

Knowledge and attitudes towards pulmonary tuberculosis and factors associated among general public aged 20-30 in Colombo district.

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Abstract

Background: Pulmonary tuberculosis is one of the leading respiratory diseases in Sri Lanka. After the COVID-19 Pandemic, Peoples' Knowledge and Attitude towards Respiratory diseases has been improved.

Objectives: The objective of this study was to describe the knowledge, attitudes and factors associated towards pulmonary tuberculosis among general public aged 20-30 in Colombo District.

Methodology: A descriptive cross-sectional study was conducted by snowball sampling method on a sample of 408 participants aged between 20-30 years residing in Colombo District. Data was collected using a validated, pre-tested, self-administered, structured Google form in English, Sinhala and Tamil languages consisted of 3 separate entities on sociodemographic factors, knowledge on and attitude towards pulmonary tuberculosis. The knowledge level of the participants was categorized as good knowledge, average knowledge and poor knowledge and the attitude of the participants were categorized as positive attitude, neutral attitude and negative attitude. Results were analyzed by using SPSS software. Association of socio-demographic and other factors with the level of knowledge and attitudes were analyzed by Chi square tests. Level of significance was considered as $p < 0.05$.

Results: The sample size is 408 persons and 394 persons consented to participate in this study. The response rate was 96.6%. Good level of knowledge on pulmonary tuberculosis was observed among 32.5% ($n=128$) of the participants where as 41.4% ($n=162$) had a positive attitude towards it. There were statistically significant associations between participants' level of knowledge and their gender, occupation and educational level. And also, there were statistically significant associations between participants attitude towards pulmonary tuberculosis and their age, gender, occupation and educational level.

Conclusion and Recommendations: The Level of Knowledge and the Attitude towards Pulmonary Tuberculosis affected by the participants socio demographic factors and participants who had more knowledge on the disease had more positive attitude towards the disease and it is recommended to held more awareness about respiratory diseases including Pulmonary tuberculosis among general public.

Key words: Pulmonary tuberculosis, Knowledge, Attitude, General public.

Introduction

Tuberculosis is a serious infectious disease that affects the respiratory system mainly the lungs and for a lesser extent the other systems. This is a bacterial infection caused by a bacterium called *Mycobacterium tuberculosis*. This aetiological bacterium can spread from person to person via tiny droplets released from coughing and sneezing by an infected person causing pulmonary tuberculosis (PTB). There are two forms in this disease, latent and active PTB.

In latent PTB, the immune system prevents the further spreading of existing bacteria in the body. These patients are not symptoms or contagious, however, there is a possibility of reactivation of the infection due to a compromised immune system by several factors. World health Organization reports, about one third of the world population has latent form of PTB.

Patients with active form of PTB are symptomatic and contagious. Diagnosis of active PTB is done based on chest X-rays, microscopic examination and culture of specimens obtained from the respiratory tract; most of the instances sputum. Main mode of prevention of PTB includes Bacillus Calmette-Guerin (BCG) vaccination and children born in high-risk countries like Sri Lanka are immunized with recommended dose of BCG vaccine soon after birth.

People with close and frequent contact with infected patient are high at risk and frequent screening is required to early diagnosis. The rate of transmission depends on number of active infectious droplets released by the patient, ventilation, time period of exposure and the immunity of uninfected person.

Methodology

A descriptive cross-sectional study was conducted among general public aged 20-30 in Colombo district to describe the knowledge and attitude towards pulmonary tuberculosis and factors associated with it. Foreign nationals living in Colombo and People who cannot read English or

Sinhala or Tamil were excluded. Study period for this research was May 2022- November 2022 and sample size was calculated as 408 samples with Non response rate of 10%. The sampling technique used was the snowball sampling. It is a nonprobability sampling technique, where the questionnaire was distributed among identified individual who fulfill the inclusion criteria. Same process carried out until the sample size is saturated. Pre-tested structured self-administrated questionnaires was used as the tool for our study. We used them to determine and describe the level of knowledge of our participants and their attitude towards the disease and patients.

A standard questionnaire that includes above variables was prepared. The questionnaire consisted of three sections. Section 1 was to ask about the socio demographic factors of the participants (Gender, MOH area of residence, educational level, occupation, Marital status, Monthly income, Age). Section was to determine the knowledge of participants about pulmonary tuberculosis. Section 3 was to determine the attitudes of participants towards pulmonary tuberculosis.

Data from the Google form was entered into a single database and interpreted using SPSS software. There were 16 questions to assess participants' level of knowledge and it was marked accordingly. Participants who answered 11-16 questions correctly came under good knowledge category, participants who answered 6-10 questions correctly came under average knowledge category and participants who answered 5 questions or less than 5 questions correctly came under poor knowledge category.

There were 9 questions to assess participants' attitude towards pulmonary tuberculosis and they were in Likert scale, and the marks were given as below, strongly agree – 1

mark, agree-2 marks, neutral-3 marks, disagree-4 marks and strongly disagree-5 marks. Participants who score between 31-45 marks came under positive attitude category, participants who score between 16-30 marks came under neutral attitude category and participants who scored less than 16 marks came under negative attitude category. Range check and Customs check was performed to ensure the accuracy of the data. Univariate and Multivariate tables was presented with appropriate statistical tests.

Privacy, confidentiality, anonymity, and informed consent was obtained from the people above mentioned. Data was collected without their names. We assured that the data we gather from the people would not be revealed outside the research team. The data we gather was strictly be used only for this study and was not used for any other purpose. The results of this research will be published in journals, symposiums or any other appropriate academic forums without mentioning the personal details of the participants. Questionnaires were only accessible for the research team. Ethical clearance for the study was obtained from the Ethical Clearance Committee of University of Sri Jayewardenepura.

Results and Analysis

4.1: Non-response

The sample size is 408 participants. Out of the selected 408 persons, 394 consented to participate. Hence, the response rate was 96.6%.

4.2: Socio demographic characteristics of the study population

The socio demographic characteristics of the participants were assessed in the questionnaire and the frequency distribution of data is presented in the following Table 1.

Table 1: Socio-demographic characteristics of the participants

	Frequency (n)	Percentage (%)
<i>Age (in years)</i>		
30	24	6.1
29	27	6.9
28	16	4.1
27	25	6.3
26	33	8.4
25	48	12.2
24	101	25.6
23	60	15.2
22	8	2.0
21	32	6.1
20	20	5.1
<i>Total</i>	394	100.0

<i>Gender</i>		
<i>Male</i>	163	41.4
<i>Female</i>		39.6
<i>Total</i>		
<i>Occupation</i>		
<i>Medical related</i>	156	
<i>Non-medical related</i>	238	60.4
<i>Total</i>	394	100.0
<i>MOH area</i>		
<i>Baththaramulla</i>	16	4.1
<i>Homagama</i>	41	0.4
<i>Boralesgamuwa</i>	37	9.4
<i>Dehiwala</i>	1	2.8
<i>Hanwella</i>	22	5.6
<i>Kaduwela</i>	17	4.3
<i>Kahathuduwa</i>	13	3.3
<i>Kolonnawa</i>	4	3.6
<i>Maharagama</i>	33	8.4
<i>Moratuwa</i>	62	15.7
<i>Nugegoda</i>	47	11.9
<i>Padukka</i>	13	3.3
<i>Piliyandala</i>	35	8.9
<i>Pitakotte</i>	8	2.0
<i>Ratmalana</i>	25	6.3
<i>Total</i>	394	100
<i>Educational Level</i>		
<i>No school education</i>	2	0.5
<i>Primary education</i>	8	2.0
<i>Up to OL</i>	16	4.
<i>Up to AL</i>	82	20.8
<i>Undergraduate</i>	267	67.8
<i>Postgraduate</i>	19	4.8
<i>Total</i>	394	100
<i>Family monthly income</i>		
<i></=Rs 49000</i>	66	16.8
<i>Rs 50000-Rs 99000</i>	130	33.0
<i>Rs 100000-Rs 199000</i>	124	31.5
<i>>/=Rs 200000</i>	74	18.8
<i>Total</i>	394	100.0
<i>Marital status</i>		
<i>Married</i>	54	13.7
<i>Unmarried</i>	338	85.8

<i>Divorced</i>	2	0.5
<i>Total</i>	394	100

According to table 1 above, highest frequency of participants (n=101 ,25.6%) were aged 24 years and majority (n=231 ,58.6%) of the participants were Female. Among the study done, most of the participants (60.4%, n=238) were not related to the medical field. Out of the respondents the highest number of respondents were residing in Moratuwa MOH area (15.7%, n=62). Major proportion of the participants (67.8%, n=267) were Undergraduates. 13.7% (n=54) of the participants were married while only 0.5%(n=2) of the participants were divorced. Majority of the participants 85.8% (n=338) were unmarried. According to the family income, 16.8%(n=66) of the participants had a family income of less than or equal to Rs49,000.

33% (n=130) of the participants had an income between Rs 49,000 to Rs 90,000. 31.5% (n=124) of the participants had a monthly income between Rs 100,000 to Rs 199,000 and 18.8%(n=74) of the participants had an income more than or equal to Rs 200,000.

4.3: Assessment of Knowledge on Pulmonary TB

Knowledge on Pulmonary Tuberculosis was assessed in the questionnaire in section 2. They are 16 MCQ type questions and they have been marked accordingly. The correct and incorrect responses of the participants are shown in Table 2

Table 2: Frequency of distribution of the correct and incorrect responses of Participants by their knowledge

	<i>Correct Responses</i>		<i>Incorrect Responses</i>		<i>Total</i>	
	<i>Frequenc y (n)</i>	<i>Percentage (%)</i>	<i>Frequenc y (n)</i>	<i>Percentage (%)</i>	<i>Frequenc y (n)</i>	<i>Percentage (%)</i>
<i>Knowledge on Pulmonary Tuberculosis</i>						
<i>Q1 Mode of transmission</i>	346	87.8	48	12.2	394	100.0
<i>Q2 Causative Organism</i>	308	78.2	86	21.8	394	100.0
<i>Q3 Contagiousness</i>	304	77.2	90	22.8	394	100.0
<i>Q4 Number of patients reported</i>	71	18.0	323	82.0	394	100.0
<i>Q5 Curability</i>	320	81.2	74	18.8	394	100.0
<i>Q6 Latent Tuberculosis</i>	220	55.8	174	44.2	394	100.0
<i>Q7 Signs and Symptoms</i>	308	78.2	86	21.8	394	100.0
<i>Q8 Who are at Risk</i>	215	54.6	179	45.4	394	100.0
<i>Q9 Complications</i>	292	74.1	102	25.9	394	100.0
<i>Knowledge on Preventive methods and Treatment</i>						
<i>Q1 Vaccination</i>	308	78.2	86	21.8	394	100.0
<i>Q2 X-ray detection</i>	100	25.4	294	74.6	394	100.0
<i>Q3 Tuberculin Test</i>	156	39.6	238	60.4	394	100.0
<i>Q4 Multi Resistant Tuberculosis</i>	182	46.2	212	53.8	394	100.0
<i>Q5 PTB treatment time period</i>	144	36.5	250	63.5	394	100.0
<i>Q6 Drug Resistant Tuberculosis cause</i>	186	47.2	208	52.8	394	100.0
<i>Q7 Contagiousness during treatment</i>	126	32.0	268	68.0	394	100.0

According to table 4.3.1 above, majority of the participants (87.8%) (n=346) were aware of the mode of transmission which is Air. 77.2% (n=304) knew PTB was contagious. 78.2% of the participants (n=308) knew the causative organism as a bacterium. 81.2% of the participants (n=320) knew PTB was curable. 78.2% of the participants (n=308) knew the appropriate signs and symptoms of pulmonary tuberculosis to identify the disease. When it comes to knowledge of prevention and treatment modalities, most of the participants (78.2%) answered correctly regarding the use of BCG vaccines as a prevention method of PTB. 74.1% of the participants (n=292) knew the complications of pulmonary tuberculosis. Nearly half of the participants (55.8%, n=220) were aware of latent tuberculosis, 47.2% of the participants (n=186) answered correctly regarding drug resistant tuberculosis while 46.2% (n=182) answered correctly in regard to the multi resistant tuberculosis question.

Although the result seems positive at one glance, majority of the participants were not aware of preventive methods and treatment. Compared to the question on knowledge of PTB, where the results were satisfactory, a low percentage of participants answered correctly regarding X-ray detection (25.4%), tuberculin test (39.6%) in detecting PTB. While only around 1/3rd of the respondents knew pulmonary tuberculosis treatment time period (36.5%) and contagiousness during treatments (32.0%), only 18% of the respondents (n=71) knew about the actual number of patients reported of PTB in Colombo District each year.

According to table 3 above, among the study participants, majority (39.8%, n=157) of them were having an average knowledge on pulmonary tuberculosis while 32.5% (n=128) were having good knowledge. 27.7% (n=109) of the participants were having poor knowledge on pulmonary tuberculosis.

Table 3: Frequency of distribution of overall knowledge on Pulmonary Tuberculosis among study participants

Characteristics	Frequency	Percentage
Good knowledge	128	32.5
Average knowledge	157	39.8
Poor knowledge	109	27.7
Total	394	100.0

4.4: Assessment of Attitude towards Pulmonary Tuberculosis

Attitude towards pulmonary tuberculosis were assessed in the questionnaire in section 3.

The attitude of the participants was assessed by 9 questions using Likert scale and they have been marked accordingly.

Table 4: Frequency of distribution of attitude towards Pulmonary Tuberculosis among study participants.

Questions	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Total	
	p	n	p	n	p	n	p	n	p	n	p	
I believe TB is not a serious illness and it will get cured on its own like common cold	19	4.8	83	21.1	80	20.3	107	27.2	105	26.6	394	100.0
I will be ashamed to be diagnosed with TB	37	9.4	89	22.6	92	23.4	83	21.1	93	23.6	394	100.0
I fear I will get cornered by the society if I get TB	49	12.4	109	27.7	86	21.8	74	18.8	76	19.3	394	100.0
I would encourage my												

<i>family member to get tested for TB</i>	175	44.4	107	27.2	42	10.7	43	10.9	27	6.9	394	100.0
<i>A patient is able to live a normal life after TB treatment</i>	81	20.6	127	32.2	102	25.9	53	13.5	31	7.9	394	100.0
<i>I prefer Diabetes over Tuberculosis because diabetes is common</i>	18	4.6	62	15.7	157	39.8	57	14.5	100	25.4	394	100.0
<i>I would associate with a person who had treated for TB in past</i>	98	24.9	157	39.8	69	17.5	42	10.7	28	7.2	394	100.0
<i>I would be hesitant to share items with TB patient.</i>	59	15.0	119	30.2	93	23.6	78	19.8	45	11.4	394	100.0
<i>I think a TB patient should completely isolate themselves</i>	48	12.2	92	23.4	148	37.6	71	18.0	35	8.9	394	100.0

Table 5: Frequency of distribution of overall attitude towards Pulmonary Tuberculosis among study participants

Characteristics	Frequency (n)	Percentage (%)
<i>Positive Attitude</i>	162	41.1
<i>Neutral Attitude</i>	174	44.2
<i>Negative Attitude</i>	58	14.7
<i>Total</i>	394	100.0

According to table 4 above, majority of the participants either disagreed (27.2%) or strongly disagreed (26.6%) to "I believe TB is not a serious illness and it will get cured on its own like the common cold without any treatment". 9.4% of the participants strongly agreed and 22.6% to "I will be ashamed to be diagnosed with TB". 40.1% of the participants agreed to the statement "I fear I will get cornered by the society if I get diagnosed with TB". Majority of the participants (71.4%) strongly agreed with the statement "I would encourage a family member or a friend to get tested for TB if they show relevant symptoms". Only 20.6% of the participants strongly agreed to the statement

"I believe a patient is able to live a normal life after the full course the TB treatment. Overall, 20.3% of the participants agreed or strongly agreed to the statement "I prefer to have Diabetes over Tuberculosis as people are scared of TB and diabetes is a common disease". 64.7% of the participants either agreed or strongly agreed to the statement, "I would associate with a person who was treated for TB in the past without hesitation" but 45.2% of the participants either agreed or strongly agreed the statement "I would be hesitant to share items with TB patient within their treatment course despite the items being fully sanitized". 35.6% of the participants either agreed or strongly agreed to the statement, "I think a TB patient should completely isolate themselves during the full course of treatment despite their contagiousness.

Table 6: Association between Knowledge on Pulmonary Tuberculosis and Age among study participants

Characteristics	Good knowledge		Average knowledge		Poor knowledge		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
	<i>Age</i>								
20-25	87	32.3	112	45	70	26.0	269	100.0	X ² =21.1 df=2 p=0.392,
26-30	41	32.8	41.7	36.0	39	31.2	125	100.0	

There was no statistically significant associations between Age and Knowledge among study participants. (p=0.392, p>0.05).

Table 7: Association between Knowledge on Pulmonary Tuberculosis and Gender among study participants

Characteristics	Good knowledge		Average knowledge		Poor knowledge		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
	<i>Gender</i>								
Male	64	39.3	61	37.4	38	23.3	163	100.0	X ² =6.2 df=2 p=0.044, s
Female	41	28.3	56	38.6	48	33.1	231	100.0	

There was statistically significant associations between Gender and Knowledge among study participants. (p=0.044, p<0.05).

Table 8: Association between Knowledge on Pulmonary Tuberculosis and Occupation among study participants

Characteristics	Good knowledge		Average knowledge		Poor knowledge		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
	<i>Occupation</i>								
Medical related	76	48.7	67	42.9	13	8.3	156	100.0	X ² =56.5 df=2 p=0.000
Non-medical related	52	21.8	90	37.8	96	40.3	238	100.0	

Participants who are in the medical field (48.7%) were having good knowledge than the Participants who are not in the medical field (21.8%).

There was statistically significant associations between Occupation and Knowledge among study participants. (p=0.000, p<0.05).

Table 9: Association between Knowledge on Pulmonary Tuberculosis and Educational level among study participants

Characteristics	Good knowledge		Average knowledge		Poor knowledge		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
<i>Educational level</i>									
Up to AL	17	15.7	39	36.2	52	48.1	108	100.0	X ² =68.6 df=10 p=0.000, s
Higher studies	111	38.8	118	41.3	57	19.9	286	100.0	

Participants who are doing their higher studies were having good knowledge than the other Participants and the above associations are statistically significant. There were statistically significant associations between educational level and Knowledge among study participants. (p=0.000, p<0.05).

4.3: Factors associated with Attitude towards Pulmonary Tuberculosis

Significances of Associations between Knowledge and selected factors are presented in the following tables.

Table 10: Association between Attitude towards Pulmonary Tuberculosis and Age among study participants

Characteristics	Positive Attitude		Neutral Attitude		Negative Attitude		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
<i>Age</i>									
20-25	124	46.1	115	42.8	30	11.1	269	100.0	X ² =39.308 df=2 p=0.006, s
26-30	41	32.8	45	36.0	39	31.2	125	100.0	

Participants who were aged 20-25 years (46.1%) were having positive attitude more the Participants who were aged 26-30 years (32.8%).

There was statistically significant associations between Age and Attitude among study participants. (p=0.006, p<0.05).

Table 11: Association between Attitude towards Pulmonary Tuberculosis and Gender among study participants

Characteristics	Positive Attitude		Neutral Attitude		Negative Attitude		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
<i>Gender</i>									
Male	57	35.0	68	41.7	38	23.3	163	100.0	X ² =16.874 df=2 p=0.000, s
Female	105	45.5	106	45.9	20	8.7	231	100.0	

Participants who were Female (45.5%) were having positive attitude more the participants who were male (35.0%). There were statistically

significant associations between Gender and Attitude among study participants. ($p=0.000$, $p<0.05$).

Table 12: Association between Attitude towards Pulmonary Tuberculosis and Occupation among study participants

Characteristics	Positive Attitude		Neutral Attitude		Negative Attitude		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
<i>Occupation</i>									
Medical related	90	57.7	55	35.3	11	7.1	156	100.0	$X^2=32.214$ df=2 $p=0.000$, s
Non-medical related	72	30.3	119	50.0	47	19.7	238	100.0	

Participants who were in the medical field (57.7%) were having positive attitude more the Participants who were not in the medical field

(30.3%). There was statistically significant associations between Occupation and Attitude among study participants. ($p=0.000$, $p<0.05$).

Table 13: Association between Attitude towards Pulmonary Tuberculosis and Educational level among study participants

Characteristics	Positive Attitude		Neutral Attitude		Negative Attitude		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
<i>Educational Level</i>									
Up to AL	21	19.4	51	47.2	36	33.4	108	100.0	$X^2=82.472$ df=10 $p=0.000$, s
Higher studies	141	49.3	123	43.0	22	7.7	286	100.0	

Participants who were in the higher studies (49.3%) were having positive attitude more the Participants who were studied up to AL (19.4%). There was statistically significant associations between Educational level and Attitude among study participants. ($p=0.000$, $p<0.05$).

4.4 : Association between Knowledge and Attitude towards Pulmonary Tuberculosis

Association between knowledge and attitude towards Pulmonary Tuberculosis is shown in the Table 4.7

Table 14: Association between knowledge and attitude towards Pulmonary Tuberculosis

Characteristics	Positive Attitude		Neutral Attitude		Negative Attitude		Total		
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %	
Participants who have good knowledge	86	67.2	39	30.5	3	2.3	128	100.0	$X^2= 83.360$

									df=
<i>Participants who have average knowledge</i>	62	39.5	73	46.5	22	14.0	157	100.0	4
<i>Participants who have poor knowledge</i>	14	12.8	62	56.9	33	30.3	109	100.0	p=0.000,s

There was statistically significant association between knowledge on pulmonary tuberculosis and Attitude towards pulmonary tuberculosis. ($p=0.000$).

Majority of the participants who have good knowledge on pulmonary tuberculosis were having positive attitude towards pulmonary tuberculosis (67.2%) and 12.8% of the participants who have poor knowledge on pulmonary tuberculosis were having positive attitude towards pulmonary tuberculosis.

Discussion

On behalf of determining the knowledge and attitude towards pulmonary tuberculosis, a descriptive cross-sectional study was conducted among the public, aged 20-30 in Colombo District.

5.1 Methodological issues

Google forms were used to collect responses as it would be easier to reach the participants via an online platform given the fact, that the research was conducted during the COVID-19 pandemic. The sample size was 408 which was difficult to reach within the given time despite us using an online google form.

5.2 Results

Thirty-two-point five percent of the participants had good knowledge on pulmonary tuberculosis, while 39.8% and 27.7% of the participants had average and poor knowledge respectively. Further, the current study revealed that 41.1% of the participants had positive attitude, 44.2% had neutral attitude and 14.7% had negative attitude towards pulmonary tuberculosis.

5.2.1 Assessment of knowledge of pulmonary tuberculosis

Knowledge of pulmonary tuberculosis was assessed through predominantly covering the areas of basic knowledge of the disease and the knowledge on preventive methods and treatments. The knowledge of PTB was asked through questions that covered the knowledge of the causative organism, mode of transmission, contagiousness, number of patients reported within the Colombo District annually, curability of the disease, signs and symptoms of the disease and complications and the knowledge of the most vulnerable people at risk of being infected with PTB. The knowledge of preventive

methods and treatments of PTB was assessed through questions covering the areas of the tests that are done to detect PTB, the use of BCG vaccine to prevent the spread of TB, the treatment process for PTB and the importance of adherence to the treatment regime.

Regarding the overall knowledge, most participants were having an average (39.8%, $n=157$) while 32.5% ($n=128$) of them were having good knowledge and the rest, 27.7% ($n=109$) with a poor knowledge on pulmonary tuberculosis. A cross sectional study which was conducted during January-March 2011, assessing the attitudes and practices towards TB across 30 districts of India showed that only 17% of the general population were having appropriate knowledge on TB¹

In contrast to that, this study, although it was conducted among the general population, the proportion of participants who were having good and average knowledge were higher than that of poor knowledge. This could be due to the advances in technology with time and the fact as a majority of the sample already had or were in the process of undergoing higher studies (67.8% were undergraduates)¹.

In another cross-sectional study which was conducted in 2003 in Iraq on randomly selected 500 patients and 500 health care workers (HCWs) from 250 primary health care centers, 95.5% of HCWs had a good knowledge of TB while 64.4% of patients had a good knowledge solely based on the information, they have gathered from physicians¹⁰.

Most participants in the current study had correctly answered the mode of transmission of PTB (87.8%, $n=346$). In a similar study which was done in 2018 to assess the knowledge, attitude and practice towards PTB among North Mecha District residents visiting public health facilities, 74% of the sample had mentioned that droplet inhalation as the main mode of transmission of the disease which gave somewhat similar results.⁶

Regarding signs and symptoms of TB, most of the participants were aware of the usual signs and symptoms of PTB (78.2%, $n=308$). However, in the study, 39.4% mentioned that cough for greater than

or equal 2 weeks as the symptom of PTB. More than half of the respondents of the study (56%) stated that bacteria is the responsible agent for TB whereas in the current study a majority knew (78.2%) that a bacterium is the causative microorganism.

Only a small proportion (18.8%) of population had no knowledge on curability. Comparatively in a cross-sectional study which was conducted during January - March 2011 across 30 districts in India, 87% of the participants knew that TB was curable.⁶

In the recent study, 78.2% of the participants were aware of vaccination but only minority (39.6%) knew about the tuberculin skin test. Further, only 36.5% of the study population were aware of the treatment period of PTB. Comparatively, in a cross-sectional study which was conducted to assess the knowledge of TB among undergraduate health care students in 15 Italian universities, 87.4% of participants were aware of the existence of a vaccine out of which 66.3% declared that this vaccine has a poor effectiveness. Seventy-five-point one percent of respondents mentioned that the treatment of TB is problematic and requires the intake of a combination of antibiotics over a long period of time. In the same study, 88% declared that the tuberculin skin test (TST) is helpful in diagnosing latent TB infection.⁹

5.2.2 Attitudes towards pulmonary tuberculosis

Most participants were having neutral attitude towards pulmonary tuberculosis (44.2% n=174), 41.1%(n=162) were having positive attitude and only 14.7%(n=58) were having negative attitude towards pulmonary tuberculosis. However, a cross sectional study which was conducted during January-March 2011; assessing the attitude and practices towards TB across 30 districts of India showed that 73% had stigmatizing and 98% had discriminating attitude towards TB patients.¹

A cross sectional study, which was conducted in 2007 to describe the attitude towards TB in general population in Croatia showed that being near to a TB patient would be uncomfortable for 39.9% of respondents. In the current study, only 17.9% of the participants either disagreed or strongly disagreed to the statement, "I would associate with a person who was treated for TB in the past without hesitation". That study also showed that contact with TB patient would be avoided by 26.4% of respondents and if sick with TB, 9.6% of participants would keep it hidden from the society³

However, the current study revealed that 89.2% of respondents either agreed or strongly agreed to "I would be hesitant to share items with TB patients" and 32% of respondents either agreed or strongly agreed to "I will be ashamed to be diagnosed with TB".

Another cross-sectional study which was conducted in Iraq including randomly selected 500 patients and 500 health care workers from 250 primary care centers showed that 54.8% had negative attitude towards TB and they were reluctant

to seek care for fear of being diagnosed with TB. In the present study 40.1% of respondents have agreed or strongly agreed to "I fear I will get cornered by the society if I get TB".

Another cross-sectional survey conducted on knowledge, attitude and practices towards TB in 28 health facilities providing TB services in Kathmandu, Valley and Nepal revealed that the majority (73.2%) of HCW s had positive attitude towards infection control of TB⁸

In contrast, although the current study was conducted among the general population, 35.6% of respondents either agreed or strongly agreed to "I think a TB patient should completely isolate themselves".

5.2.3 Assessment of knowledge of pulmonary tuberculosis in association with selected the sociodemographic factors.

The distribution of the overall knowledge regarding PTB was analyzed and found 32.5% (n=128) of the participants had good knowledge, 39.8 (n=157) had average knowledge and 27.7% (n=109) had poor knowledge of PTB.

The knowledge of the participants regarding PTB was further evaluated according to their socio-demographic factors stating their statistical validity and found that of the 269 participants aged 20-25 years, 32.3% had good knowledge, 41.7% average knowledge and 23% poor knowledge of PTB. Further, out of 125 participants aged 26-30, 32.8% had good knowledge, 36% average knowledge and 31.2% poor knowledge. The association between knowledge on PTB and age among study participants showed no statistically significant association ($p=0.392$, $p>0.05$). A study done in India in 2016 has a similar percentage in this category where 33% of the participants between the ages of 18-24 and 32% of participants in the age group of 25-34 years had good knowledge of PTB also showing no statistical significance⁵.

Out of the 163 male participants, 39.3% had good knowledge, 37.4% average knowledge and 23.3% poor knowledge while out of the 231 female participants only 28.3% had good knowledge, 38.6% had average knowledge and 33.1% had poor knowledge in PTB. The percentages of good knowledge and poor knowledge vary vastly with the gender according to the study. This indicates a statistically significant association between gender and knowledge among the study participants. ($p=0.044$, $p<0.05$). In a study done in India to assess the self-reported PTB, knowledge about tuberculosis transmission and its determinants among adults also shows that as a percentage men had better knowledge of PTB than women giving similar findings.⁵

Among the participants, 156 out of the 394 had an occupation related to the medical field. Out of these, 48.7% had a good knowledge while only 8.3% had poor knowledge on PTB. On the contrary only 21.8% of the participants related to non-medical related occupations had a good knowledge while most of them (40.3%) had poor knowledge of PTB.

Association between knowledge of PTB and field of occupation shows statistical significance. ($p=0.000$, $p<0.05$).

Out of the 108 participants with an education only up to Advanced Level, 15.7% had good knowledge of PTB while the majority, 48.1%, had poor knowledge. Out of the 286 participants with higher education only 19.9% had poor knowledge on PTB while 38.8% had good knowledge. Therefore, the participants who are doing their higher studies having good knowledge than the other participants are highlighted denoting the statistical significance between educational level and knowledge among the study participants. ($p=0.000$, $p<0.05$)

5.2.4 Assessment of attitude of pulmonary tuberculosis in association with the sociodemographic selected factors.

The attitude of the participants regarding PTB was further evaluated according to their socio demographic factors stating their statistical validity. The distribution of the overall attitude regarding PTB was analyzed and found as 41.1% of the participants ($n=162$) having a positive attitude, 44.2% ($n=174$) having a neutral attitude and 14.7% ($n=58$) having a negative attitude towards pulmonary tuberculosis.

In the present study, 46.1% of the participants aged between 20-25 had positive attitude, 42.8% of the participants had neutral attitude and only 38.8% of the participants aged between 26-30 have positive attitude towards tuberculosis and it showed as direct proportional relationship between age and positive attitude. There were statistically significant associations between age and attitude among study participants ($p=0.000$). A similar study conducted in 2007 in Croatia, having most individuals in the 18-28 age group showed an inverse relationship between age and positive attitude towards TB with no statistically significant association between age and attitude³ This difference may be due to other factors that associated with tuberculosis over time and due to knowledge being within an arm's reach with advanced technology.

35% of the male participants had positive attitude towards tuberculosis, 41.7% had neutral attitude and 23.3% had negative attitude towards tuberculosis. 45.5% of the female participants had positive attitude, 45.9% had neutral attitude and 8.7% had negative attitude towards tuberculosis. According to the current research females tend to have positive attitudes than male counterparts and there were statistically significant associations between gender and attitude ($P=0.000$). In a cross-sectional study that was conducted in India during 2011, the attitude of both genders were same. 73% of each gender had stigmatizing attitude while 98% of both genders had discriminative attitudes towards TB patients. The negative attitude percentage is very less here compared to the above study.¹

57.7% of the participants who engaged in medical related fields had positive negative towards tuberculosis and only 30.3% of the participants who were in non-medical field were having positive attitude towards tuberculosis. There was statistically significant association between occupation and

attitude towards tuberculosis. In a similar study done in Iraq during 2003, it was concluded that more exposure people have with their occupation leads to better knowledge and the role in attitude towards tuberculosis (Hashim, Al Kubaisy and Al Dulayme, 2003)

5.3 Limitations

The study was conducted among public aged 20-30 years from Colombo District, in Sri Lanka therefore the results cannot be generalized to the whole country. Also, there was more representation of university undergraduates than others. Non-probability snowball sampling method was used for sample collection therefore the representativeness of the study population is affected.

5.4 Strengths

Because of the COVID-19 pandemic, most of the people had switched to online based learning and working. This was an advantage in conducting an online study.

Due to the use of trilingual Google forms, participant from all 3 languages could be involved in the research in their native language.

Acknowledgments

First, we would like to thank the Department of Community Medicine, Faculty of Medical sciences, University of Sri Jayewardenepura for taking the initiative research as a part of our curriculum, giving us the opportunity to carry out this research and for providing the necessary academic support.

With a deep sense of gratitude, we acknowledge the continued support, encouragement, advice and guidance given to us by our internal supervisors Dr. K.L.M.D. Seneviwickrama, Senior Lecturer in Community Medicine Department of Community Medicine, Faculty of Medical Sciences University of Sri Jayewardenepura and Dr. A.M.A.D.K. Alagiyawanna, Lecturer in Community Medicine Department of Community Medicine, Faculty of Medical Sciences University of Sri Jayewardenepura.

We express our sincere respect and gratitude to our external supervisor Prof. Jananie Kottahachchi, Department of Microbiology, Faculty of Medical Sciences University of Sri Jayewardenepura who gave her valuable support and cooperation and suggestions from time to time in successfully completing this research work.

We express our heartfelt thank you to the staff of the Department of Community Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura for their extraordinary support in this process.

Next, we would also like to specially thank our research participants who took off their time and answered our questions. Finally, a debt of gratitude is also owed to our seniors and colleagues for their advice. They supported us greatly and are always willing to help us whenever we need them.

Conflict of Interest

Authors declare that there is no conflict of interest.

References

1. Sagili KD, Satyanarayana S, Chadha SS (2016) Is knowledge regarding tuberculosis associated with stigmatizing and discriminating attitudes of general population towards tuberculosis patients? Findings from a community-based survey in 30 districts of India. PLoS ONE 11(2); e0147274. Doi: 10.1371/journal.pone.0147274
2. T.K.Koay(2004) Knowledge and attitudes towards tuberculosis among people living in Kudat District, Sabah
3. Anamarija Jurcev Savicevic (2010) Attitudes towards tuberculosis and sources of tuberculosis related information: study on patients in out patient in Split, Croatia.
4. S.H. Chang, J.K. Cataldo (2013) A systemic review of global cultural variations in knowledge, attitudes and health responses to tuberculosis stigma.
5. Chandrashekhar T Sreerareddy, H N Harsha Kumar, John T Arokiasamy (2013) Prevalence of self reported tuberculosis, knowledge about tuberculosis transmission and its determinants among adults in India: results from a nation wide cross sectional household survey.
6. Sifrash Meseret Gelaw (2015) Socioeconomic factors associated with knowledge on Tuberculosis among adults in Ethiopia.
7. C K Liam, K H Lim, C.M.M.Wong, B.G.Tang (1998) Attitudes and knowledge of newly diagnosed tuberculosis patients regarding the disease and factors affecting treatment compliance.
8. N. Gladys Kigozi, J. Christo Heunis (2017) Tuberculosis knowledge, attitudes and practices of patients at primary health care facilities in a South African metropolitan: research towards improved health education.
9. Maria Teresa Montagna (2014) Knowledge about tuberculosis among undergraduate health care students in 15 Italian universities: a cross sectional study.
10. D.S.Hashim, W.Al Kubaisy, A.Al Dulayme (2005) Knowledge, attitudes and practices survey among health care workers and tuberculosis patients in Iraq.