Knowledge and Attitude of Diabetes Mellitus and Adherence to Treatment Regimen among Diabetic Patients Attending Kirehe District Hospital, Rwanda

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Abstract

Background: Chronic diseases such as diabetes mellitus require daily self-management and long term therapies. Non-adherence to diabetic treatment has been shown to contribute to poor glycemic control leading to development of complications, repeated hospital admissions, amputations and even death. Despite high readmission rates with complication in Rwanda, there is limited data on the adherence to medication among diabetic patients.

Objectives: To determine the knowledge and attitude of diabetes mellitus and adherence to treatment regimen among diabetic patients attending Kirehe District Hospital, Rwanda.

Methods: A descriptive cross-sectional study was carried out. A systematic sampling method was used to recruit 127 diabetic patients. Data was collected using pretested semi structured questionnaire. Score assessment was used to assess knowledge and attitude level towards treatment and prevention of diabetes mellitus and adherence to treatment regimen. Factors associated with adherence were considered statistically significant at P ≤ 0.05 and multivariate analysis for statistically significant variables in bivariate analysis was performed.

Results: The finding revealed that 42.5% of the respondents had good knowledge. Similarly, respondents with good attitude towards diabetes risk factors, treatment and prevention was 44.1%. However, majority of the respondents (64.6%) had adequate adherence towards treatment regimen. The predictors of adequate adherence were older age (AOR=51.98; 95%CI=7.82-345.71, p<0.001), attaining primary school (AOR=12.64; 95%CI=2.00-79.95, p=0.007), attaining secondary or university (AOR=53.54; 95%CI=5.98-479.37, p<0.001) and good knowledge (AOR=10.60; 95%CI=1.55-72.32, p=0.016).

Conclusion: The levels of knowledge and attitude towards diabetes mellitus were low. Therefore, the Ministry of Health and other related stakeholders should help increase the awareness and enhance positive attitude among diabetes mellitus patients through education programs. More focus should be given to illiterate and young age group.

Introduction

Diabetes Mellitus Type 2 (DMT2) is defined as deficiency or lack of insulin production, leading to metabolic disorders of carbohydrates, protein and fat characterized by high sugar level in the blood, degenerative vascular changes and neuropathy [1]. It is a public health concern which is considered as a leading cause of death in both developed and developing countries. The projection of DMT2 in the future is alarming. For example, according to the World Health Organization (WHO), the prevalence of DMT2 in 2000 worldwide was 170 million, and this number is expected to rise to around 370 million by 2030 [2,3]. The prevalence of diabetes mellitus among Rwandan population is about 3.2% [4] and is increasing like in other developing countries [5]. Moreover, the premature deaths are due to Non-Communicable Diseases (NCDs) such as diabetes and hypertension in Rwanda which accounts for 30% of all deaths [5].

The management of diabetes mellitus largely depends on patients' ability to self-care in their daily lives. However, most diabetes mellitus come to the hospital with complications soon after they are discharged which mainly resulted from non-compliance of treatment regimens. This makes diabetes mellitus one of the most common causes of hospitalization [6]. Furthermore, there is evidence that non-adherence to medications among diabetic patients resulted poor glycemic control leading to treatment ineffectiveness, increased incidences of diabetic mellitus complications and increased health care cost [7-9].

Adherence in healthcare is defined as the extent to which a patient's behavior (in terms of taking medication, executing the lifestyle changes, undergoing medical tests or keeping appointments with the physicians) coincides with the healthcare provider's recommendations for health and medical advice [10]. More specifically, adherence to medications is one of the key dimensions of health care quality, which

is defined as the proportion of prescribed doses of medication actually taken by a patient over a specified period of time [11]. It is reported that better medical adherence leads to improving disease control, fewer cases of diabetes related complications [12]. On the other hand, if diabetes is poorly controlled, it can cause complications like heart attacks, strokes, kidney failure, blindness, and foot ulcers that can lead to amputations [13]. Therefore, achieving controlling diabetes mellitus and preventing early complications are the ultimate targets of diabetes management which depends on patient's adherence to regimens [14].

Although self-management is difficult, there is evidence suggesting that patients who are knowledgeable about DMT2 self-care, have better long term of controlling the disease [15-17]. The ability to attain treatment goals of drug therapy is correlated with general knowledge about treatment and risk factors [18]. Studies have shown that there is improvement in compliance to treatment and decrease in the complications associated with the disease with increase in patients' knowledge about the disease and its complications [18,19]. Medication compliance is also found highly correlated with attitudes and beliefs towards medication [18]. Thus it is crucial to ensure that patients' knowledge and attitudes are satisfactory.

However, studies have shown low level of knowledge and attitude regarding of diabetes mellitus. For instance a study conducted by Al-Maskari et al. [20] on knowledge, attitude and practices of diabetic patients in the United Arab Emirates, observed that 31% of patients had poor knowledge, 72% had negative attitudes towards having the disease and 57% had poor glycemic control. A study by Adejoh [21] in Igala Nigeria revealed that almost half of the respondents had low diabetes knowledge. Another study in South East Nigeria, also showed that majority of respondents (93.6%) lacked basic knowledge of diabetes management or care and reported inability to visit the doctor except when manifesting serious symptoms or complications [22]. However, there is no study conducted on knowledge and attitudes of the disease and tis complications among diabetes mellitus patients in Rwanda.

Generally, non-adherence is associated with factors that are patient-centered, therapy-related, or healthcare system related. The patient-centered factors can be demographic (age, gender, educational level, and marital status) and psychological (patients beliefs and motivation towards the therapy, negative attitude, patient-prescriber relationship, understanding of health issues, and patients knowledge) [23,24]. The therapy-related factors include route of medication, duration of treatment, complexity of treatment, type of medication and the side effects of the medicines [25-27]. The factors linked to the healthcare system include availability and accessibility of health care, and the health provider-patient interactions [28]. Even though, there is high prevalence of re-admission with severe complications among diabetes patients, in our knowledge there is no study why the readmission is high. Therefore, this study was conducted to assess knowledge and attitude of diabetes mellitus and to determine adherence of treatment regimen among diabetic patients.

Materials and Methods

A cross-sectional study was employed among confirmed type 2 diabetes patients. The study was conducted in the diabetic clinic of Kirehe District Hospital. It is a well-established clinic in terms of number of skilled staff, space and facilities. The sample size was estimated based on a study that was carried out in Uganda [29], where the proportion of non-adherence was 28.9%. Using Fisher's formula

$(n= (Z 2) p (1-p)/d2)$, the minimum estimated sample size at 95% confidence interval and 5% level of significance was 316. Since the target population was less than 10,000, finite population correction factor (nc=Nxn/N+n-1)[30] was applied to the calculated sample size. The sample size after finite population correction factor was 114 patients and this was inflated to 127 after10% for attrition rate was considered.

The study participants were recruited as they come for the clinic using a systematic random sampling technique with a sampling interval of 2. The choice of the first study participant was selected through random sampling from the first 2 visitors after that every second was selected.

Data was collected using a pretested semi-structured questionnaire which was in English and translated to Kinyarwanda. The questionnaire was developed from different other studies. It mainly included socio demographic characteristics, knowledge and attitude of diabetes and adherence to the medications. In this study, adherence to diabetic treatment was determined through self-reports of how patients were taking medication one week prior to the data collection. Patients were specifically asked to recall if they missed any doses of medication on a day by day basis over a period of seven days. The number of times doses missed was calculated basing on the patients medication regimen.

Raw data from the questionnaire were entered into EPI data and transported into SPSS version 22 for analysis. Descriptive statistics were used to tabulate and describe the data and the association between independent and dependent variables were carried out using chi square test. The strengths of the associations were determined with multiple logistic regressions. Inference was made using a 95% confidence interval and a p-value <0.05.

The level of knowledge and attitude of diabetes mellitus was assessed using a score assessment based on the variables presented in Tables 1 and 2, respectively. There were 10 questions regarding knowledge and each correct answer was awarded a score of 1 while every incorrect answer or unsure answer was awarded a score of 0. Similarly, there were 24 positive and negative statements for attitude and depending on the statements, score 1 or 0 was awarded to agree or disagree. The scores were totaled then converted into percentages and categorized as:

- Good knowledge or attitude for scores of 75% and above

- Moderate/average knowledge or attitude for scores of 50% to 74%

- Poor/low knowledge or attitude from scores of less than 50%.

Treatment adherence was assessed according to the total number of tablets taken divided by number required to be taken in the previous week x 100%. This was classified as adequate adherence for those who scored 95% and above while for those who scored below 95% were categories as in-adequate adherence. Approval to carry out the study was sought and obtained from Kirehe district Hospital and Mount Kenya University Rwanda. All the information collected from study participants were ensured confidential.

Results

Demographic characteristics of respondents

About half (49.6%) of the respondents were aged 65 years and above with majority being males (70.9%). Regarding education level, more

than half (52%) attained primary school followed with secondary school (18.9%) and illiterate (18.9%). Majority of the respondents (81.1%) were Christian followers. In terms of marital status, most (60.6%) of respondents were either single or divorced or separated. About a three quarter (76.4%) were employed and majority (85.8%) had medical insurance (Table 1).

Variables	Frequency=127	Percent
Age group		
35-44	25	19.7
45-64	39	30.7
65 and above	63	49.6
Sex		
Male	90	70.9
Female	37	29.1
Education level		
No formal education	24	18.9
Primary school	66	52
Secondary school	24	18.9
High/university	13	10.2
Religion		
Christian	103	81.1
Muslim	24	18.9
Marital status		
Married	50	39.4
Single/divorced/separated	77	60.6
Occupation		
Unemployed	30	23.6
Employed	97	76.4
Medical insurance		
Yes	109	85.8
No	18	14.2

Table 1: Socio-demographic characteristics of respondents.

Knowledge and attitude of diabetes mellitus and adherence towards treatment regimen

The level of knowledge was assessed using a score assessment based on the variables presented in Table 1. Respondents with good knowledge were 42.5% and about half (47.2%) had average knowledge on diabetes mellitus. Similarly, the overall attitude was assessed based on the variables presented in Table 2. More than half (55.9%) had moderate attitude towards diabetes mellitus while 44.1% of them had good or positive attitude. Majority of the respondents (64.6%) had adequate adherence towards diabetic treatment regimen (Table 2).

Variables	Frequency=127	Percent
Level of knowledge		
Low Knowledge	13	10.2
Moderate knowledge	60	47.2
Good knowledge	54	42.5
Level of attitude		
Low attitude	0	0
Moderate attitude	71	55.9
Good attitude	56	44.1
Adherence to medication		
Inadequate adherence	45	35.4
Adequate adherence	82	64.6

Table 2: Knowledge and attitude of diabetes mellitus and adherence towards treatment Regimen Factors associated with adequate adherence to treatment regimen.

Table 3 shows the bivariate and multivariable analysis and independent factors associated with adherence to treatment regimen were older age, higher level of education and high knowledge on diabetes mellitus.

Respondents aged 65 years and above were about 52 times more likely to have adequate adherence (AOR=51.98; 95%CI=7.82-345.71, p<0.001) compared to those respondent aged 34 to 44 years. Diabetic patients who attained primary school were 12.6 times more likely to practice adequate medication adherence (AOR=12.64; 95%CI=2.00-79.95, p=0.007) compared to those who were illiterate.

Similarly, respondents who attained secondary or university were 53.5 fold more likely to have adequate medication adherence (AOR=53.54; 95%CI=5.98-479.37, p<0.001) than to those who were illiterate. The patient-centered factors can be demographic (age, gender, educational level, and marital status) and psychological (patients beliefs and motivation towards the therapy Respondents with good knowledge on diabetes mellitus were 10.6 times more likely to practice adequate medication adherence (AOR=10.60; 95%CI=1.55-72.32, p=0.016) compared to those with low level of knowledge.

Discussion

This study was carried out to investigate the knowledge and attitude of diabetes mellitus among diabetic patients attending in Kirehe district hospital as well as to determine the adherence level to treatment regimen and its associated factors. There is evidence that diabetes mellitus management and care are strongly related to good knowledge, and there is a correlation between diabetes mellitus knowledge and hemoglobin A1c level [31-33]. Our study found that only 42.5% had good knowledge towards treatment, prevention and risk factors of diabetes mellitus. Similarly, other various studies also showed that knowledge on diabetes ranged from 23.8% to 45% [34-36]. However, it is lower than other studies [37-39].

Variable	Adequate, n (%)	Inadequate, n (%)	COR (95%CI)	*P value	AOR (95%CI)	*P value
Age in years						
35-44	9 (36.0)	16 (64.0)	Ref		Ref	
45-64	21 (53.8)	18 (46.2)	2.07 (0.74-5.82)	0.166	2.05 (0.43-9.72)	0.365
65 and above	52 (82.5)	11 (17.5)	8.40 (2.96-23.87)	<0.001	51.98 (7.82-345.71)	<0.001
Sex						
Male	61 (67.8)	29 (32.2)	1.60 (0.73-3.52)	0.24		
Female	21 (56.8)	16 (43.2)	Ref			
Education level						
No formal education	8 (33.3)	16 (66.7)	Ref			
Primary school	43 (65.2)	23 (34.8)	3.74 (1.39-10.05)	0.009	12.64 (2.00-79.95)	0.007
Secondary and above	31 (83.3)	6 (16.2)	10.33 (3.06-34.94)	<0.001	53.54 (5.98-479.37)	<0.001
Religion						
Christian	74 (71.8)	29 (28.2)	5.10 (1.97-13.21)	0.001	1.31 (0.12-14.25)	0.825
Muslim	8 (33.3)	16 (66.7)	Ref		Ref	
Marital status						
Married	26 (52.0)	24 (48.0)	Ref		Ref	
Single/divorced	56 (72.7)	21 (27.3)	2.46 (1.17-5.20)	0.018	4.44 (0.95-15.79)	0.071
Occupation						
Unemployed	17 (56.7)	13 (43.3)	Ref			
Employed	65 (67.0)	32 (33.0)	1.55 (0.67-3.59)	0.302		
Level of Knowledge						
Low	4 (30.8)	9 (69.2)	Ref		Ref	
Moderate	34 (56.7)	26 (43.3)	2.94 (0.82-10.62)	0.099	2.99 (0.41-21.64)	0.277
Good	44 (81.5)	10 (18.5)	9.90 (2.53-38.70)	0.001	10.60 (1.55-72.32)	0.016
Attitude level						
Moderate	44 (62.0)	27 (38.0)	Ref			
Good	38 (67.9)	18 (32.1)	1.30 (0.62-2.71)	0.492		

AOR: Adjusted Odds Ratio; COR: Crude Odds Ratio; CI: Confidence Interval; Ref: Reference
*Bolded significant

Table 3: Factors associated with adequate adherence to treatment regimen.

These variations could be due to the tools used to assess the level of knowledge as some studies use validated tool and others use structured face-to-face interview. In our study we used structured questionnaire developed by the researchers after considering different literatures and studies. Similarly, the present study found out only 42.1% had positive attitude towards diabetes mellitus treatment, prevention and risk factors. This is in agreement reported by Roux et al. [40] which they indicated a relatively negative attitude among diabetic patients. Patients with diabetes mellitus reported that stigma contributed to their negative attitude and impacted on their psychological well-being [41]. The challenges of adhering to a healthier lifestyle and taking medication to prevent complications were also contributory factors to negative attitudes among older diabetic patients. Similar findings have been described in a study conducted in Ethiopian among type 2 diabetes mellitus [42]. Regarding adherence to treatment, the study revealed that 64.6% had adequate adherence. This was comparable with other different studies including in Saudi Arabia (62.0%) [43], Malaysia (66%) [44] And in Botswana (57.6%) [45]. It was also higher

compared to studies conducted in Sudan (45%) [46] And in southern Ethiopia (40.95%) [47]. However, the rate was lower compared to other studies such as in Northwest Ethiopia (85.1%) [48], in New York (72%) [49], Iran (74.8%) [50] and Nigeria (72.5%) [51]. the observed difference could be because of medication adherence measurement method, sources of study population or sample size.

After running multivariable analysis, age, level of education and knowledge were the predictors of adequate adherence. Participants aged 65 years and above were significantly more likely to have adequate adherence compared to those between 35 and 44 years. This is in line with a study carried out in Cameroon [52] and a recent systematic review conducted by Krueger et al. [53] which indicated that non-adherence to medication is common in younger patients. This could be that older patients with longer duration of disease are believed to be more aware about the disease and the importance of adherence to prevent complications [48]. On the other hand young diabetic patients might have challenges in accepting new diagnoses of the disease [54], limited disease knowledge, fear of side effects and burden of regimens [55].

Level of education was also independently associated with adherence to treatment where the adherence was significantly higher among those with higher level of education. Diabetic patients with secondary or university education were about 54 times more likely to adequately adhere compared to illiterate patients. This finding is in agreement with studies in different parts of Ethiopia where patients with educational status of secondary and above were more likely to attain adequate glycemic control compared to illiterate [48-57]. This could be attributed to the fact that the understanding and knowledge of self-care practice increased with an increased level of education [58]. The other factor remained significant after multivariable analysis in our study was the level of knowledge. The higher level of knowledge towards diabetes mellitus the better adherence to its treatment regimen. This is supported by findings from studies done in Malaysia [44], Harari Ethiopia [59], and Palestine [60] where knowledgeable patients were found to be significantly associated with a higher adherence rate. The possible explanation of why people with better knowledge are adherent could be the right knowledge about diabetes mellitus and its medications creates a clear understanding and avoids confusion about the treatment and the disease condition. However, people with wrong/poor knowledge may reach with wrong decisions.

Some of the limitations that should be highlighted in this study are self-report of adherence to treatment which could be prone to recall bias and the methodological approach that was used in this study was cross sectional which only provides association not causal inferences. Therefore, the results might not be generalized to other populations or applicable to some other diseases. Despite, these limitations, the study offers valuable results as there is limited study in Rwanda.

Conclusion

Our study revealed that low knowledge and negative attitude towards diabetes mellitus treatment, prevention and risk factors. This may hamper the practice of adherence to treatment regimen among diabetic patients. Moreover, the factors associated with adequate adherence to treatment were older age, higher level of education and good knowledge on diabetes mellitus. Therefore, the Government of Rwanda along with Ministry of Health and Rwanda biomedical center should provide a diabetes education program to increase patients' knowledge and enhance positive attitude towards diabetes mellitus.

Furthermore, more emphasis should be given to those who are illiterate and young age group.

Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contribution

Michael Habtu conceptualized the idea for the study, contributed in the design and protocol preparation, performed analysis and interpretation of data and drafted the first manuscript

Uwingabire Sandra conceptualized the idea for the study, contributed in the design and protocol preparation, involved in acquisition of data and participated in critical review of the subsequent draft of the manuscript

Connie Mureithi: assisted in design and protocol preparation, made a substantial contribution toward analysis and participated in critical review of the subsequent draft of the manuscript

Gashegu Misbah: provided assistance with the design and participated in critical review of the subsequent draft of the manuscript

Each author has given final approval of the version to be published.

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