were Muslim except resting 2.1% Hindu. Less than half of the respondents (41.1%) were used sanitary latrine, whereas majority (58.9%) weren't. Most of the respondents (44.8) were living in urban area, whereas 42.2% in urban slum area and resting 13.0% were in rural area. In this study, socioeconomic status was evaluated by principal component analysis. In three groups, the frequency was more likely in the same amount namely poor (32.81), middle class (33.85%) and upper class (33.33 %).

Table 2 shows that 51.0% had primary education which was followed by 31.3% had no education, 10.9 %had incomplete primary education.

In this study, INH chemotherapy was taken by 20.3% of the children aged below 5 years.

Lack of counseling (56.3%) was the main reason for the non-adherence (not providing) INH to the children followed by Unwilling/Uncooperative (11.5%) and Forgotten (6.3%).

Almost three in every four (74.0%) respondents who were not receiving INH didn't have any knowledge regarding INH, whereas only 8.9% mentioned INH as vaccine of TB and 7.8% mentioned as treatment of TB.

Table 5 depicts the symptoms of TB in participant children. About 20.8% study sample were suffered from symptoms of tuberculosis.

Multiple responses analysis found that fever was the most common symptom (52.5%) followed by cough (40.0%), malnutrition (37.5%). loss of appetite (25.0%) and weight loss (22.5%).

Among all the respondents, 8.3% was diagnosed as having TB, for 6.8% respondents it was latent (LTBI), and resting (84.9%) were healthy contact.

Table 8 shows that 9.5% of tuberculosis in boy against 7.2% in girl, LTBI 7.4% against 6.2% and healthy contact in boy was 83.2% against 86.6% in girl.

Majority of PTB (81.3%) and LTBI (53.8%) were diagnosed before follow up but during follow up a few PTB (18.8%) and good number of LTBI (46.2%) were diagnosed.

Study explored that tuberculosis wasn't found in the children aged under 5 years those who took INH prophylaxis (group-1), but noticeably found in 21.3% of children aged under 5 years those who didn't take INH prophylaxis (group-2). Furthermore, one in every twenty children (5.1%) aged between 5-12 years those who

didn't take INH prophylaxis (group-3) were affected by TB. These associations were statistically very highly significant. Again, prevalence of TB was found in 8.3% of all the children aged under 12 years. This table depicts that only 13.7% of boys were taken INH of <5 years and that of 14.4% of girls were taken INH.

Table 12 shows that TB according to the location of residence in different age groups. Within the age group ≤5 years, a highly significant difference (p, <0.001) was found between TB and non-TB patients. Most of the participants resided in urban slum (80%) in ≤ 5 years age group. In consideration of > 5 years, there were also more patients of tubercular group resided in urban slum than non-TB group (83.3% vs. 41.1%) and it was also it was significant difference (p= 0.014).

DISCUSSION

Tuberculosis is one of the leading causes of mortality and morbidity across all age groups throughout the world, especially in developing countries. The infection is almost exclusively transmitted through air from patients with pulmonary disease. Therefore, proximity and persistence of contact are major determinants of the risk of transmission of infection, and those living within the same household are at higher risk than casual contacts. Among household contacts, those who are very young and those with absolute or relative immunodeficiency states are at increased risk of acquiring infection from the index case. So, it is important to give preventive prophylactic treatment especially by Isoniazid to their contacts. This prospective observational study was carried out to detect the frequency of tuberculosis and also effect of isoniazid preventive chemotherapy in children contact with adult open pulmonary tuberculosis. It was in the department of Pediatrics, Shaheed Suhrawardy Medical College and Hospital, Dhaka for duration of three (3) years, from July 2015 to July 2018. About 384 population under 12 years children who were close contacted with adult open pulmonary tuberculosis patients, were taken as study sample. There is no known study on this fact. It is our little endeavor to investigate importance of INH preventive chemotherapy among the children age above 5 years who were contacted with adults having open pulmonary tuberculosis, as well as the effectiveness of INH prophylaxis among the children age under 5 years regarding Bangladeshi context.

Though it strongly recommended by the World Health Organization (WHO) and the International Union against Tuberculosis and Lung Disease (IUATLD) to take INH chemotherapy prophylaxis for the children aged under 5 years those are closely contacted with a sputum smear positive index case, current study found a moderate proportion of children aged ≤5 years for taking INH chemotherapy prophylaxis in Bangladesh. Out of 148 children aged ≤5 years, only 78 received INH chemotherapy prophylaxis (52.7%).

But, this study found a successful and highly adherence, whereas all of the children successfully completed their chemotherapy (100% adherence), whereas acceptable adherence (over 80% of all medication taken) (le Roux et al. 2009) is rarely achieved. This achievement represents a successful implementation strategy by the National Tuberculosis Control Program (NTP) of Bangladesh. On the other hand in comparison with the global context, same type of adherence was found in Iran reported by Aminzadeh and Asl (2011) by their study conducted during 1997-98, whereas all children aged under 6 years old completed their INH

chemoprophylaxis. Again, in another Asian country, Indonesia, adherence to IPT among the children aged under 5 years reported that it was low whereas this poor adherence was 74.4%.[9] They identified this dissatisfactory scenario may be resulted from a combination of financial, knowledge, health service and medication related barriers (Rutherford et al., 2012).Among the African countries, based on available conducted studies, a higher adherence rate was found in Benin. Researchers found 86% children were adhered to IPT for at least 6 months. Regarding the country with moderate TB incidence and a well-functioning NTP, they expressed the integration of IPT into the NTP for children aged <5 years exposed to TB in the family was feasible based on simple tools associated with the follow-up of index cases. [10] Nearly adherence was reported from another African country, Gambia. The home-delivered IPT among child contacts of adults with smear-positive TB achieved verifiable high uptake and adherence rates. Altogether, 77.7% of children completed all 6 months, with a good adherence.[11]

But, few extremely low adherences were also found around the world. In Timor-Leste, a very unresponsive rate to attain the INH chemotherapy prophylaxis for the children exposed to TB patients. Among the ≤5 years children, only 52.7% of them received INH prophylaxis and nobody developed TB. But TB was noticeably found in 21.3% of children aged ≤5 years those who didn't take INH prophylaxis. One in every twenty children (5.1%) aged between 5-12 years those who didn't take INH prophylaxis were affected by TB. Again, this prevalence was 9.7% among the children considering aged under 12 years those who didn't receive chemoprophylaxis. Here, despite of verbal requests to bring all contacts for assessment, only 12.9% children attended health care center and again, only 7% commenced Isoniazid Preventive Therapy (IPT).[12] On the other hand, it was found by this current study that those who taken INH chemotherapy prophylaxis nobody developed TB after the completion of follow-up period (100% efficacy). But the study explored that the prevalence of getting TB was 21.3% among the under 5 years children those who were contacted with TB patients and didn't receive chemoprophylaxis, whereas this prevalence was found more epidemic among the Egyptian children estimated as 51.6% because of several important risk factors for transmission of TB infection were younger age, male sex, severe malnutrition, absence of BCG vaccination, contact with a sputum-positive adult who was a source case, household overcrowding, and exposure to environmental tobacco smoke (Mohamed, 2012). Again, in this study, this prevalence was 5.1% among the 5-12 years children those who didn't receive chemoprophylaxis. Furthermore, this prevalence was 9.7% among the children considering aged under 12 years those who didn't receive chemoprophylaxis.

In this study, location of residence was found a significant factor in comparison of tubercular patients and healthy contacts. Regarding location of residence when tubercular group included both TB and LTBI Patients, the respondents of tubercular group mostly residing in urban (41.38%), urban-slum (58.62%) and nobody in rural area whether in healthy contact they were residing in 3 area. At the same time, the majority of tuberculosis patients stayed in urban slum in comparison to LTBI and healthy contact (81.25% vs. 30.77% vs. 39.26%). Urban slum is an area of highly populated, congested and lacking of hygienic environment which contribute to develop TB.

Here, drinking water, utensil washing water and water for cooking was found as significant factor in developing tuberculosis. In all type of water using in tubercular group used mainly supply water (96.55%). Water is not contaminated by tuberculosis but without purifying supply water use may be a source of water borne diseases which will causes suppression of immune response and make the individual more prone to other diseases like tuberculosis. There also recorded mother education was a significant risk factor. Here, more higher educated was detected in healthy contact than tubercular group (19.63% vs. 10.34%). Mother education is an important factor for children treatment purpose and also for adherence.

In logistic regression analysis, those not taking INH are 5.436 times more prone to develop TB and LTBI than those taking INH as preventive chemotherapy which was statistical significant. When considering age distribution by INH taken, ≤5 years who not taken INH, were 13.419times increased risk and 5-12 years were 2.943 times risk to develop TB and LTBI.

CONCLUSION

In conclusion, INH preventive chemotherapy is an important factor in children contact with adult open pulmonary tuberculosis. Among the ≤5 years children, only52.7% of them received INH prophylaxis and nobody developed TB. But TB was noticeably found in 21.3% of children aged ≤5 years those who didn't take INH prophylaxis. One in every twenty children (5.1%) aged between 5-12 years those who didn't take INH prophylaxis were affected by TB. Again, this prevalence was 9.7% among the children considering aged under 12 years those who didn't receive chemoprophylaxis. In logistic regression analysis, those not taking INH are 5.436 times more prone to develop TB and LTBI than those taking INH as preventive chemotherapy which was statistical significant. When considering age distribution by INH taken, ≤5 years who not taken INH, were 13.419 times increased risk and 5-12 years were 2.943 times risk to develop TB and LTBI. It was an extremely good efficacy whereas nobody developed TB among under 5 children those who received INH chemotherapy. There was a good adherence for the completion of INH chemoprophylaxis by the children aged under 5 years those who were contacted with adult TB cases, though participation rate was not up to the satisfactory mark which need to be focused more. In this study, location of residence was found a significant factor in comparison of tubercular patients and healthy contacts. There also found the majority of tuberculosis patients stayed in urban slum in comparison to LTBI and healthy contact (81.25% vs. 30.77% vs. 39.26%). Malnutrition was one of the contributing factors in current study population and more than 90% of tuberculosis patients were severe underweight in this study.

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