FACTORS ASSOCIATED WITH NON-ADHERENCE TO ANTIDIABETIC MEDICATION AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS AT MASAKA DISTRICT HOSPITAL, KIGALI CITY, RWANDA

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Abstract

Introduction: Non-adherence to medication is the degree to which the behavior of patient (in terms of taking prescribed medicines, execution of agreed lifestyle changes, enduring medical tests and respecting appointments and follow-up) does not comply with the recommendations and advice given by competent healthcare provider. The objective of this study was to assess factors associated with non-adherence to antidiabetic medication among patients with type 2 diabetes mellitus at Masaka district hospital, Kigali city, Rwanda.

Methods: Cross-sectional design with quantitative approach was used in this study. Questionnaire was used to collect data from a sample size of 217 patients with type 2 diabetes mellitus attending appointments for follow-up services at Masaka district hospital. Data analysis was done using statistical package for social science (SPSS) version 21, Chi-square test was used to determine association; P-value less than 0.05 taken as significant to analyze and assess non-adherence. Regression analysis was done to find out adjusted odds ratio, confidence interval and probability value (p-value).

Findings: The study findings showed that the majority of participants 59.0% were females, the proportion of non-adherence was 35.9%. The proportion of adherents and non-adherents was 64.06 % and 35.94% respectively. The main factors found to be statistically significant associated with non-adherence to antidiabetic medication were: forgetfulness with AOR=0.165; 95%CI=[0.081-0.334]; P=<0.001, being on insulin(s) with AOR=4.371; 95%CI=[1.725-11.077]; P=0.002, being on insulin(s) with oral hypoglycemic agent(s) with AOR=13.371; 95%CI=[3.604-49.617]; P=<0.001, unpleasant way of taking medication with AOR=0.356; 95%CI=[0.171-0.743]; P=0.006, unhappy clinic visit with AOR=3.019; 95%CI=[1.617-5.638]; P=0.001.

Conclusion: The study concluded that above the half of patients with type 2 diabetes mellitus at Masaka district hospital were adherent to antidiabetic medication. This study recommended to minimize the waiting period of time patients spent waiting for services, strengthen counseling and health education, reduction or eradication if possible the problem of stock out of medication.

Keywords: *adherence to medication, non-adherence to medication, type 2 diabetes mellitus, factor*

Introduction

Type 2 diabetes mellitus (T2DM) is a lifelong illness which develops when the human body is unable to generate required quantity of insulin or it develops a resistance to insulin resulting to abnormal increase of sugar in forms of glucose into the blood [8]. This illness now slow by slow is being a big concern for all global health that is carefully thought as principal cause of deaths in both low and middle income countries (LMICs) and in developed countries. The estimation of T2DM in future becomes fearsome, because in year 2013 it was found that people who had T2DM globally were 382 million and this prevalence is prospected to go up to around 483 million people having T2DM in year 2030; this illness, now days is clearly seen as one of the quickest growing global and health problems all over the world [4].

Non-adherence in healthcare system is explained as the is the degree or level to which the behavior of patient (in terms of taking prescribed medicines, execution of agreed lifestyle changes, enduring medical tests and respecting appointments and follow-up) does not comply with the recommendations and advice given by a healthcare provider. In specific way, medication adherence included in the keys dimensions of quality in a healthcare system and is expressed as the percentage of prescribed doses of medicine that are being consumed by a client or patient in a determined time period. And it is found in many researches that better adherence to prescribed medicines or treatment may result to ameliorated control of disease and decreased complicated cases of type 2 diabetes mellitus. Contrarily, when the control of T2DM is in poor ways, the illness may lead to many complicated condition [5].

In United Arab Emirates (UAE), a hospital based study found that there is a proportion 80% of antidiabetic medication adherence; while other similar researches conducted in Uganda showed 83.3% and Ethiopia showed 85.1%. Contrally, other studies conducted in Botswana obtained lower prevalence of 52% and in Switzerland obtained 40% [3]. In Cameroon a similar study conducted at two regional hospitals to explore adherence to antidiabetic medication and factors associated to non-adherence among patients with T2DM revealed that the prevalence of non-adherence was 54.4% [2].

In Rwanda, the ministry of health in 2016 reported that the proportion of DM in Rwandan people was 3.2% and also reported that 43% of admissions in different hospitals in Kigali were due to non-communicable diseases where diabetes mellitus occupied 27% among them and where 194,300 people were suffering from diabetes mellitus and this proportion was estimated to rise in future as the same in other non-industrialized nations [11]. There is a deficit of recent data focusing on this problem in Rwanda, especially at Masaka district Hospital. Therefore, the study has been conducted to explore more this issue.

Conceptual framework

Independent variables   **Dependent variable**

Patients-related factors: low level of knowledge of patient, forgetfulness, tobacco smoking, alcohol intake, busy due to workload and travels, disappearance of symptoms, disbelief in medicine effectiveness, etc.

Non-adherence to antidiabetic medication among patients with type 2 diabetes mellitus

Medication-related factors: unpleasant way of taking medication, and fear of side effects, bad taste, difficult administration schedule, etc.

Healthcare system factors: long waiting time of patients at health facility, unhappy clinic visit, stock out of medications at health facility, etc.

Intervening variables

Hospital policies and procedures, government policies.

Figure 2. 1: Conceptual framework

Source: From literature review, organized and modified by the researcher (2022)

Figure 2.1 shows the conceptual framework, that connects different research's variables. Independent variables consist of patient-related factors which are factors caused or from the patient him/herself, medication-related factors which are the factors caused by different medicines of type 2 diabetes mellitus and healthcare system factors which are factors caused by health facilities, working system and organizational structure; dependent variable which is the research problem; and then intervening variables which are hospital policies and procedures, government policies.

Methods

Study design:

Cross-sectional design with quantitative approach was used in this study. Questionnaire was used to collect data from a sample size of 217 patients with type 2 diabetes mellitus attending appointments for follow-up services at Masaka district hospital, in Kigali city, Rwanda. Convenience sampling technique was used to select study's participants.

Data collection:

Collection of data was done after the researcher obtained approval from required institutions including Mount Kenya University's clearance and Masaka district hospital's permission. All clarifications about the research and its objectives, importance and consequences were given to every individual who participated on this research; also a consent form was given to everyone and signs it before participating in research. Then, participant was asked to respond voluntarily to questionnaire after being explained on all information related to the study.

Statistical analysis:

Data analysis was done using statistical package for social science (SPSS) version 21, cleaning of data was done before analysis, calculation of frequencies and percentage was done to describe the sample. The Chi-square test was used to determine association; P-value less than 0.05 taken as significant to analyze and assess non-adherence. Regression analysis was done to find out adjusted odds ratio, confidence interval and probability value (p-value). Data were presented using tables.

Non adherence to medication was determined by using subjective method that consists of asking the participant various questions regarding medication taking behavior for example by asking how often he/she missed doses etc [3]. A series of seven questions related to medication adherence was put in place with different response scales options made of never, sometimes and always. Each scale has given a score where never=2, sometimes=1 and always=0. The maximum total score to all seven questions was 14 and the minimum total score was 0. Non-adherents were patients who responded to all seven questions and scored 12 out of 14 and below.

Results

The findings of this study are based on the total responses from 217 participants. Statistical Package for Social Sciences (SPSS) version 21 was used to generate frequencies, percentages and other parameters.

Table 4. 1 Socio-demographic characteristics of respondents

Variables	Frequency	Percentage
Sex		
Male	89	41.0
Female	128	59.0
Age group (in years)		
18-40	49	22.6
41-60	110	50.7
Above 60	58	26.7
Marital status		
Single	19	8.8
Married	161	74.7
Divorced	9	4.1
Widowed	27	12.4
Educational status		
Primary studies	91	41.9
Secondary studies	62	28.6
University	24	11.1
Illiterate	40	18.4
Employment status		
Employed	65	30.0
Unemployed	132	60.8
Retired	20	9.2
Place of residence		
Urban	158	72.8
Rural	59	27.2
Time spent walking on feet from home to health facility		
Less than 3o minutes	55	25.3
30 minutes and above	162	74.7

Source: Primary data (2022)

As the table 4.1 showed, among 217 respondents who participated; concerning sex the results showed that the majority 128 (59.0%) were female and 89 (41.0%) were male; concerning the age group the results showed that the majority 110 (50.7%) were belonged between 41 to 60 years old, 58 (26.7%) had the age above 60 years old and the minority 49 (22.6%) were belonged between 18 t0 40 years old; concerning marital status the results showed that the majority 162 (74.7%) were married, 27 (12.4%) were widows, 19 (8.8%) were single and the minority 9 (4.1%) were divorced; concerning educational status the results showed that 91 (41.9%) attended primary school, 62 (28.6%) attended secondary school, 24 (11.1%) attended university and 40 (18.4%) were illiterates (did not attended school); concerning employment status the results showed that the majority 131 (60.8%) were unemployed, 65 (30.0%) were employed and the minority 20 (9.2%) were retired; concerning place of residence the results showed that the majority 158 (72.8%) were residents in urban areas and the minority 59 (27.2%) were residents in rural areas;

concerning time spent walking on feet from home to health facility the results showed that the majority 162 (74.7%) spent 30 minutes and above and the minority 55 (25.3%) spent less than 30 minutes.

Table 4. 2 Responses of patients on adherence to antidiabetic medications

Questions related to adherence to medication	Responses		
	Never	Sometimes	Always
How often do you forget to take medication?	167 (77.0%)	49 (22.6%)	1 (0.5%)
How often personally do you take decision not to take your medication?	195 (89.9%)	22 (10.1%)	0 (0.0%)
How often do you take decision to not take your medication because you feel well?	179 (82.5%)	38 (17.5%)	0 (0.0%)
How often personally do you take decision to take less of your medication?	181 (83.4%)	33 (15.2%)	1 (0.5%)
How often do you stop taking medication because you fear medication side effects?	185 (85.3%)	31 (14.3%)	0 (0.0%)
How often do you miss to take your medication because of busy workload?	181 (83.4%)	36 (16.6%)	0 (0.0%)
How often do you miss taking medication because of busy travels?	180 (82.9%)	37 (17.1%)	0 (0.0%)

Source: Primary data (2022)

Table 4.2 Showed that among 217 respondents who participated; findings revealed that 1 patient always forget to take medication and 1 patient always take less than of recommended medication, a proportion of patient did not take medication sometimes and the majority reported that they always take their medication as recommended.

Table 4. 3 Summary of adherents and non-adherents to antidiabetic medications

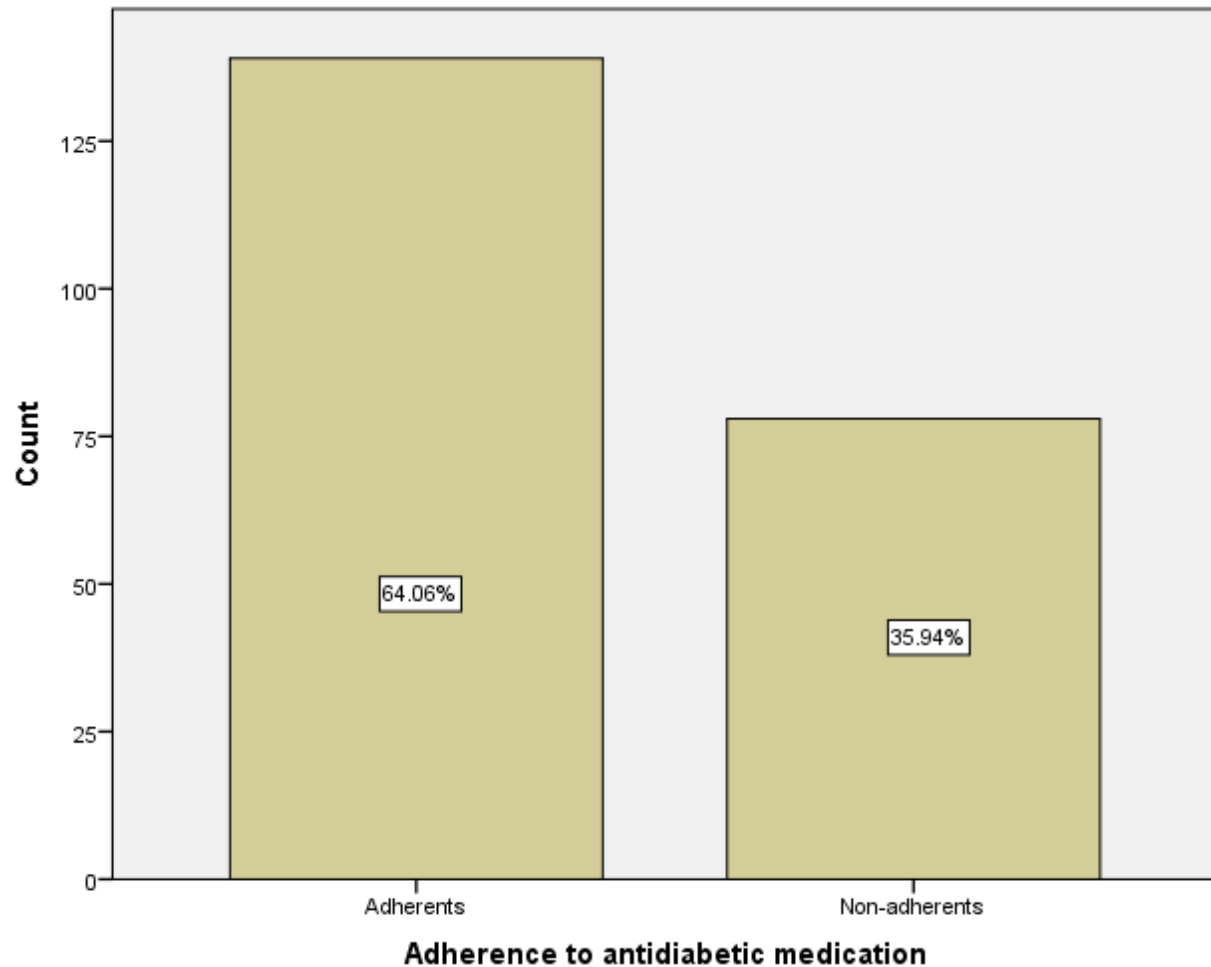| Adherents and non-adherents	Frequency	Percentage (%)
Adherents	139	64.06
Non-adherents	78	35.94
Total	**217**	**100**

Source: Primary data (2022)

Figure 4.1 Proportion of adherents and non-adherents

Source: Primary data (2022)

Table 4.3 and figure 4.1 showed that concerning level of adherence and non-adherence to antidiabetic medication; a series of seven questions related to medication adherence was put in place with different response scales options made of never, sometimes and always. Each scale has given a score where never=2, sometimes=1 and always=0. The maximum total score to all seven questions was 14 and the minimum total score was 0. Adherents were patients who responded to all seven questions and scored at least 13 out of 14 and above and they were 139 out of 217 respondents (64.06%). Non-adherents were patients who responded to all seven questions and scored 12 out of 14 and below and they were 78 out of 217 respondents (35.94%).

Table 4. 4 Chi-square test of association between patient related factors and adherence to antidiabetic medication

Factors	Adherents	Non-adherents	Chi-square	P-value
Forgetfulness				
Yes	18(12.9%)	37(47.4%)	31.404	**<0.001**
No	74(87.1%)	41(52.6%)		
Alcohol intake				
Yes	23(16.5%)	12(15.4%)	0.050	0.823
No	116(83.5%)	66(84.6%)		
Smoking				
Yes	5(3.6%)	1(1.3%)	0.996	0.318
No	134(96.4%)	77(98.7%)		
No enough knowledge on how to take medication				
Yes	14(10.1%)	66(84.6%)	1.337	0.248
No	125(89.9%)	12(15.4%)		
Busy due to workload and travels				
Yes	31(22.3%)	18(23.1%)	0.017	0.896
No	108(77.7%)	60(76.9%)		
Disbelief in medicine effectiveness				
Yes	28(20.1%)	14(17.9%)	0.154	0.695
No	111(79.9%)	64(82.1%)		
Disappearance of signs and symptoms				
Yes	6(4.3%)	6(7.7%)	1.090	0.296
No	133(95.7%)	72(92.3%)		
Low level of income				
Yes	44(31.7%)	38(48.7%)	6.188	**0.013**
No	95(68.3%)	40(51.3%)		

Source: Primary data (2022)

Table 4.4 showed that among patient related factors chi-square test revealed that only two factors were significantly associated with non-adherence. These factors were forgetfulness with chi-square 31.404, p-value <0.001 and low level of income of patient compared to the cost of medication with chi-square 6.188, p-value 0.013.

Table 4. 5 Chi-square test of association between medication related factors and non-adherence to antidiabetic medication

Factors	Adherents	Non-adherents	Chi-square	P-value
Type of antidiabetic medication a patient was on				
Single pill	36(25.9%)	7(9.0%)	22.314	**<0.001**
Two and more pills	58(41.7%)	24(30.8%)		
Insulin	40(28.8%)	34(43.6%)		
Insulin and pill(s)	5(3.6%)	13(16.7%)		
Unpleasant way of taking medication				
Yes	19(13.7%)	27(34.6%)	13.123	**<0.001**
No	120(86.3%)	51(65.4%)		
Multiple medication				
Yes	100(71.9%)	62(79.5%)	1.503	0.220
No	39(28.1%)	16(20.5%)		
Long duration of treatment period				
Yes	39(28.1%)	21(26.9%)	0.032	0.858
No	100(71.9%)	57(73.1%)		
Fear of medication's side effects				
Yes	65(46.8%)	37(47.4%)	0.009	0.924
No	74(53.2%)	41(52.6%)		
Bad taste of medication				
Yes	41(29.5%)	30(38.5%)	1.824	0.177
No	139(70.5%)	48(61.5%)		
Difficult schedule time for taking medication				
Yes	16(11.5%)	19(24.4%)	6.097	**0.014**
No	123(88.5%)	59(75.6%)		

Source: Primary data (2022)

Table 4.5 showed that among medication related factors chi-square test revealed that only two factors were significantly associated with non-adherence. These factors were type of medication a patient was on with chi-square 22.314, p-value <0.001, unpleasant way of taking medication with chi-square 13.123, p-value <0.001 and difficult schedule time for taking medication with chi-square 6.097, p-value 0.014.

Table 4. 6 Chi-square test of association between healthcare system factors and non-adherence to antidiabetic medication

Factors	Adherents	Non-adherents	Chi-square	P-value
Difficult accessibility				
Yes	36(25.9%)	27(34.6%)	1.842	0.175
No	103(74.1%)	51(65.4%)		
Long waiting time				
Yes	105(75.5%)	61(78.2%)	0.197	0.657
No	34(24.5%)	17(21.8%)		
Unhappy clinic visit				
Yes	106(76.3%)	40(51.3%)	14.159	**<0.001**
No	33(23.7%)	38(48.7%)		
Stock out of medication				
Yes	40(28.8%)	32(41.0%)	3.381	0.066
No	99(71.2%)	46(59.0%)		
Inadequate availability of medication				
Yes	46(33.1%)	30(38.5%)	0.633	0.426
No	93(66.9%)	48(61.5%)		
Inadequate health education				
Yes	104(74.8%)	56(71.8%)	0.236	0.627
No	35(25.2%)	22(28.2%)		

Source: Primary data (2022)

Table 4.6 showed that among healthcare system factors chi-square test revealed that only two factors were significantly associated with non-adherence. The only one factor was found to be unhappy clinic visit with chi-square 14.159, p-value <0.001.

Table 4. 7 Chi-square test of association between socio-demographic characteristics and non-adherence to antidiabetic medications

Variables	Adherents	Non-adherents	Chi-square	P-value
Sex				
Male	58(41.7%)	31(39.7%)	0.081	0.776
Female	81(58.3%)	47(60.3%)		
Age group (in years)				
18-40	38(27.3%)	11(14.1%)	8.946	**0.011**
41-60	72(51.8%)	38(48.7%)		
Above 60	29(20.9%)	29(37.2%)		
Marital status				
Single	13(9.4%)	6(7.7%)	10.187	**0.017**
Married	109(78.4%)	53(67.9%)		
Divorced	7(5.0%)	2(2.6%)		
Widowed	10(7.2%)	17(21.8%)		
Educational status				
Primary studies	53(38.1%)	38(48.7%)	10.672	**0.014**
Secondary studies	44(31.0%)	18(23.1%)		
University	21(15.1%)	3(3.8%)		
Illiterate	21(15.1%)	19(24.4%)		
Employment status				
Employed	51(36.7%)	14(17.9%)	11.568	**0.003**
Unemployed	80(57.6%)	52(66.7%)		
Retired	8(5.8%)	12(15.4%)		
Place of residence				
Urban	104(74.8%)	158(72.8%)	0.788	0.375
Rural	35(25.2%)			
Time spent walking on feet from home to health facility	40(28.8%)	59(27.2%)	2.406	0.121
Less than 3o minutes	99(71.2%)	15(19.2%)		
30 minutes and above		63(80.8%)		

Source: Primary data (2022)

Table 4.7 showed that among socio-demographic characteristics chi-square test revealed that characteristics that were significantly associated with non-adherence included: age group with chi-square 8.946, p-value 0.011, marital status with chi-square 10.187, p-value 0.017, educational status with chi-square 10.672, p-value 0.014 and employment status with chi-square 11.568, p-value 0.003.

After understanding different socio-demographic characteristics and different factors, multivariate analysis was performed on all variables that found to be statistically significant associated to non-adherence to antidiabetic medication during chi-square test. This is shown in the table below:

Table 4. 8 Multivariate analysis of factors associated with non-adherence to antidiabetic medication

Variables	AOR	95% CI		P-value
		Lower	Upper	
Age group (in years)				
18-40	reference			
41-60	1.823	0.838	3.968	0.130
Above 60	3.455	1.483	8.048	**0.004**
Marital status				
Single	reference			
Married	1.054	0.379	2.926	0.920
Divorced	0.619	0.098	3.919	0.610
Widowed	3.683	1.062	12.771	**0.040**
Educational status				
Primary studies	0.792	0.375	1.673	0.542
Secondary studies	0.452	0.198	1.035	0.060
University	0.158	0.041	0.615	0.080
Illiterate	reference			
Employment status				
Employed	reference			
Unemployed	2.368	1.192	4.705	**0.014**
Retired	5.464	1.870	15.969	**0.002**
Patient related factors				
Forgetfulness	0.165	0.081	0.334	**<0.001**
Level of income	0.540	0.283	1.029	0.061
Medication related factors				
Type of antidiabetic medication a patient was on:				
▪ Single pill	reference			
▪ Two or pills	2.128	0.832	5.443	0.115
▪ Insulin(s)	4.371	1.725	11.077	**0.002**
▪ Insulin(s) and pill(s)	13.371	3.604	49.617	**<0.001**
Unpleasant way of taking medication	0.356	0.171	0.743	**0.006**
Difficult schedule time for taking medication	0.539	0.238	1.218	0.137
Healthcare system factors				
Unhappy clinic visit	3.019	1.617	5.638	**0.001**

AOR: adjusted odds ratio, CI: confidence interval

Source: Primary data (2022)

Table 4.8 showed findings from multivariate analysis of all variables that found to be statistically significant during chi-square test. The study findings showed that the main factors found to be statistically significant associated with non-adherence were: having above 60 years old with AOR=3.455; 95%CI=[1.483-8.048]; P=0.004, being widow with AOR=3.683; 95%CI=[1.062-12.771],P=0.040, retired from work with AOR=5.464; 95%CI=[1.870-15.969], P=0.002, unemployment with AOR=2.368; 95%CI=[1.192-4.705]; P=0.014, and the mostly common reported causes of non-adherence statistically significant associated were forgetfulness with AOR=0.165; 95%CI=[0.081-0.334]; P=<0.001, being on insulin(s) with AOR=4.371; 95%CI=[1.725-11.077]; P=0.002, being on insulin(s) with oral hypoglycemic agent(s) with AOR=13.371; 95%CI=[3.604-49.617]; P=<0.001, unpleasant way of taking medication with AOR=0.356; 95%CI=[0.171-0.743]; P=0.006, unhappy clinic visit with AOR=3.019; 95%CI=[1.617-5.638]; P=0.001.

Discussion

Other similar studies to this that were conducted in different countries were explored and discussed by comparing them with this study.

Concerning level of non-adherence to medication, in line with other similar study conducted in Ethiopia on predictors of poor adherence to antidiabetic therapy in patients with T2DM the results revealed that the proportion of non-adherents people was 25% (Wahdey et al, 2020). Other study conducted to explore adherence to antidiabetic medication and factors associated with non-adherence among type 2 diabetes mellitus in two regional hospitals in Cameroon showed that the prevalence of non-adherence to medicines was at 54.4% [2].

Concerning patient related factors, in study conducted in India on factors associated with therapeutic non-compliance among T2DM patients in Chidambaram showed that patient's factors mostly found to be statistically significant was financial inabilities to buy medication themselves with p-value of 0.001 (Kalyani et al, 2017), whereas in other similar study done in Mizan-Tepei university teaching hospital in Ethiopia showed that age over 60 years old with AOR=0.276, 95% CI=0.124-0.611, retirement from work with AOR=7.771, 95% CI=1.458-41.427, level of education, forgetfulness and no capability to afford medication also were found to be statistically significant in this study [13].

Concerning medication related factors, similar studies done like one conducted in university of Gondar hospital in Ethiopia, revealed that multiple medication or poly-pharmacy and fear of side effects were the most reported reasons for non-adherence to T2DM regimen (Messele et al , 2015). In other similar study in the same country results showed that also multiple medication consisted of more than drugs with AOR=7.192, 95% CI=2.171-23.824 was the mostly reported reason by different patients with T2DM [10].

Concerning healthcare system factors, different similar studies revealed that long distance from home to health facility, stock out of medication at health facility, unhappy visits and inadequate health education were mostly reported by patients. For example in similar qualitative study conducted in Iran showed that lack of adequate interaction between health care provider and patient concerning health education was found to be one of the most reasons for non-adherence (Ebtekar et al, 2019). In other study conducted in Eastern zone of Tigrai, the findings showed that the distance longer than 24 km from home to hospital AOR=10.091, 95% CI=3.509-29.020, never receiving health education and counseling AOR=22.334, 95% CI=9.270-53.810 were mostly reported by patients among reasons for non-adherence [10].

Conclusion

By concluding the findings from this study showed that non adherence was mostly associated the following factors: having above 60 years old, being widow, retired from work, being on insulin and being on insulin and oral hypoglycemic agent(s) and the mostly common reported causes of non-adherence and significantly associated were forgetfulness, unpleasant way of taking medication, unhappy clinic visit. above the half of patients with type 2 diabetes mellitus at Masaka district hospital were adherent to antidiabetic medication.

Recommendation

Masaka district hospital should minimize the waiting period of time patients spent waiting for services, strengthen counseling and health education about disease and medication adherence especially by focusing on older adults and newly or recently diagnosed patients; reduction or eradication of the problem of stock out of medication. Patients with type 2 diabetes mellitus have to respect their recommended regimens and have to respect their scheduled follow-up visits. The government should consider all ways

possible that can lead to the reduction of cost of antidiabetic medications so that they can be largely available and affordable by population concerned. Also the government should decentralize more other health facilities across the district(s) in order to ease accessibility and employ enough staffs to improve the quality of services. There should be other studies that can be conducted in the whole country so that the findings can be extended enough and where can be relied on them by formulating solutions countrywide.

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