

## Knowledge on Symptoms, Transmission and Treatment of Pulmonary Tuberculosis- Single Centre Study

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**Abstract—** *Introduction: Tuberculosis, caused by mycobacteria, is a major health hazard in our country. This disease can spread to any organ or system in the body resulting in destructive lesions which are clinically significant. Objective: The aim of this study was to assess the awareness of symptoms, transmission and treatment of pulmonary tuberculosis among patients and their relatives visiting the outpatient department (OPD) at the Colombo South Teaching Hospital. Method: A cross-sectional study conducted at the OPD of Colombo South Teaching Hospital. The study included 384 participants above 18 years of age. Verbal and written consent was obtained from all participants. Data was collected using a pre-tested questionnaire & the results were analysed by Pearson chi-squared (SPSS 16 version) method. Results: In our study the majority of participants were found to have a “moderate” knowledge of tuberculosis. Knowledge of the symptoms, transmission and treatment of pulmonary tuberculosis significantly correlated with the demographic variables other than gender, age and profession ( $p < 0.05$ ). A high percentage of participants (95.8%) knew that pulmonary tuberculosis is curable and that prolonged cough (93.8%) is an important symptom of the disease. However, only 45.6% knew that HIV infection is a risk factor for the development of tuberculosis. The participants’ knowledge of the causative organism of TB and its transmission from mother to fetus was considerably low. A high proportion of participants (83.1%) knew that inhalation of infectious droplets is the most common route of transmission of TB. Awareness of preventive measures (covering the mouth and nose while coughing or sneezing-67.2%) and the treatment plan of tuberculosis was at a high level. Conclusion: Except gender, age and profession, other demographic variables (education level and monthly income) is significantly correlated with the level of knowledge of tuberculosis ( $p < 0.05$ ).*

**Keywords—** Tuberculosis, Pulmonary TB

### I. INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*. The disease frequently affects the lungs (pulmonary TB) but can involve other organs/systems (extra pulmonary TB). Tuberculosis remains as a major global health problem as it causes ill-health among millions of people each year. Tuberculosis has been ranked as the second leading cause of death from an infectious disease worldwide, after the human immunodeficiency virus (HIV). The latest estimations reported that there were almost 9 million new cases in 2011 and 1.4 million TB deaths (970,000 among HIV negative people and 430,000 HIV-associated TB deaths). Geographically, the burden of TB is higher in China, India and South Africa. India and China altogether account for almost 40% of the world’s TB cases. About 60% of the cases are in the South-East Asia and Western Pacific regions. The African region has 24% of the world’s TB cases, and the highest rate of deaths due to tuberculosis (WHO report, 2012).

Although Sri Lanka is not categorized under high burden countries for TB, tuberculosis remains as a widespread problem and possess a continuing threat to the health and development of the people. In 1990, it was estimated that about 1841 people were dying from TB every year in Sri Lanka. Current estimates have shown a profound decline in the number of deaths to about 1,622 per year. This is primarily due to the improvement in health education programmes. The TB control programme has a significant impact on the mortality rate (National TB control programme, 2008).

AIDS (Acquired immunodeficiency syndrome), diabetes mellitus, tobacco usage and malnutrition are some risk factors which contribute to the increased incidence of tuberculosis. Among those AIDS is the most important risk factor. AIDS compromises the immunity of the body and render the patient susceptible to exogenous infection or reactivation of the latent disease (Desalu et al, 2013).

Health seeking behaviour and the perceived knowledge on TB among communities is very critical and may reduce or increase the transmission of the disease. Certain native practices, beliefs and failure in the early recognition of symptoms, may delay the diagnosis and hence promote the spread of the disease in the community (Hoa N. P. et al, 2003). Similar to AIDS, TB is often associated with social stigmatization and thus may create resistance among patients to seek proper medical treatment (Janakan et al, 2008). Thus it is important for the community to be knowledgeable about the curative aspect of tuberculosis (JL P N et al, 2002).

In response to the global epidemic and poor control of TB, a comprehensive framework for effective TB control including the “Directly observed treatment, short - course strategy (DOTS)” was developed by the World Health Organization, with the objective of achieving cure and case detection. As a result the TB mortality rate has decreased by 41% since 1990 and the world is on track to achieve the global target of a 50% reduction by the year 2015 (Kaona et al, 2004).

II. METHODOLOGY

A descriptive cross sectional study done at the out patient department (OPD) of the Colombo South Teaching Hospital. Study population included patients and their relatives. Sample size was determined using the following equation.

$$n = \frac{z^2 [P(1-P)]}{d^2}$$

Since there had been no recent research regarding this topic, prevalence was taken as 50%. The (P) value was taken as 0.05(5%).

Margin of error (d) was taken into consideration since the study did not cover a universal population. Thus (d) was taken as 0.05(5%).

$$n = \frac{1.96^2 [0.05(1 - 0.05)]}{0.05^2}$$

$$n = 384.16 = 384$$

Sampling method - Systematic random sampling  
 Data collection method- Written consent was obtained from all the participants. Data was gathered from the pre-tested interviewer administered questionnaire which was written in Sinhala and English languages.

GENERAL OBJECTIVE

To assess the knowledge of symptoms, transmission and drug management of pulmonary tuberculosis among patients and their relatives visiting the outpatient department (OPD) of the Colombo South Teaching Hospital.

III. DATA ANALYSIS

Data was analysed using the SPSS 16 version as the analysis tool. Descriptive statistical methods were used to describe and summarize the sample characteristics. t-test was used to identify the statistical significance of the association between two variables and p-value <0.05 has been taken as the level of significance.

When assessing the level of knowledge with regard to tuberculosis, percentage marks were divided into three categories.

- 0-40 - "Poor Knowledge"
- 41- 65 - "Moderate Knowledge"
- 66-100 - "Good knowledge"

When correlating the category of knowledge with demographic variables (age, gender, profession, education level and monthly income) the marks were divided into two categories.

- 0-40 - "Poor Knowledge"
- 41-100 - "Good Knowledge"

Awareness of preventive measures, treatment plan, attitude and misconceptions were analysed using frequency distribution tables.

IV. RESULTS

Table 1 shows the distribution of demographic characteristics of the study population. A total of 384 subjects participated in the study. The majority (60.8%) of the participants were in the age category of 19-30 years. Females constituted 56.8% of the study sample and 63.8% of the participants had an education level above G.C.E ordinary level. Majority of the participants were employed in the private sector (39.3%) and belong to the low-income category (60.7%).

Table 1. Demographic characteristics

	Characteristic	Frequenc y	Percentag e(%)
<b>Gender</b>	Female	218	56.8
	Male	166	43.2
<b>Age (years)</b>	19-30	126	32.8
	30-40	86	22.4
	40-50	94	24.5
	50-60	60	15.6
	60-75	18	4.7

<b>Education Level</b>	Primary education	22	5.7
	Up to GCE O/L	117	30.5
	Up to GCE A/L	153	39.8
	Higher education	92	24.0
<b>Income level</b>	Low income (Rs.5000-20000)	233	60.7
	Moderate income (Rs.20000-30000)	118	30.7
	High income (Rs.30000-100000)	33	8.6
<b>Occupation</b>	Unemployed	18	4.7
	Government servant	86	22.4
	Private sector	141	36.7
	Merchant	24	6.25
	Retired	76	19.7
	Self employed	39	10.1

Table 2. Frequency distribution of the category of knowledge

Category	Frequency	Percentage (%)
Poor knowledge	123	32.0
Moderate knowledge	218	56.8
Good knowledge	43	11.2

Majority (56.8%) of the participants were in the category of “moderate” knowledge.

Table 3 describes the awareness of the symptoms of tuberculosis. Majority of the participants (93.8%) were aware of prolonged cough as an important symptom of

pulmonary tuberculosis. Hemoptysis was known by 62% of the participants.

Table 3. Awareness of the symptoms of tuberculosis

Common symptoms	Frequency	
	Yes	No
Prolonged Cough	360 (93.8%)	24 (6.2%)
Coughing out blood	238 (62.0%)	146 (38%)
Night sweats	106 (27.6%)	278 (72.4%)
Low-grade fever	150 (39.1%)	234 (60.9%)
Weakness, lethargy	171 (44.5%)	213 (55.5%)
Weight loss	155 (40.4%)	229 (59.6%)

Table 4. Curability, causative organism & transmission of tuberculosis

Variables	Frequency	Percentage (%)
Curability		
Yes	368	95.8
Not known	16	4.2
Causative organism		
Bacteria	151	39.3
Other organisms	104	27.1
Not known	129	33.6
Involvement of organs		
Lung	340	88.5
Bone	10	2.6
Brain	12	3.1
Stomach	15	4.0
Kidney	07	1.8
HIV as a risk factor		
Yes	175	45.6
No	42	11.0
Not known	167	43.5
Spread from person to person		

Yes	356	92.7
No	28	7.3
Most common route of transmission		
Inhalation	319	83.1
Others	65	16.9
Transmission from mother to fetus		
Yes	150	39.0
No	142	37.0
Not known	92	24.0

Out of the total number of participants 368(95.8%) knew that TB is a curable disease but only 151 (39.3%) participants knew that the causative organism was a bacteria. A significant number of participants (88.5%) mentioned that the lung is a major organ to be infected from TB.

In this study, 175(45.6%) participants had reported HIV as a risk factor for TB. Regarding the transmission of tuberculosis 92.7% respondents mentioned that TB can spread from person to person and 319 (83.1%) knew that inhalation is the most common route of transmission. Only 150 (39.0%) participants were aware of the spread of tuberculosis from mother to fetus.

Table 5. Knowledge with regard to the diagnostic tests of tuberculosis

Diagnostic tests	Frequency	Percentage(%)
Blood test	50	13.0
Sputum test	285	74.2
X-ray	43	11.2
Urine	6	1.6

Most subjects (74.2%) accepted the sputum test as the diagnostic test for detecting tuberculosis.

Table 6. Knowledge on the preventive measures of tuberculosis

Preventive measures	Yes	No
Improvement of living conditions	165(43.0%)	219(57.0%)
BCG vaccination	147(38.3%)	237(61.7%)
Good health habits (covering the mouth and nose when sneezing)	258(67.2%)	126(32.8%)
Isolation of patients	102(26.5%)	282(73.4%)
Completion of drug treatment	222(57.8%)	162(42.2%)

Majority of the respondents (67.2%) has considered that covering the mouth and nose with a clean piece of cloth when coughing or sneezing, as the most important preventive measure of minimizing the transmission of tuberculosis.

Table 7. Frequency distribution of the treatment plan of tuberculosis

Variable	Frequency	Percentage(%)
Best treatment		
Western medicine	361	94.0
Others	23	6.0
Recommended treatment		
Western medicine	374	97.4
Others	10	2.6
Reasons for not accepting the recommended treatment		
Inadequate knowledge on TB	262(68.2)	122(31.8)
Travelling difficulties	137(35.7)	247(64.3)
Lack of time	131(34.1)	253(65.9)
Financial difficulties	152(39.6)	232(60.4)
Duration of treatment		
Few days	3	0.8
Few weeks	49	12.7
Several months	332	86.4
Continuity of drugs		
Do not discontinue drugs once the symptoms have resolved	279(72.7)	105(27.3)
Discontinue drugs once the symptoms have resolved	105(27.3)	279(72.7)

Out of 384 participants, 374(97.4%) had considered western medicine as the best treatment option. Majority of the respondents believed that the inadequate knowledge regarding the treatment plan(68.2%) and financial difficulties(39.6%) were the major factors which contributed to the discontinuation of treatment. There were 279(72.7%) respondents mentioning that drugs should not be stopped once the symptoms have disappeared.

Table 8. Frequency distribution of the misconceptions of tuberculosis

Misconceptions	Frequency	Percentage
Transmission through food	103	26.8
Transmission through skin	18	4.7
Transmission through blood	50	13.0

One hundred and seventy one participants of the study population believed in at least one of the above mentioned misconceptions.

Table 9. Frequency distribution of the sources of information

Sources of Information	Frequency	
	Yes	No
News paper	251(65.4%)	133(34.6%)
Television	311(81.0%)	73(19.0%)
Radio	159(41.4%)	225(58.6%)
Magazines	149(38.8%)	235(61.2%)
Health workers	51(13.3)	333(86.7%)

Majority of the participants mentioned that the television (81.0%) was the main source of information about tuberculosis.

### V. DISCUSSION

Tuberculosis is a disease which is preventable and curable. The disease still thrives in countries of Asia and Africa. Developed countries have relatively low rates of infection, which is encountered predominantly among homeless people, migrants, prisoners, drug users, heavy drinkers and people with HIV/AIDS (Li X et al, 2012). The goal of the World Health Organization is to drastically reduce the infection rate and eliminate tuberculosis by the year 2050. The WHO strategy involves broader screening for both active and latent TB infections in high risk groups, funding high quality health services and investing in new drugs, vaccines and diagnostic tests (Maher et al, 1997).

This study was undertaken to appraise the knowledge on symptoms, transmission and treatment of tuberculosis among the patients and their relatives who visit the outpatient department (OPD) at Colombo South Teaching Hospital. There are few studies of pulmonary tuberculosis

which have been conducted in Sri Lanka<sup>(8)</sup>. In our study the categorization of knowledge on tuberculosis into three groups as poor, moderate and good resulted in zero values for certain variables, thus hampering the application of the chi squared test. To overcome this problem knowledge on TB was categorized as poor and good.

There was no statistically significant association between gender, age and profession with the category of knowledge ( $p > 0.05$ ). These results are quite similar to a study conducted among the general population of Metro Manila, Philippines. In contrast to the above findings a research conducted in Vietnam revealed that the gender ( $p = 0.001$ ) and age ( $p = 0.003$ ) had a significant association with the level of knowledge.

In our study almost all the respondents were aware of at least one warning sign of tuberculosis. A study conducted in Nigeria had revealed that 71% of the participants were aware of at least one warning sign of tuberculosis<sup>(6)</sup>. In our study the most frequently identified TB warning sign was prolonged cough (93.8%) followed by haemoptysis (62.0%) and generalized weakness (44.5%).

The fact that TB is caused by a microbe helps the public to understand how the disease is transmitted (Mohamed A et al, 2007). A considerable number of respondents (39.3%) in this study knew that TB was caused by a bacteria. This result differs from the findings of a similar study conducted in Sudan where only 1.9% respondents knew that TB was a microbial infection.

In our study the major sources of information about TB was the television (81%) followed by newspapers (65.4%). Research conducted in two districts of Pakistan’s Punjab province had disclosed that television (urban-80.1%, rural-68.1%) and health workers (urban-30.6%, rural-41.4%) as the main sources of information (Mushtaq et al, 2011). We found that there was a significant association between the source of information and the level of knowledge on TB ( $p < 0.05$ ). However, this result varies with the research conducted in Philippines which revealed that there was no significant association between the sources of information and the level of knowledge on TB ( $p > 0.05$ ).

Surprisingly, only 45.6% respondents had known that HIV was a risk factor for the development of TB. In a study done in Nigeria 49.8% of the participants had correctly responded to this fact (Obuku et al, 2012; Odusanya et al, 2004). These results are in contrast to what had been reported in Philippines where 97.7% respondents noted that HIV/AIDS was not a risk factor for TB (Rubel et al, 1992).

The most common route of transmission of TB, which is inhalation was known by 83.1% of the respondents. A study conducted in Vietnam reported that 313 (55.99%) of interviewed subjects knew inhalation was the main mode of transmission of TB (Sreeramareddy et al, 2013). Our study revealed that the higher family income and higher literacy attributed to better knowledge on tuberculosis. Families that have high revenues are able to procure household assets like television, radio and other communication appliances that enhance their knowledge on health related issues which are of public concern ( $p > 0.05$ ). A research done in Philippines had disclosed that a higher score was independently associated with the education level ( $p > 0.05$ ) (9). A recent study carried out in Pakistan had noted that there is an association between the higher monthly income and the level of knowledge on TB ( $p > 0.05$ ). (Verhagen et al, 2011).

The majority of respondents (95.8%) in our study knew that tuberculosis was a curable disease. In a similar study done in Sudan, 80.3% of the participants had known that TB can be cured. This is an important fact that needs to be emphasized in public awareness programmes. This message will encourage the community to seek medical treatment (Sheikh et al, 2012).

In our study the majority of the respondents (74.2%) mentioned the sputum test as a key investigation for the diagnosis of TB. In a research conducted in Pakistan 91.4% of parents and 66.67% of guardians had mentioned that X-ray is the key investigation for the diagnosis of TB.

Preventive measures are important to be followed to avoid the transmission of the disease. Most of the respondents had noted that covering the mouth and nose while coughing and sneezing (67.2%) as the main preventive measure. In addition, assisting the patients to seek proper medication (57.8%) and administering BCG vaccine during childhood (38.3%) were the other practice methods mentioned by the participants. These results are somewhat similar to a study done in Pakistan where they have identified that covering the mouth and nose while coughing and sneezing (urban-78.2%, rural-61.6%), using appropriate drugs (urban-44.7%, rural-41.2%) and BCG vaccination at childhood (urban-43.8%, rural-32.7%) as important preventive measures.

Another important health related issue to be assessed is the transmission of TB to the fetus from an infected mother. One hundred and forty six (38%) participants who visited the Colombo South Teaching Hospital, knew about the transplacental transmission from an infected mother. In a research done in Zambia 59.3% of subjects

had known that TB could be transmitted from mother to fetus.

Misconceptions related to TB were shown in the table 4. Similar misconceptions have been identified in a study done in India.

Our study revealed that poor knowledge (68.2%) and financial difficulties (39.6%) were the most common reasons for not seeking proper treatment. It is essential to identify the reasons for not seeking medical treatment and address those issues through health education programmes.

The attitude of most participants (97.9%) regarding TB infected patients was to be supportive and caring. A study done in Pakistan (urban-81.5%, rural -74.2%), had reported similar results (Mushtaq et al, 2011).

## VI. CONCLUSION

Our study revealed that a high percentage of participants were aware of the important symptoms of TB. The majority of participants knew that tuberculosis is a curable disease. The knowledge of routes of transmission and preventive measures was satisfactory. The participants' knowledge of HIV/AIDS as a risk factor for TB was poor (45.6%). Apart from gender, profession and age, other demographic variables (education level and monthly income) had a statistically significant association with the category of knowledge on TB ( $p < 0.05$ ).

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