NIJPP
Publications 2023

OPEN ACCESS
ONLINE ISSN:2992-5479
PRINT ISSN:2992-605X

NEWPORT INTERNATIONAL JOURNAL OF PUBLIC HEALTH AND PHARMACY (NIJPP)
Volume 3 Issue 3 2023

Assessment of Factors Influencing Tuberculosis Diagnostic and treatment delays among Patients at two Tertiary Hospitals in Ishaka, Bushenyi

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ABSTRACT

Tuberculosis (TB) is an essential public health disease caused by *Mycobacterium tuberculosis*, a bacterium that depends on its human host to achieve its own airborne transmission and existence. The objective of this study is to determine the factors influencing tuberculosis diagnostic and treatment delay among patients at Ishaka Adventist Hospital and Kampala International University Teaching Hospital in Ishaka, Bushenyi. The study shows that rate of tuberculosis diagnostic and treatment delay was 76.0% that is 108 (70.1%) reported to have taken ≥ 3 weeks to seek for TB diagnosis (delayed TB diagnosis) and 42(27.3%) reported to have taken ≥ 1 week to initiate anti-TB treatment (delayed TB diagnosis). The study shows multivariate analysis of social demographic factors and knowledge attributes associated with tuberculosis diagnostic and treatment delay. According to results after multivariate model, the social demographic factors and knowledge attributes significantly associated with tuberculosis diagnostic and treatment delay were male gender (AOR= 5.97, 95%CI: 1.91-18.43, p = 0.002), knowing the TB symptoms (AOR= 11.9, 95%CI: 1.81-8.57, p =0.010), As well as knowing that regular use of a cloth or both hands to cover mouth and nose while coughing or sneezing can prevent TB (AOR= 5.29, 95%CI: 1.32-21.14, p = 0.018). The rate tuberculosis diagnostic and treatment delay were high with about three quarters of study population having TB diagnostic delay and less than a third of study population having TB treatment delay.

Keywords: tuberculosis, diagnostic, treatment delays

INTRODUCTION

Tuberculosis (TB) is an essential public health disease caused by *Mycobacterium tuberculosis*, a bacterium that depends on its human host to achieve its own airborne transmission and existence [1]. It is one of the oldest human ailments and for more than50 years, measures have been in place to eliminate TB [7-9]. However, it is still incurable and is the second most common cause of infectious disease death worldwide, after HIV [10-12].The Lake Victoria area in Sub-Saharan Africa has one of the highest rates of tuberculosis [13]. According to the World Health Organization (WHO), 9.2 million people develop TB each year [7], with low-income countries accounting for 95% of all Tuberculosis patients around the world [14]. approximately 10 million new cases and 1.6 million deaths from tuberculosis, a major infectious cause of morbidity and mortality worldwide, were anticipated to have occurred in 2017 [15]. Uganda, one of the 22 nations with the highest TB burden, has a 67% treatment success rate, with 50% of TB patients also co-infected with HIV [16-19]. Approximately 95% of all TB-related deaths occur in low- and middle-income countries, where the disease burden is disproportionately concentrated [20]. Nearly 40% of TB cases were undetected globally by 2018 despite the fact that the majority of these deaths might be avoided with early diagnosis and treatment [21]. The TB problem is getting worse worldwide, but a notable issue is the number of cases that have gone untreated [22]; the delay between the onset of the disease and the time of diagnosis and the

start of treatment could be the cause of this, among other things [23]. Delay in diagnosis may lead to illness progression, increased mortality, and community-wide disease spread [24]. Many definitions of delay have been used in studies of the diagnosis and treatment of tuberculosis (TB), but the two that are most frequently employed are delay due to patient variables and delay owing to healthcare system factors [25-29]. However, other studies have showed that the stigma attached to the disease could also hamper access to judicious health care [30].

METHODOLOGY

Study design and rationale

A quantitative cross section study approach was conducted in order to determine the factors influencing tuberculosis diagnostic and treatment delay among patients at Ishaka Adventist Hospital and Kampala International University Teaching Hospital in Ishaka, Bushenyi using a questionnaire.

Study Site

The study was conducted at Ishaka Adventist Hospital and Kampala International University Teaching Hospital in Ishaka, Bushenyi.

Study population

The study was conducted among patients who are on anti-tuberculosis medication at Ishaka Adventist Hospital and Kampala International University Teaching Hospital in Ishaka, Bushenyi.

Inclusion criteria and rationale

It included all patients who are on anti-tuberculosis medication at Ishaka Adventist Hospital and Kampala International University Teaching Hospital in Ishaka, Bushenyi that were available at the time of collecting data and willing to participate in the study. Only sputum smear positive patients were included in the study. All of them were out-patients.

Exclusion criteria

Patients who met the inclusion criteria but decline to participate in the study. Also, patients previously treated for TB and those with extra-pulmonary TB were excluded from the study.

Sample size determination and rationale

The sample size was determined using the Kish Leslie's formula (1965)

$$n = \frac{(Za/2)^2 p(1-p)}{e^2}$$

Where n is the required sample size

p is the prevalence of TB according to study done at Mulago National Referral Hospital inKampala, Uganda by [31] which was 11.7%.

$Z\alpha/2 = 1.96$ taking into account 90% confidence intervale is
marginal error which is 5%. 3.8416

$$n = \frac{(1.96)^2 * 0.11(1-0.11)}{(0.05)^2} = 159$$

In line with the above consideration, the minimum calculated sample size was 159 respondents.

However, since in a period of six months (from January to June 2022) KIU-TH had only 105 patients on TB treatment and Ishaka Adventist had only 108 patients on TB treatment. The sample size of 159 participants was achievable.

Sampling procedure

Simple random sampling technique was used to select participants. Patients were consecutively enrolled and interviewed using a structured questionnaire.

Data collection method and tool

Data was collected using an interviewer-administered questionnaire. Eligible participants were asked to participate in the study as they visit the TB clinics for drug refill. Patients were consecutively enrolled and interviewed using a structured questionnaire. Each participant was required to give an informed consent before enrolling in the study. The researcher assisted the respondents in filling the questionnaires by explaining to the respondents for clarifications. The

properly filled questionnaires was then collected and then data was taken for analysis. The researcher used a structured questionnaire and participants were asked similar questions and from options, they picked the best alternative. A pen and paper were used to record the necessaryinformation.

Data analysis

The qualitative data collected was statistically analyzed and documented using Microsoft Excel and Word version 2019 which was then analyzed using SPSS v.16. The analyzed data was then presented in form of tables which was a basis for discussion and conclusion among others.

Ethical considerations

Consent

Participants were given information regarding the research to seek consent. Each participant's choice to participate or not was respected and data collected from participants was kept confidential.

Privacy protection

The participants' names were not included while filling out the questionnaire to maintain privacy.

Confidentiality

It was clearly communicated that the information obtained from the participants was kept under lock and key to only be used for research purposes

RESULTS

Table 1 shows that many 78(50.6%) were aged greater than 50 years, 101(65.6%) were females, 91(59.1%) were peasants, 103(66.9%) earned ≥ 150000 Ugshs, 67(43.5%) were of secondary level of education, 118(76.6%) were married and lastly many 127(82.5%) had five or more family members.

Table 1: Table showing demographic of study respondents

Age group	Frequency	Percent
< 40 years	18	11.7
40-50 years	58	37.7
> 50 years	78	50.6
Gender		
Male	101	65.6
Female	53	34.4
Occupation		
Peasant	91	59.1
Business	45	29.2
Unemployed	15	9.7
Civil servant	3	1.9
Income		
< 150000	51	33.1
≥ 150000	103	66.9
Education level		
Uneducated	18	11.7

Primary	67	43.5
Secondary	60	39.0
Tertiary/university	9	5.8
Marital status		
Single	9	5.8
Divorced/separated/window	27	17.5
Married	118	76.6
House hold members		
< 5 members	27	17.5
≥ 5 members	127	82.5

Table 2 shows that rate of tuberculosis diagnostic and treatment delay was 76.0% that is 108 (70.1%) reported to have taken ≥ 3 weeks to seek for TB diagnosis (delayed TB diagnosis) and 42(27.3%) reported to have taken ≥ 1 week to initiate anti-TB treatment (delayed TB diagnosis).

Table 2: Rate of tuberculosis diagnostic and treatment delay among patients at Ishaka AdventistHospital and Kampala International University Teaching Hospital in Ishaka, Bushenyi

TB diagnostic and treatment delay	Frequency	Percent
Delayed	117	76.0
Not delayed	37	24.0
Period taken before seeking TB diagnosis		
< 3 weeks	46	29.9
≥ 3 weeks	108	70.1
Period before seeking anti-TB treatment		
< 1 week	112	72.7
≥ 1 week	42	27.3

TB diagnosis and anti-TB treatment delays were defined based on studies by (Macfarlane & Newell, 2012; (Lambert et al., 2005).

Table 3 shows bivariate analysis of social demographic factors and knowledge attributes associated with tuberculosis diagnostic and treatment delay. At this stage age, gender, and income had p-value less than 0.2. Thus, they were proceeded/used for multivariate stage/analysis.

Table 3: Bivariate analysis of social demographic factors and knowledge attributes associated with tuberculosis diagnostic and treatment delay

		TB diagnosis and treatment delayed			
		Delayed	No delayed	cOR(95%CI)	P-Value
Age	< 40 years	18	0	N/A	
	40-50 years	**36**	**22**	**0.39(0.18-0.84)**	**0.017**
	> 50 years	63	15	1.00	
Gender	**Male**	**87**	**12**	**6.71(2.98-15.13)**	**0.001**
	Female	27	25	1.00	
Income	**< 150000**	**45**	**6**	**3.23(1.25-8.35)**	**0.016**
	≥ 150000	72	31	1.00	
Education	Uneducated	15	3	2.50(0.39-16.05)	0.334
	Primary	48	19	1.26(0.29-5.57)	0.758
	Secondary	48	12	2.00(0.44-9.18)	0.373
	Tertiary/university	6	3	1.00	
Marital status	Single	9	0	N/A	
	Divorced/separated/ window	21	6	1.25(0.46-3.38)	0.664
	Married	87	31	1.00	
House hold members	< 5 members	21	6	1.13(0.42-3.05)	0.801
	≥ 5 members	96	31	1.00	

Table 3 shows bivariate analysis of social demographic factors and knowledge attributes associated with tuberculosis diagnostic and treatment delay. At this stage knowledge attributes such as knowing the TB symptoms, knowing that one family member can infect other members as well as knowing that regular use of a cloth or both hands to cover mouth and nose while coughing or sneezing can prevent TB had p-value less than 0.2. Thus, they were proceeded/used for multivariate stage/analysis.

Table 4: Bivariate analysis of social demographic factors and knowledge attributes associated with tuberculosis diagnostic and treatment delay

		TB diagnosis and treatment delayed			
		Delayed	No delayed	cOR(95%CI)	P-Value
The etiological cause of TB is the infectious TB germ	Yes	81	28	0.96(0.35-2.67)	0.944
	No	18	3	2.00(0.43-9.26)	0.375
	Not sure	18	6	1.00	
TB can give group of symptoms	**Yes**	**96**	**28**	**5.14(1.69-15.69)**	**0.004**
	No	15	0	N/A	
	Not sure	6	9	1.00	
When untreated TB cough, TB can be spread out	Yes	72	22	0.89(0.37-2.15)	0.800
	No	9	6	0.41(0.12-1.46)	0.167
	Not sure	33	9	1.00	
Respiratory tract is a route of TB infection enter into human body	Yes	60	21	0.87(0.37-2.06)	0.744
	No	24	6	1.21(0.39-3.79)	0.741
	Not sure	33	10	1.000	
One family member can affect others	**Yes**	**21**	**19**	**0.17(0.06-0.49)**	**0.001**
	No	57	12	0.73(0.25-2.11)	0.731
	Not sure	39	6	1.00	
BCG vaccination is the active measure for children to prevent TB	Yes	45	19	0.69(0.31-1.53)	0.368
	No	21	3	2.06(0.54-7.86)	0.291
	Not sure	51	15	1.00	
Regular use of a cloth or both hands to cover mouth and nose while coughing or sneezing can prevent TB	**Yes**	**99**	**18**	**8.71(3.61-2.99)**	**0.01**
	No	3	0	N/A	
	Not sure	12	19	1.00	

The accurate way to detect of TB infection is sputumicroscopy	Yes	51	18	0.89(0.41-1.93)	0.766
	No	15	3	1.57(0.40-6.12)	0.517
	Not sure	51	16	1.00	
After anti-treatment patients will no longer transmit infection	Yes	30	9	0.92(0.37-2.61)	0.852
	No	18	9	0.55(0.21-1.42)	0.217
	Not sure	69	19	1.00	

Table 5 shows bivariate analysis of health system factors influencing tuberculosis diagnostic and treatment delay. At this stage age, none of had health system factors p-value less than 0.2. Thus, they no factor was proceeded/used for multivariate stage/analysis and it was concluded that none of health system factors is significantly associated with tuberculosis diagnostic and treatment delay.

Table 5: Bivariate analysis of health system factors influencing tuberculosis diagnostic and treatment delay

		TB diagnosis and treatment delayed			
		delayed	no delayed	cOR (95%CI)	P-value
Received any information about any TB clinic	Yes	90	9	10.37(4.37-24.64)	0.601
	No	27	28	1.00	
Distance from home to this TB clinic	< 5km	33	12	0.96(0.42-2.18)	0.923
	>5km	63	22	1.00	
Total traveling time from house to TB clinic	<30 minutes	39	25	0.26(0.109-0.618)	0.512
	> 30 minutes	54	9	1.00	
Waiting time to see the doctor for examination	< 30 minutes	66	37	N/A	
	> 30 minutes	51	0	1.00	
Overall money spent to the TB clinic	< 20000	30	9	1.15(0.49-2.72)	0.75
	> 20000	81	28	1.00	
Money spent to the TB clinic is a burden tme	Yes	42	15	0.70(0.31-1.59)	0.392
	No	60	15	1.00	

Table 4 shows multivariate analysis of social demographic factors and knowledge attributes associated with tuberculosis diagnostic and treatment delay. According to results after multivariate model, the social demographic factors and knowledge attributes significantly associated with tuberculosis diagnostic and treatment delay were male gender (AOR= 5.97, 95%CI: 1.91-18.43, p = 0.002), knowing the TB symptoms (AOR= 11.9, 95%CI: 1.81-8.57, p =0.010), As well as knowing that regular use of a cloth or both hands to cover mouth and nose while coughing or sneezing can prevent TB (AOR= 5.29, 95%CI: 1.32-21.14, p = 0.018).

Table 6: Multi-variate analysis of social demographic factors and knowledge attributes associated with tuberculosis diagnostic and treatment delay

		TB diagnosis and treatment delayed			
		Delayed	No delayed	aOR(95%CI)	P-Value
Age	< 40 years	18	0	N/A	
	40-50 years	36	22	0.307(0.091-18.43)	0.056
	> 50 years	63	15	1.00	
Gender	**Male**	**87**	**12**	**5.97(1.91-18.43)**	**0.002**
	Female	27	25	1.00	
Income	< 150000	45	6	4.14(0.79-21.72)	0.093
	≥ 150000	72	31	1.00	
TB can give group of symptoms	**Yes**	**96**	**28**	**11.90(1.81-8.57)**	**0.010**
	No	15	0	N/A	
	Not sure	6	9	1.00	
	Not sure	33	10	1.000	
One family member can affect others	Yes	21	19	0.18(0.04-8.57)	0.061
	No	57	12	0.41(0.08-2.04)	0.29
	Not sure	39	6	1.00	
Regular use of a cloth or both hands to cover mouth and nose while coughing or sneezing can prevent TB	**Yes**	**99**	**18**	**5.29(1.32-21.14)**	**0.018**
	No	3	0	N/A	
	Not sure	12	19	1.00	

DISCUSION

Early detection of disease and prompt initiation of treatment are essential for an effective TB control program (Basnet et al., 2019). In this study, the rate of tuberculosis diagnostic and treatment delay was 76.0%, with 108 (70.1%) patients reporting that it took them longer than three weeks to seek a TB diagnosis and 42 (27.3%) patients reporting that it took them more thanone week to begin anti-TB medication. The Lake Victoria area in Sub-Saharan Africa has one of the highest rates of tuberculosis [13]. According to the World Health Organization (WHO), 9.2 million people develop TB each year [7], with developing countries accounting for 95% of all Tuberculosis infected people around the world [14]. Approximately 10 millionnew cases and 1.6 million deaths from tuberculosis, a major infectious cause of morbidity and mortality worldwide, were anticipated to have occurred in 2017 [15]. Uganda, one of the 22 nations with the highest TB burden, has a 67% treatment success rate, with 50% of TB patients also co-infected with HIV [16]. In this study, the social demographic factors and knowledge attributes significantly associated with tuberculosis diagnostic and treatment delay were male gender (AOR= 5.97, 95%CI: 1.91-18.43, p = 0.002), knowing the TB symptoms (AOR= 11.9, 95%CI: 1.81-8.57, p = 0.010), As well as knowing that regular use of a cloth or both hands to cover mouth and nose while coughing or sneezing can prevent TB (AOR= 5.29, 95%CI: 1.32-21.14, p = 0.018). Urban slum inhabitants have a higher chance of contracting tuberculosis than the general population, which has been found to affect health seeking behavior. Researchers discovered low understanding about TB causation, symptoms, transmission, prevention, and free treatment whileanalyzing the knowledge of tuberculosis and its related socio-demographic variables. There wasa fair amount of knowledge on TB treatment and prevention. In Mumbai, a study that looked at the causes of diagnosis delay among patients with simple pulmonary TB discovered that considerably more female patients did [16]. Atthe Yangon Regional Tuberculosis Center in Myanmar, a cross-sectional study found that low middle school education, non-permanent employment, co-existing diabetes mellitus, and a lackof knowledge were some of the predictors of a protracted diagnosis delay. Age between 31 and 50, history of MDR-TB patients older than 50, living more than 20 kilometers from a regionalTB center, and a lack of awareness were all independent predictors of prolonged treatment delays [32]. To establish the overall treatment delay and its contributing factors, a retrospective investigation of newly diagnosed pulmonary TB cases registered in 2010 at the Ahvaz health center was done. Delayed time was substantially correlated with smoking, being a woman, and using immunosuppressive medications [32].

CONCLUSION

The rate tuberculosis diagnostic and treatment delay were high with about three quarters of study population having TB diagnostic delay and less than a third of study population having TB treatment delay. Knowing the TB symptoms and that consistent use of a handkerchief or both hands to cover mouth and nose while coughing or sneezing can prevent TB were significant factors positively related with tuberculosis diagnostic and treatment delay in men. None of health system factors was significantly associated with tuberculosis diagnostic and treatment delay

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Tady Kerry Iyamuremye (2023). Assessment of Factors Influencing Tuberculosis Diagnostic and treatment delays among Patients at two Tertiary Hospitals in Ishaka, Bushenyi. NEWPORT INTERNATIONAL JOURNAL OF PUBLIC HEALTH AND PHARMACY (NIJPP)3(3):50-60.