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**Factors Associated with Treatment Adherence of
Patients on Anti-Tuberculosis Drugs Following Covid-19
Pandemic at Health Facilities of Masaka City, Uganda**
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Factors Associated with Treatment Adherence of Patients on Anti-Tuberculosis Drugs Following Covid-19 Pandemic at Health Facilities of Masaka City, Uganda

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ABSTRACT

Purpose: To examine factors associated with adherence of patients on Anti-tuberculosis treatment in Health facilities at Masaka City. Specifically the study was guided by four objectives; to establish the current level of adherence, to explore the patient knowledge, to find out socio-economic factors, and to identify Health facility factors contributing to adherence of patient on tuberculosis treatment.

Methodology: A cross-sectional research design with both quantitative and qualitative approaches of data collection and analysis was used. At least 110 patients on tuberculosis drug were selected and 15 health workers working in tuberculosis clinics to give expert views on the problem under investigation. Interview guide and questionnaires were used and data were analyzed using Stata version 13. Descriptive statistics, percentages were presented in the findings on frequency distribution tables. Qualitative data obtained using interviews was analyzed using thematic content analysis and narrative reasoning.

Results: Prevalence of adherence to TB treatment was at 86% from the patients the study was conducted. In the study most patients had adequate knowledge on *Tuberculosis* treatment and it had attributed a majority 86% with good adherence on Tuberculosis Drug. On health facility factors there was limited medical supplies of drug to improve care, most patients were youth. Statistically, there was significant relationship between frequent counseling and patient adherence at multivariate levels. (OR=15.5073; [95% CI: 3.73553 to 27.27917]; p=0.010). There was no relationship between patients' adherence and employment status and good conduct of health workers was significantly associated with patient adherence. (OR=7.0566; [95%CI: 2.77620 to 11.3371]; P=0.001). In this study factors affecting adherence included stigma, discrimination and suspension of transport as COVID-19 prevention guideline by Ministry of health Uganda negatively contributed to poor adherence of patients. This was attributed to by isolation and neglect by family members, relatives, health workers and the community for fear of COVID-19 suspicion at each respective health facility. Involvement of TB survivor in TB treatment would increase adherence and retention in care.

Recommendations: In the study there was suboptimal adherence of 86% as opposed to MOH Uganda of 95%, due to stigma and discrimination. The study recommended each TB patient be assigned a family member and a village health team as treatment supporters. Intensified health education and pre TB treatment counselling on adherence increases patients ability to take medication consistently leading to good TB treatment outcomes. Not involving and supporting private clinics to provide TB services is a very big missed opportunity by the health sector. Most patients first visit private clinics before coming to public health centers. Involvement of TB survivor in TB treatment would increase adherence and retention in care.

Keywords: *Treatment Adherence, Anti-Tuberculosis Drug, Covid-19 Pandemic.*

Background to the study

Tuberculosis (TB) is an infectious disease mainly caused by the *Bacillus Mycobacterium tuberculosis*, other species of *Mycobacterium* include *Mycobacterium bovis* and *Mycobacterium avium*, the disease typically affects the lungs (pulmonary TB) but can affect other sites as well (extra-pulmonary TB) [1]. The disease is spread in the air when people who are sick with pulmonary TB expell the bacteria through coughing. A small proportion (5–15%) of the estimated 2–3 billion people infected with *M. tuberculosis* will develop TB disease during their lifetime [2]. More so, the probability of developing TB is much higher among people infected with HIV/AIDS [3]. TB requires long medication regimens and currently in Uganda, treatment takes between six and eight months depending on the drugs given [4] and COVID-19 has affected adherence of patient on Anti-Tuberculosis when MOH Uganda instituted lockdown across the country and disrupted transport of patient to refill their TB drug [5].

Tuberculosis treatment outcomes are reported according to internationally accepted definitions. These include cure, treatment completion, treatment failure, default, transfer-out and death. Specific criteria are defined for cure, treatment failure and death [6]. Poor adherence to treatment remains a challenge for most tuberculosis control programs. It often leads to poor final treatment outcomes and drug-resistance, which has been a challenge for health systems [7]. Defaulter may be used interchangeably as poor adherence and is defined as a patient whose treatment was interrupted for 2 months or more without physician advices [1]. WHO recommend TB cure rate and success rate to be more than 90% of all patients started on TB treatment. To achieve this adherence must be above 95% [8].

Tuberculosis remains a public health concern and the second leading cause of death after HIV [9]. It was estimated that in 2015 there were 10.4 million TB cases reported globally and prevalence was at 42% despite having met the target of halving TB prevalence by 2015 and 28% of these were from Africa, treatment default rate for new TB cases was at 14% [10]. The risk of poor adherence was influenced by factors such as prolonged duration of treatment, socio-economic factors and drug toxicity, perceived health benefits and subjective experience of illness [11]. Previous research reported travel expenses to health centers', male sex, poor patient information and communication, alcoholism and homelessness as the major determinants of non-compliance to anti TB treatment. Thus, non-compliance to treatment by TB patients is a complex and multifaceted behavioral issue that needs to be understood better [12].

The rate of success to default for new cases were at 77% to 23% respectively [11]. TB burden estimates list accounts for 85–89% of the global burden of incidence of case among the 48 countries of the world, Uganda inclusive [8]. Treatment default was at 25% and 33% for New and relapse cases respectively [11]. The surveillance data show estimated TB prevalence was 200/100,000 population in Uganda, incidence at 161/100,000 population, and TB-related mortality at 35/100,000 population [12]. TB is the second killer after HIV/AIDS which posed a national threat to country if something is not done to address this course [9]. Masaka District is among the District with high prevalence of TB known to be associated with risk of infection of HIV/AIDS. According to F/Y 2018/2019 Masaka region registered 16% lost to follow up of patients on anti-tuberculosis [15]. Defeat TB project for Jan-March Quarter 2018, Masaka district reported a default rate of 18% [13] of TB in the region. Several factors like pill burden, length of treatment, substance abuse among TB patients have been attributed to risk of TB treatment non-adherence

[14]. The study sought to understand the current risk factors influencing poor adherence among TB patients at Masaka city in Masaka District South-western Uganda.

Statement of the problem

Poor adherence to treatment is one of the major challenges affecting tuberculosis control and account for the major obstacles to treatment management [16]. Uganda had a TB default rate of 11% with a treatment success rate of only 70% among smear positive patients [3], compared with current national accepted adherence level of 95% of WHO guideline [13]. Masaka District is among the District with high prevalence of TB known to be associated with risk of infection of HIV/AIDS [9]. Tuberculosis defaulting continues to be high in Masaka (33.1%), Kampala (28.9%), Wakiso (29.6%), and Mpigi (22.8%) [17]. According to URC-USAID's defeat TB project for Jan-March Quarter (2018), Masaka District reported a default rate of 18%, and financial year 2018/2019 was 17%, which contributed to cure rate of only 49% [13]. Tuberculosis affects all age groups and requires long medication regimens, Currently in Uganda, treatment takes between six and eight months depending on the drugs given [18]. Poor adherence contributes to worsening of tuberculosis situation not only by increasing incidence of Tuberculosis but also by initiating TB drug resistance which has become a serious obstacle in the control of the disease. Several factors like pill burden, length of treatment, substance abuse among TB patients have been attributed to risk of TB treatment non-adherence [14].

Despite introduction of global strategies like Directly Observed Therapy (DOT), the government supports treatment of tuberculosis by availing free diagnostic services and drugs, integration of tuberculosis to other treatment in health facilities [1]. There is still persistent poor adherence to tuberculosis drugs among patients in Masaka city and if this situation is not put at rest infection rate and MDR cases may be on rise at community. In Masaka there is no recent study conducted to address this continuous poor adherence therefore the study sought to investigate factors associated with adherence of patient on anti-tuberculosis drug at Masaka city.

Main objective of the study

To assess factors associated with adherence of patients to Anti-tuberculosis treatment in Health Facilities of Masaka City.

Specific objectives of the study

To establish the current level of adherence of Tuberculosis patients to anti-tuberculosis treatment.

To explore the knowledge of patients on the importance of adherence to anti-tuberculosis Drugs.

To identify socio-economic factors associated with adherence of patients on anti-tuberculosis treatment.

To establish Health facility factors affecting adherence of patient on tuberculosis treatment.

Hypothesis

Tuberculosis clients who receive frequent counseling adhere to treatment than their counter parts who do not receive frequent counseling.

Tuberculosis Clients with source of income adhere to TB treatment than their counterpart who don't have sources of income.

Methodology

Research design: An institutional based cross-sectional study design was used. Quantitative and qualitative data collection techniques were applied to collect data from one hundred and ten (110) TB patients.

Target population: The study population were TB patients' receiving TB treatment in the selected Health Facilities. The Aim was to establish those who were consistently receiving their treatment and those that were missing appointment (defaulters) and the predisposing factors. A patient was regarded as a TB defaulter if one missed in the clinic for two or more consecutive months.

Study Populations: Specifically, the study targeted TB Patients aged 12 years and above enrolled in TB care and treatment. These were individuals diagnosed with TB or TB/HIV infections, patients who consented to participate in the study, and medical personnel's present and directly involved in management of TB at the hospital /clinic at the time of data collection.

Sample Size determination: Using Cochran (1965) statistical formula
$$n_0 = \frac{Z^2 * p * (1 - p)}{e^2}$$

A sample size of 110 respondents was achieved after adjusting the obtained sample size to get a sample size for a smaller population of patients on TB treatment.

Sampling technique for the study area: The study was conducted in Masaka city. Masaka city district was selected based on the high prevalence of TB compared to other districts in the same region. Using simple random sampling, (2) divisions were selected out of 3, and Health facilities offering TB services were selected by simple random sampling from each division.

Selection criteria for study respondents: Using the health facility TB register, patients who had started TB treatment within 6 month were identified and assessed for eligibility for non-adherence, missed the appointment or defaulted treatment.

Data collection method and study instruments: A structured interviewer administered questionnaire was used to get information from the TB patients and a semi structured questionnaire used to get data from health workers. The questionnaire was pre-administered to 15 TB patients in one rural Health Centre level IV before actual data collection at the selected health Facilities in the study area. The results got were run through STATA and reliability coefficient of the tool determined using Cronbach's Alpha Coefficient. The value was 0.731, thus the instrument was considered reliable.

Data analysis: Quantitative data analysis was done for descriptive and inferential statistics at three levels:- univariate, bivariate and multivariate using STATA version 14. Descriptive statistics were entailed in determination of measures of central tendency, the mean, measure of dispersion range and standard deviation but also for frequency distributions and percentages. For Inferential statistics, the statistical significance of the relationship was determined at a p-value ($p \leq 0.05$). For significant relationships at bivariate level, correlation analysis at multivariate by correlation coefficient analysis was performed on the outcome variable

Measurement of patient's adherence: Adherence was categorized as good adherence if the patients' score was (95%-100%) =1 and poor adherence (0-94%) = 0, as dependent variables. At multivariate analysis, reported associations from each section 'C' and 'D' of Questionnaires was

then re-analyzed at multivariate level to remove cofounders in the relationship between adherence of patience and factors affecting adherence, reporting ODDs ratio, confident interval at 95% and p values.

Presentation Analysis and Interpretation of Findings

Demographic characteristics of respondents

Table 1: Demographic characteristics of respondents

Characteristics	Frequency	Percentage
Sex of Respondents		
Male	57	54.29
Female	48	45.71
Total	105	100.00
Ages of Respondents		
12-20	18	17.14
21-30	38	36.19
31-40	24	22.86
41-60	18	17.14
61+	7	6.67
Total	105	100.00
Marital Status		
Married	52	49.52
Single	26	24.76
Divorced/Separated	19	18.10
Widow	8	7.62
Total	105	100.00
Level of Education		
No Education	25	23.81
Primary	40	38.10
Secondary	31	29.52
Tertiary /University	9	8.57
Total	105	100.00

Table 1 indicates that most of the Tuberculosis clients 57 (54.29%) were Male and 48 (45.71%) were Female. Slightly a third of the respondent 38 (36.19%) belonged to age group 21-30 years, nearly half 52 (49.52%) were married, 40 (38.10%) had primary level of education.

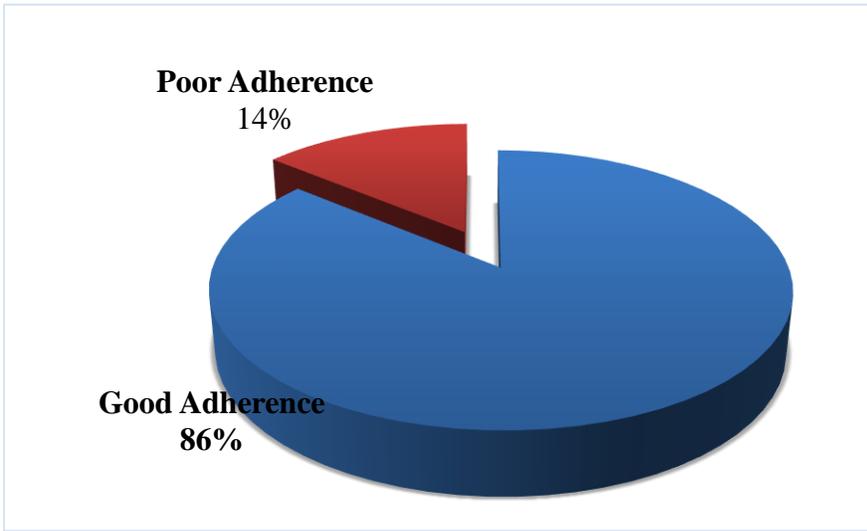


Figure 1: Prevalence of Patient adherence on Anti-Tuberculosis drug.

From the figure 1, the suboptimal adherence was at 86%.

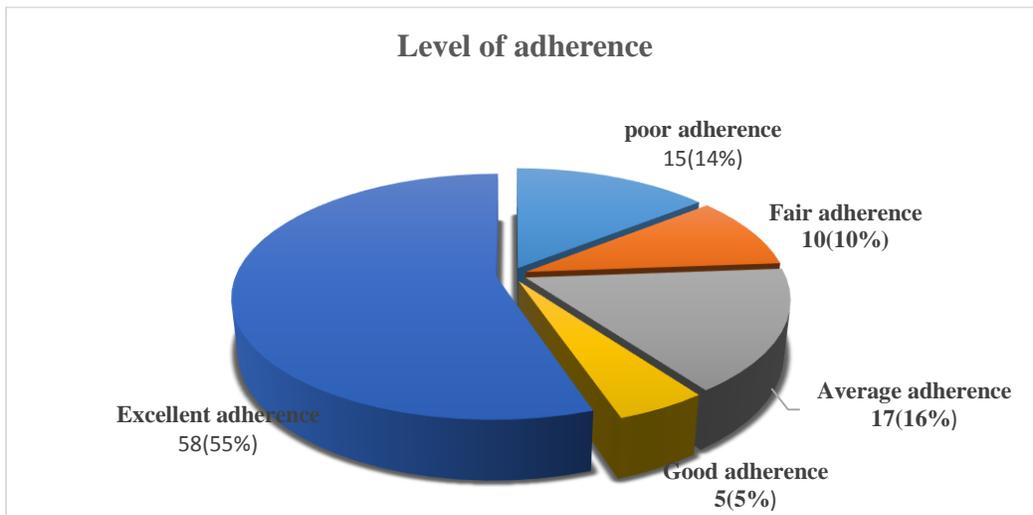


Figure 2: Patients Adherence of Anti-tuberculosis drug.

From the figure 2, more than half of respondents 58 (55%) had excellent adherence on Anti-tuberculosis Drug and 10 (10%) of patient had fair adherence to Tuberculosis Drug.

Level of knowledge on adherence

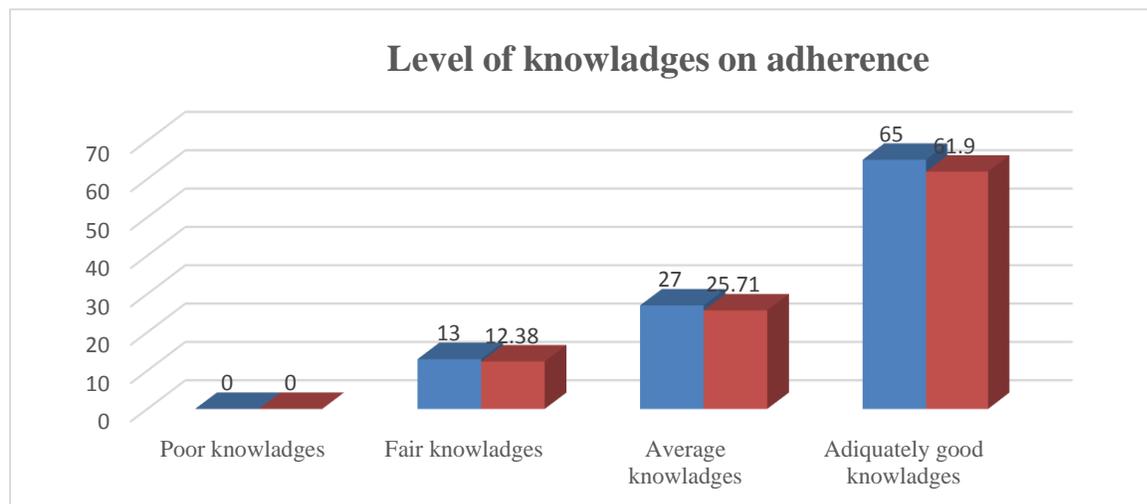


Figure 3: Knowledge on patients' adherence on Anti-tuberculosis drug.

From the figure 3, majority of the participants 65 (61.9%) had adequate knowledge on adherence on anti-tuberculosis drug, a quarter 27 (25.71%) of patients had average knowledge on Tuberculosis, No patient had poor knowledge on patience adherence on Anti-tuberculosis drug.

Social economic factors contributing to adherence of patient on Anti-Tuberculosis drug

Table 2: Social economic factors contributing to Patients adherence to Anti-tuberculosis drug.

Social economic factors	Frequency	Percentage
Employment status		
Casual labor	11	10.43
Self-employed	05	04.76
Employed	15	14.29
Dependent	10	09.52
Not employed	64	60.95
Total	105	100.00
Transport cost		
No cost	12	11.43
Lesser than 1000 Ugx.	10	09.52
1000-2000 Ugx.	67	63.81
2000 Ugx and above	16	15.23
Total	105	100.00
Substance abuse		
Alcohol	34	32.38
Tobacco	11	10.48
Marijuana	4	3.61
None of above	56	53.33
Total	105	100.00

From the table 2, majority of the Tuberculosis patient 64 (60.95%) were not employed, 15 (14.29%) employed, 11 (10.43%) were casual laborer, the least is 5 (4.76%) self-employed. Most Tuberculosis patient 67 (63.81%) use transport costs between sh.1000-2000 to pick their drug from the nearby health facility, 16 (15.23%) use sh. 2000 and above of the transport cost. Also 56 (53.33%) were non-substance abusers, 34 (32.38%) used alcohol while taking tuberculosis drug, 11 (10.48%) used tobacco and the least 4 (3.61%) used marijuana.

Table 3: Health facility factors contributing to patients' adherence Anti-tuberculosis.

Health facility factors	Frequency	Percentage
<i>Health worker attitude</i>		
Friendly	83	79.05
Empathetic	17	16.19
Rude	3	2.86
Uncaring	2	1.90
Total	105	100.00
Estimated time spend in refills		
Lesser than hour	65	61.90
2-3hours	39	37.14
3 and above hours	1	0.95
Total	105	100.00
Turned back		
Yes	10	9.52
No	91	86.67
Sometime	4	3.81
Total	105	100.00
Received counselling		
Yes	100	95.24
No	5	4.76
Total	105	100.00
Stages of counselling		
On the first visit	17	16.19
On each visit	71	67.62
Once a while	17	16.19
Never counselled	0	00.00
Total	105	100.00
Conduct of staff		
Bad	4	3.81
Fair	22	20.95
Good	79	75.24
Total	105	100.00
Space and privacy		
Yes	100	95.24
No	5	4.76
Total	105	100.00

From table 3, more than three quarter of the Health Worker 83 (79.05%) were friendly to client, (1.9%) were uncaring to TB clients. More than half of the TB clients 65 (61.90%) spend lesser than one hour in the facility on TB refills, 1 (0.95%) spend 3 hours and above. About 91 (86.67%) reported they had never been turned back, 10 (9.52%) have ever been turned back home, 4 (3.81%) were sometime turned back. Also 100 (95.24%) received counselling, 5 (4.76%) did not received counseling. Most of the client 71 (67.62%) received counselling at the stage of each visit while 17 (16.19%) received counselling once in a while. About 79 (75.24%) reported good conduct of health care worker, 22 (20.95%) reported conduct of healthcare worker as fair, 4 (3.81%) reported bad conduct of health worker. and 100 (95.24%) of the client reported they have given space and privacy, 5 (4.76%) of client reported they have not been given space and privacy.

Association between patients’ adherence and socio-economic factor to adherence of patient on Anti-Tuberculosis treatment at bivariate analysis.

Table 4: Association between patients’ adherence and socio-economic factors

Characteristics	Odd Ratio	Std. Err.	T	P> T	[95% Conf. Interval]	
How Tb Medicine is Taken						
Without Food and Water	1					
Water	.396036	.344121	-1.07	.72129	1133925	3.754491
Food	8.14787	2.799049	-2.91	0.004	-13.7011	-2.594645
Employment Status						
Not Employed	1					
Casual Labour	.822044	.7969532	1.03	0.305	-0.759088	2.403176
Self Employed	.3890497	.3135724	-1.17	0.241	.0801568	1.888295
Employed	.6524808	.5825583	-0.48	0.632	.1133925	3.754491
Dependant	1.090616	1.117552	0.08	0.933	.1463685	8.126363
Transport Cost						
No Cost	1					
1000 and Above	-0.54009	1.278603	-0.42	0.674	-3.07680	1.996619
Engage in Substance Abuse						
None (Alcohol & Tobacco)	1					
Alcohol	0.857562	.8459817	1.01	0.313	-.820841	2.535966
Tobacco	2.061898	1.977599	0.75	0.451	.314678	13.51039
Marajuana	.3430429	.4228959	-0.87	0.385	.03062	3.843184

Table 4 shows the logistic Regression between patients’ adherence and socio-economic factor affecting adherence. The level significances was accepted if $p < 0.005$, at 95% confident interval at bivariate analysis. From the figures above, there was relationship between patients adherence and availability of food for taking TB drug thus patient who take TB drug with food were 8 times more likely to adhere to treatments compare to those who take drug without water or food (OR=8.14787; [95% CI: -13.7011 -2.594645]; $P = 0.004$). There was no relationship between patients adherence and employment status (OR=.6524808; [95% CI=.1133925 3.754491]; $P = 0.632$). Therefore the

researcher failed to reject null hypothesis. However other factors affecting patients' adherence were substance abuse, transport cost was no significant.

Association between patients Adherence and health facility factors affecting adherence of patients on Anti-Tuberculosis treatment at bivariate Level of analysis.

Table 5: Association between patients Adherence and health facility factors affecting adherence

Characteristics of variable	Odd ratio	Std. Err	T	P> t	95% conf. Interval	
Heath care attitude						
Uncaring and rude	1					
Friendly	.311802	1.925086	0.16	0.872	-3.50896	4.132566
Empathetic	.9899297	.7297131	-0.01	0.989	.2334279	4.198131
Time spent						
Lesser than 1 hrs.	1					
2-3 hrs.	.5045971	2.32483	0.22	0.829	-4.1095	5.118742
3hrs and above	.8519172	.5155018	-0.26	0.791	.2602128	2.789113
Turned back						
Yes	1					
No	8.405111	3.634911	2.31	0.023	1.1908	15.6194
Some time	43.93784	86.98696	1.91	0.056	.9070942	2.128261
Received counselling						
Not counselled	1					
On the first visit	6.217087	4.993474	2.28	0.063	1.287995	30.00957
At each visit	9.19539	6.639391	3.04	0.003	7.0180	33.37274
Once awhile	3.368793	3.152026	1.30	0.194	3.602128	2.789014
Staff conduct						
Fair	1					
Good	7.618056	2.389823	3.19	0.002	2.8749	12.36119
Bad	8.350252	8.64e+09	0.02	0.989	.5383241	21.08166
Space and privacy						
Yes	1					
No	.0682459	.0943732	-1.94	0.052	.0045394	1.026014

The table 5 shows results of logistic regression analysis. From table 5, there was relationship between patients' adherence and patient not turned back during their appointment and refill days hence patients who had never been turned back were 8.4 times more likely to adhere to treatment compared to turned back (OR=8.4051; [95% CI: 1.1908 15.6194]; P=0.023). There was significant relationship between patients' adherence and TB client who were frequently received counselling at each visit and thus 9.2 times more likely to adhere to TB treatment than patient who didn't

received counselling (OR=9.19539, [95% CI: 7.0180 - 33.37274]; p=0.003). The study supported the hypothesis that clients who received frequent counselling adhere to Anti-Tuberculosis treatment.

Multiple Logistic regression to show association between adherence and factors affecting adherence.

Table 6: Association between patients' adherence and factors affecting adherence on Anti-tuberculosis.

Characteristic of variable	Odd ratio	Std. Err	T	P> t	[95% conf. Interval]	
Taking medicine with						
Lack water and food	1					
Water	1.513941	1.142562	0.55	0.583	.3449149	6.645165
Food	-5.43319	2.67234	-2.03	0.045	-10.7350	-.131335
Turn back from refill						
Yes	1					
no	5.84393	3.42894	1.70	0.091	-.958997	12.6468
Received frequent counselling						
Not counselled	1					
On the first visit	5.221684	3.322339	2.60	0.09	1.500468	18.17165
at each visit	15.5073	5.93346	2.61	0.010	3.73553	27.2791
Once in awhile	2.277243	1.71609	1.09	0.275	.5199469	9.97378
Conduct of health worker						
Fair	1					
Good	7.0566	2.15751	3.27	0.001	2.77620	11.3371
Bad	.4460711	.4601572	-0.78	0.434	.0590641	3.368875

The multiple logistic regression shows relationships between patient adherence and tuberculosis clients who frequently received counseling at each visit. They were 15.5 times more likely to adhere to TB treatment than their counter part who were not counselled (OR=15.5073; [95% CI: 3.73553 27.27917]; P=0.010). Also there was a strong relationship between patients' adherence and the good conduct of health workers thus the conduct of the health worker were 7.1 time more likely to contribute to adherence of TB patients than their counter part who received fair treatment from the health workers (OR=7.0566; [95%CI: 2.77620 11.3371]; P=0.001).

Knowledge about adherence among health care worker on the TB department

Results under this theme were obtained from the participants through interview guides with the health care providers in Masaka city Health facilities. Results indicate that the majority of health worker (80%) know how to determine adherence of patients, by counting drug and appointment schedules.

Resources to handle TB at the health facility

Responses under this theme were sought in accordance with research objective four of this study which sought to establish the health system factors that influence access and utilization of *Tuberculosis* adherence in Masaka city. Through in-depth interviews with the health care providers, results showed inadequate and irregular supplies of TB drugs at both private and public clinics and low staffing level to handle clients who have come for treatment. In addition, Most Health Facilities didn't include TB survivors in their advocacy services and yet their services could help to increase, create demand for missing opportunities within communities. District Health department to ensure Private clinics are included in treatment of TB and have access to Genexpert sites

Possible causes of Poor adherence of patients on anti TB treatment

Results also show that there is a problem among patients enrolled in treatment programs such as stigma, discrimination and suspension of transport as COVID-19 prevention guideline by president of Uganda contributed to poor adherence to treatments. Most patients tend to shy away and keep in communities without showing up because they are always isolated and neglected by their family members, relatives and communities.

Discussion

The study found out that 23.81% of the respondents had no education, 38.81% had attained primary levels of education and 8.57% had attained tertiary /university. This was in agreement with Mature *et al.*,(2011) who state that low level of education (12.5%) contribute to poor adherence of patients, since most of them take time to understand and reason traditionally especially in area with deep rooted traditional belief and culture. The study found the majority of the respondents 36.19% were between the age 21-30 years and 6.67% of them were above 61 years, since majority are in the age 21 years to 30 years this reflect youthful ages and is in agreement with Tengiz *et al.*, (2019) that shows (48.4%) were between the ages of 26 and 30. According Sempijja *et al.*, (2013). Study that indicate that 50% of the non-compliant were below the age of 30 years.

The level and knowledge on patients' adherence on Anti-tuberculosis.

The first objective of the study sought to establish the level of adherence of patient on Tuberculosis drug in Masaka in this regard, the study found out that the majority of *Tuberculosis* patients 61.9% had adequate knowledge on adherence. This study is in agreement with Kefyalew *et al.*,(2019) who shows that health workers who had a history of TB training were more likely to have good knowledge about MDR-TB than health workers who had no history of TB (AOR=1.85; [95% CI 1.12 to 3.03]) and they can help to transfer their knowledge to their clients. From the data, it also clear that Knowledge on adherence was also supported by evidence that majority of respondents 58 (55%) had excellent percentage adherence. This could have been due to fact that many 40 (38.10%) has attained primary level of education.

The study also indicated that the prevalence of poor adherence to Anti-tuberculosis was at 14% of the patients on treatment. This was not far from the studies done by Hermans *et al.*, (2017) that shows the prevalence of default were at 11% in Uganda. This implies that Tuberculosis cannot be isolated from HIV/AIDS prevalence.

Social economic factors

The study indicates that 11 (10.43%) of the respondents were casual laborers, 15 (14.29%) were employed and 10 (9.52%) were dependents. This being in agreement to Malik and Ahmad (2017) study that indicates 67% of non-compliant of TB patients were of lower social class, 28% from the middle and 5% from higher classes. The study found that 11.43% of the respondents had travelled with no cost to collect TB medicine, 63.81% travelled with between Uganda shilling 1000-2000. This was in agreement with Frezghi *et al.*, (2018) study that reflects poor access to a health care facility as an effect on compliance to TB treatment as healthcare services may be inaccessible to patients because majority live within the poverty line and cannot afford transport cost to go for refill of their drug.

Health facility factors

The study shows that about 83 (79.05%) of the respondents viewed health care workers as friendly during treatment and 2 (1.90%) as uncaring. These findings are in agreement with Mokgoadi (2012) study which suggests that a preventative measure to decrease non-compliance to TB treatment was to improve the attitude of health-care workers dealing with TB patients. Also the study reported that 100 (95.24%) of Tuberculosis patients had ever Received counselling, and 5 (4.79%) did not receive counselling. And the majority 71 (67.62) received counselling on each visit of refills. In the same, patients who received frequent counselling were associated with good adherence ($p=0.003$; [95% CI: 7.0180 - 33.37274]). This is in agreement with Hermans *et al.*, (2011) who reported that patients who have ever received counselling often express their concerns about Anti-Tuberculosis treatment and their concerned was associated with treatment adherence [$p<0.001$;95% CI: 2.51–7.46]. This shows that all patients enrolled in care should be given ultimate attention so that they can express their barriers that affect their adherence.

Most patients reported that good conduct of health workers 79 (75.24%) and 4 (3.81%) reported fair and bad conduct of health worker respectively. good conduct of staff was associated with adherence of patients ($p=0.002$; [95% CI: 2.8749-12.36119]) this study was in agreement with [22] that alluded attitude and conduct of staff (OR= 2.72; 1.02–7.25) contribute to good adherence of patients.

Health worker factors

The study revealed that there was inadequate and irregular supplies of TB drugs, Patients travelled to their native homes and assumed treatment is complete. This concur with (Gebremariam, Wolde, Beyene, 2021) study which found that TB treatment is still perceived by the majority of patients as long, agonizing and cumbersome, and there are still some doubts as to whether the disease is curable.

Also report shows that stigma, discrimination and suspension of transport as COVID-19 prevention guideline by president of Uganda and ministry of health negatively contributed to poor adherence of patient. On 25 March 2020 president of Uganda announce suspension of transport following the first case of COVID-19 by then suspension of transport disrupted patient to come back for refill. Fear of COVID-19 has made many patient to be stigmatized and discriminated by their relative for fear of COVID-19 infection and in some hence affecting adherence of patients. On advocacy for implementation of TB adherence.

In addition it was noted that Inclusion of Tuberculosis survivor in the advocacy services could help in demand creation as the health workers attested that, these survivors has help to bring back lost client into care and they can share experience in during their treatment. Also, private clinic inclusion in treatment of TB for free and access Genexpert sites would widen medical treatment for long distance patience on care.

Conclusion

Adherence to anti-Tuberculosis was positively associated with health facility factors contributing to 86% of patient adherence. There were more males than females on TB treatment, Also clients of reproductive age between 21-30 years were the main Tuberculosis patients in Masaka city. The majority of healthcare providers are friendly to their TB patients; most patients were frequently counseled on each visit on TB medication; patients spend 2-3 hours to get refill of TB treatment. Also stigma and discrimination in fear of COVID-19 has negatively affected adherence of patients on anti-Tuberculosis; health workers noted irregular supply of TB drugs in health facilities. It was also concluded that patients with low education level default more on TB drugs. Include Tuberculosis survivor in the advocacy services and demand creation; private clinic inclusion in treatment of TB for free and access to Genexpert sites.

Recommendations

1. The researcher recommended that health practitioner should help and assigned more than one treatment supporters, the immediate family member and a village health team (VHT) to help support the clients.
2. Health education should be intensified, reinforcement counseling by health care worker at each visit using the local language despite normal counseling practices.
3. Strengthen of referral system within facilities to cater for transport of patient on long distances.
4. Government should increase support of the TB treatment just like HIV/AIDS supports, herbalists should also be regulated to know their limit of treatment and care at community levels.
5. In addition it was noted that Inclusion of Tuberculosis survivor in the advocacy services could help in demand creation as the health workers attested that, these survivors has help to bring back lost client into care and they can share experience in during their treatment.
6. Also district health department to include Private clinic inclusion in treatment of TB for free and access Genexpert sites would widen medical treatment for long distance patience on care.

Study Limitations

The study will be conducted in a few health facilities in Masaka city. Cross sectional study design was anticipated not rigorous enough to detect associations compared to other study designs like the case control studies. However the researcher used large number of the participant to reduce the error and to detect enough association, the researcher used analytical cross sectional study.

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