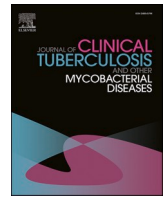




Contents lists available at ScienceDirect

Journal of Clinical Tuberculosis and Other Mycobacterial Diseases

journal homepage: www.elsevier.com/locate/jctube

Health professionals' knowledge and attitude of tuberculosis infection control in Mizan Tepi University Teaching Hospital, Ethiopia

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ARTICLE INFO

Keywords:
Attitude
Knowledge
Tuberculosis
Health professional
TBIC
Respiratory infection control

ABSTRACT

Background: Health professionals are the front-line agents to realize tuberculosis (TB) Infection Control (TBIC) in health facilities and in turn to achieve the targets of the End TB strategy. Despite this, evidence on their knowledge and attitude regarding TBIC is inadequate. As a result, this study aimed to investigate the knowledge and attitude of health professionals regarding TBIC, and associated factors in Mizan Tepi University Teaching hospital.

Methods: An institution-based cross-sectional study was conducted from September 1 to 30, 2019 by including eligible health professionals in the hospital. Knowledge and attitude of TBIC were the outcome variables. We have used 70% as a cut-off to categorize the knowledge and attitude statuses. Binary logistic regression was used to identify factors associated with the outcome variables. The odds ratio with its respective 95% confidence interval was used to measure the strength of association. The final significance was declared at a p-value of <0.05.

Results: The study found that 70.2% (95%CI: 63.8%, 76.6%) and 78.3% (95% CI: 72.3%, 84%) of the respondents had good knowledge and positive attitude regarding TBIC respectively. The current profession, job location, and history of TBIC training were significantly associated with the respondents' knowledge. Whereas, the knowledge status of the respondents was the only significant predictor of the attitude.

Conclusion: Although our study participants had satisfactory knowledge and attitude regarding TBIC to some extent, it needs due attention to achieve the target of End TB strategy. Thus, updating the health professionals through different skill-based TBIC training should be considered.

1. Introduction

Tuberculosis (TB) is a curable and preventable bacterial disease caused by mycobacterium tuberculosis. The bacteria most often affect the lungs although they can affect any other body part. TB spread from person to person through the air when people with lung TB cough, sneeze, or spit. A person needs to inhale only a few bacteria to become infected. About one-third of the world's populations have been infected by mycobacterium tuberculosis but are asymptomatic and cannot transmit the disease. Thus, had latent TB. The lifetime risk of developing active TB for the person infected with mycobacterium tuberculosis is 10%. But the risk increased for immunocompromised (HIV patients, malnourished individuals, diabetic patients, and tobacco users)

individuals. Without proper treatment up to two-thirds of people with active TB will die [1,2].

Although the magnitude and degree of severity are different, TB affects every population regardless of geographical location, age, sex, race, profession, or any other variability [3]. It remains a major cause of mortality and in 2018, it leads to an estimated 1.2 million deaths among HIV-negative and 251,000 deaths among HIV-positive people globally. In the same year, Africa had the highest (24%) TB cases, next to South-East Asia (44%) [4]. Ethiopia is among the 30 high TB burden countries and it had an estimated 24 and 2.2 TB deaths per 1000 populations among HIV negative and positive patients respectively in 2018 [4,5].

Health professionals are at increased risk of acquiring TB. They have frequent contact with TB patients in their routine activities. In addition

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<https://doi.org/10.1016/j.jctube.2021.100239>

Available online 30 April 2021

2405-5794/© 2021 The Author(s).

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to this, they can also be exposed in any other settings similar to other populations [6,7]. The incidence of TB among health professionals was significantly higher compared to the general population in different parts of the world [8–10].

The World Health Organization (WHO) announced an “End TB strategy” in 2015 to control the TB epidemics and reduce its incidence rate by 80% in 2030 [11]. Health facilities are among the settings where the risk of TB transmission is very high and needs effective infection control to achieve the target of End TB strategy. For the successful control and prevention of TB in the health facility, the tuberculosis infection control (TBIC) program should be implemented effectively [12].

TBIC is a combination of measures aimed at minimizing the risk of TB transmission within populations. It requires and complements implementation of core activities in TB control, HIV control and health-systems strengthening [13].

The government of Ethiopia has been implementing different interventions to tackle the spread of TB. Among these: implementation of directly observed treatment short-course strategy (DOTS), TB case detection and care by health extension workers, launching five years’ Health Sector Transformation Plan (HSTP) to address the major public health important diseases including TB, and applying TBIC measures in different settings can be mentioned [14–16].

Guidelines for the management of TB, drug resistance TB, and leprosy in Ethiopia, recommend a different set of measures to be implemented for facility-level TB infection control [16]. Health professionals are the frontline agents to realize the TB infection control in health facilities and they are expected to apply facility-level TB infection control measures properly [12,16].

Although the good knowledge of TBIC and positive attitude toward TBIC predict the right implementation of the TBIC program [17,18], evidence on the knowledge and attitude of health professionals regarding TBIC is inadequate. This study, which will provide its own input for the current evidence gap, investigated the knowledge and attitude toward TBIC among health professionals working in Mizan Tepi University Teaching hospital (MTUTH).

2. Methods

2.1. Study design, area and period

An institutional-based cross-sectional study was conducted from September 1 to 30, 2019 in Mizan Tepi University Teaching Hospital (MTUTH); which is located in 593 km to the southwest of Addis Ababa, the capital of Ethiopia. The hospital was serving residents from the Bench Sheko zone and partly from the Kaffa zone. These two zones are found in the southern region of the country. It was also partly serving those from the Gambella region. In Ethiopia, there are ten regions and two city administrations. Regions are further divided into different zones. In MTUTH, although there was a separate TB clinic, patients with TB were served being with others in different case teams (departments or service units) until the final confirmation of TB. In addition, if they had other comorbidities still they were also served together with others. Therefore, almost all health caregivers in this hospital had the probability of exposure to TB infection. The hospital had 836 permanent employees and among these 218 were health professionals and the rest 618 were the administrative and supportive staff.

2.2. Population

All eligible health professionals were included in the study. The health professionals who were serving permanently in the hospital were eligible (included). Those who didn’t involve directly in serving TB patients or those who were serving in a manner that will not put them to TB contact were excluded. Moreover, students, and health professionals from other institutions but working in the hospital temporarily (e.g. as a

researcher) were not included. Since the eligible participants were small in number we have included all of them. Hence, there was no sampling.

2.3. Data collection, processing, and analysis

Data collection was facilitated by trained data collectors. Data were collected using a structured self-administered questionnaire which was adapted from the previous related study [18]. The current study was related to the previous one in terms of the nature of participants (health professionals) and study title (knowledge and practice of TBIC). The questionnaire included questions related to socio-demographic and other general characteristics (age, sex, educational level, current profession, job location, year of experience, TBIC training); knowledge of TBIC (transmission way of TB, risk factor for TB infection and disease, the role of health workers in TB infection control and methods of TB prevention); attitude toward TBIC (need of: infection control committee in health facilities, TB patient isolation, protecting health professionals from TB, adequate space and opening windows for patient assessment, periodic testing, and evaluation of health workers who are at risk for TB, availing posters and signs in visible places to remind about TB, training for health workers on new updates about TB, patient education about respiratory hygiene); and other variables.

There were three response categories for each of the ten knowledge questions. These include “yes”, “no” and “I don’t know”. The response “yes” was taken as a correct response and the remaining two responses were taken as incorrect responses. The responses were scored out of twenty.

The attitude questions, which were ten in number, were five scale Likert scale questions and scored out of fifty.

Participants who correctly answered at least 70% of knowledge questions, were classified as having good knowledge of TBIC and others were classified as having poor knowledge. Similarly, those who correctly answered at least 70% of attitude questions were classified as having a positive attitude towards TBIC and others were classified as having a negative attitude. The cutoff point for classification was decided based on the previous works [19,20].

Principal investigators supervised the overall data collection process through immediate and daily checkups of the questionnaire to avoid incompleteness and inconsistency.

Data were entered in Epi-data manager version 4.0.2.101 and exported to SPSS version 21 for analysis. The knowledge of TBIC (categorized as good and poor) and attitude toward TBIC (categorized as positive and negative) were dependent variables. The explanatory variables for both dependent variables include socio-demographic characteristics (age, sex, and educational level), current profession, job location, service year, and TBIC training. Furthermore, knowledge of TBIC was considered as an explanatory variable for attitude toward TBIC.

The logistic regression was implemented to determine the association between dependent and explanatory variables. The odds ratio with respective 95% confidence interval (CI) and p-value was used to decide the strength of association. Variables with the p-value of less or equals to 0.25 in bi-variable logistic regression were considered as candidates for multivariable analysis. In multivariable analysis, independent variables with a p-value of <0.05 were declared as significantly associated with the outcome variables.

2.4. Ethical Consideration

Ethical clearance was obtained from the ethical review committee of health science college, Mizan Tepi University. The support letter was written to the hospital from the university. The objective of the study was briefed to the respondents and consent was obtained. They were also informed of their right to participate and not to participate. The confidentiality of the information was assured in different ways. The name of the respondents was not collected and an identification number

was assigned for each participant. The collected data were kept in the locked cabinet until the final safe removal.

3. Result

3.1. Socio-demographic and other general characteristics of respondents

Among the total 215 health professionals eligible for this study 198 fully participated in the study making the response rate of 92.1%. The mean [±standard deviation (SD)] age of the participants was 29.5 (±5.7) years. The majority (64.1%) of the respondents were in the age category of ≤ 30. Among these 65.4% and 74.8% had good knowledge and positive attitude of TBIC respectively. More than half (55.1%) of the participants were females and about two-third (68.8%) and three fourth (76.1%) of them respectively had good knowledge and positive attitude of TBIC. Similarly, more than half (52.5%) of the respondents had a history of training on TBIC. Among them, 81.7% had good TBIC knowledge and 77.9% had a positive attitude toward TBIC (Table 1).

3.2. Knowledge of the study participants regarding TBIC and associated factors

A high proportion (94.9%) of participants answered the possibility of pulmonary tuberculosis transmission from patients to health care workers. About 94% of the respondents identified HIV as a major risk factor to develop active TB. Similarly, 96% participants replied that TB organisms most commonly transmitted from person to person through airborne particles. Furthermore, more than half of the respondents (52.5%) knew an inability of surgical masks to protect the health professionals from inhaling mycobacterium tuberculosis containing aerosols. Overall, 70.2% (95%CI: 63.8%, 76.6%) of the respondents had good knowledge of TBIC.

The variables that were found to be eligible for multivariable logistic regression include: current profession, educational level, job location, and history of TBIC training. In the multivariable logistic regression current profession of being physician or public health and pharmacist or others, job locations other than OPD and wards, and having a history of TBIC training were significantly associated with the respondents' good knowledge of TBIC. (Table 2)

Table 1
Socio-demographic and other general characteristics of the respondents.

Variable	Categories	n	%	Knowledge		Attitude		Positive			
				Poor n	%	Good n	%	Negative N	%	n	%
Age	≤30	127	64.1	44	34.6	83	65.4	32	25.2	95	74.8
	31–40	63	31.8	15	23.8	48	76.2	11	17.5	52	82.5
	>40	8	4	0	0	8	100	0	0	8	100
Sex	Male	89	44.9	25	28.1	64	71.9	17	19.1	72	80.9
	Female	109	55.1	34	31.2	75	68.8	26	23.9	83	76.1
Educational level	Diploma	96	48.5	39	40.6	57	59.4	27	28.1	69	71.9
	1st degree	90	45.5	18	18.4	80	81.6	15	15.3	83	84.7
	2nd degree and above	12	6	2	50	2	50	1	75	3	75
History of TBIC training	Yes	104	52.5	19	18.3	85	81.7	23	22.1	81	77.9
	No	94	47.5	40	42.6	54	57.4	20	21.3	74	78.7
Service year	< 5 years	96	48.5	25	26	71	74	19	19.8	77	80.2
	≥5 years	102	51.5	34	33.3	68	66.7	24	23.5	78	76.5
Job location	OPD	44	22.2	17	38.6	27	61.4	12	27.3	32	72.7
	Ward	62	31.3	21	33.9	41	66.1	17	27.4	45	72.6
	Other units*	92	46.5	21	22.8	71	77.2	14	15.2	78	84.8
Current profession	Physician /Public health/	55	27.8	9	16.4	46	83.6	8	14.5	47	85.5
	Nurse /Midwifery/	83	41.9	40	48.2	43	51.8	30	36.1	53	63.9
	Pharmacist /others**/	60	30.3	10	16.7	50	83.3	5	8.3	55	91.7

* Other units include laboratories, pharmacies, operation rooms, ART clinic, and TB clinic.

NB. We have included TB clinic under other units (job locations); since those working in TB clinic were few in number and resulted in insufficient cells (not satisfy the assumption) for bivariable analysis.

** Others include anesthetists and laboratorists

Table 2
Multivariable logistic regression of factors associated with the respondents' good knowledge.

Variable	Category	COR	P-value	AOR (95% CI)	P-value
Current profession	Physician /Public health/ Nurse /Midwifery/ Pharmacist /others/	4.76	<0.001	3.29 (1.30, 8.30)	0.012*
	Diploma	4.65	<0.001	3.68 (1.56, 8.70)	0.003*
Educational level	First degree	1.46	0.710	1.63 (0.15, 12.07)	0.78
	Second degree & above	4.44	0.149	2.77 (0.31, 25.05)	0.37
Job location	OPD			1	
	Wards	1.23	0.614	1.42 (0.56, 3.60)	0.46
	Other case teams	2.13	0.057	2.6 (1.08, 6.33)	0.03*
History TBIC training	Yes	3.31	<0.001	3.15 (1.54, 6.42)	0.002*
	No			1	

* significantly associated with the knowledge status at a p-value<0.05

3.3. The attitude of the study participants toward TBIC and associated factors

This study revealed that 90.4% of participants agreed with the need for an infection control committee in every health facility for the successful control of TB. A majority (92.5%) of the respondents agreed with the separation of active TB patients from other patients as an effective strategy for preventing transmission of TB. Similarly, a very high proportion (90%) of participants agreed with the need for periodic testing and evaluation of health care workers who are at risk for exposure to TB disease. In general, more than three fourth (78.3%; 95% CI: 72.3%, 84%) of them had positive towards TBIC. Although the current profession, educational level, job location, and knowledge status were the variables candidate for multivariable logistic regression, only the good knowledge status was significantly associated with the positive attitude. Furthermore, the knowledge and attitude scores were almost not

linearly correlated in this study (Pearson correlation coefficient = 0.279 and p value = 0.000). (Table 3)

4. Discussion

Health professionals play important roles in preventing and controlling TB in health care settings. These roles are mostly determined by their knowledge and attitude regarding TBIC. This institution-based cross-sectional study assessed the knowledge and attitude of TBIC among health professionals in MTUTH. According to this study, more than two-thirds (70.2%; 95%CI: 63.8%, 76.6%) of the respondents had good knowledge about TBIC. This is higher compared to the findings of studies from Uganda [20], Nepal [19], and Georgia [17]; and in line with the findings of a study from North West Ethiopia [18]. This might be due to the differences in cut-offs and study tools used. For instance, a study conducted in Nepal considered 60% as a cut-off to classify the knowledge level whereas in the current study we have used 70% as cut-off [19]. Moreover, relatively the better score in Ethiopian findings (the current and northwest Ethiopia study) might be due to the attention given to TB infection control in Ethiopia compared to the aforementioned countries.

In this study, the participants with a profession of a physician or public health officer had better knowledge compared to those with nurse or midwifery (AOR = 3.29; 95% CI: 1.30, 8.30). This is comparable with the finding of the Georgian study [17], where physicians were more knowledgeable compared to others. This might be due to the differences in the curriculum to train the different professions.

Quality training of TB infection prevention and control for all health professionals is one of the core components of the TBIC program and strongly recommended by WHO [12]. Our finding, similar to previous works, supports this recommendation. Taking the TBIC training was strongly associated (AOR = 3.15; 95% CI: 1.54, 6.42) with good knowledge of TBIC in the current study. The finding of the North West Ethiopian study is in line with our finding [18]. Likewise, a study conducted in Nepal showed that TBIC training was associated with good knowledge [19].

Health professionals working in other case teams than OPD or ward had more than two and half times (AOR = 2.6; 95% CI: 1.08, 6.33) higher odds TBIC knowledge. In our analysis, those working in TB clinics were classified under the category of other case teams and compared to others they might have exposure to TBIC training in turn which contributed to good knowledge of TBIC for this particular category.

To implement TB infection prevention and control programs successfully in health facilities, the attitude of health workers is an important determinant and it is preferable to be favorable [17,18]. In our study, more than three fourth (78.3%; 95% CI: 72.3%, 84%) of the study participants had a positive attitude towards TBIC and this is in agreement with the finding of the study from Nepal [19].

Even though it might be intentional or unintentional, peoples' decision whether to perform the given behavior or not depends on their attitudes which are mostly guided by the knowledge they had [21]. Similarly, the attitude of the health professionals towards TBIC is more likely to be influenced by their knowledge. This study revealed that having good knowledge about TBIC was significantly associated with a positive attitude towards TBIC (AOR = 2.74; 95% CI: 1.26, 5.93). Studies conducted in Uganda and Nepal show a comparable finding [19,20].

5. Conclusion

For the successful control and prevention of TB in health facilities, TBIC program is a key strategy. The TBIC knowledge and attitude of health professionals are important inputs for the effectiveness of the TBIC program. Although to some extent our study participants had satisfactory knowledge and attitude regarding TBIC, due attention is needed to achieve the target of the End TB strategy. Updating the health

Table 3

Multivariable logistic regression of factors associated with the respondents' positive attitude.

Variable	Category	COR	P-value	AOR (95% CI)	P-value
Current profession	Physician/ Public health			1	
	Nurse/Midwifery	0.30	0.007	0.45 (0.17, 1.19)	0.105
	Pharmacist /others	1.87	0.299	1.88 (0.52, 6.76)	0.333
Educational level	Diploma	0.85	0.892	0.60 (0.053, 6.83)	0.68
	First degree	1.84	0.606	0.842 (0.07, 9.97)	0.89
	Second degree and above			1	
Job location	OPD	0.48	0.098	0.60 (0.23, 1.55)	0.292
	Wards	0.47	0.067	0.62 (0.26, 1.49)	0.286
	Other case teams			1	
Knowledge status	Good	4.33	<0.001	2.74 (1.26, 5.93)	0.011*
	Poor			1	

* significantly associated with the attitude status at p-value<0.05.

professionals through different skill-based TBIC training should be considered.

6. Consent

Written consent was obtained from each study participant.

7. Ethical Consideration

Ethical clearance was obtained from the ethical review committee of health science college, Mizan Tepi University. The support letter was written to the hospital from the university. The objective of the study was briefed to the respondents and the written consent was obtained. They were also informed of their right to participate and not to participate. The confidentiality of the information was assured in different ways. The name of the respondents was not collected and the identification number was assigned for each participant. The collected data were kept in the locked cabinet until the final safe removal.

Funding

This research did not receive external funding from agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Wondimagegn Wondimu: Conceptualization, Methodology, Formal analysis, Writing - original draft. **Tewodros Yosef:** Formal analysis, Writing - review & editing. **Tadesse Gebremedhin:** Conceptualization, Validation, Visualization. **Nasro Hailemariam:** Data curation, Writing - original draft.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgment

The authors would like to acknowledge the study participants for

their participation.

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