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Adherence to Self-care Practices among Diabetes Mellitus Patients at a Tertiary Hospital in Eastern Uganda

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Abstract

Adherence to self-care practices among diabetes mellitus patients is vital in achieving optimal glycemic control and delaying the progression of the disease complications. There is limited information regarding diabetes self-care among diabetic patients in Eastern Uganda, where the disease is most prevalent. The aim of this study was to determine the level of adherence to diabetes mellitus self-care practices and the associated factors among adult diabetic outpatients at a tertiary hospital in Eastern Uganda. A cross-sectional study was conducted at Mbale Regional Referral Hospital in Eastern Uganda between September and October 2020, on a sample of 156 diabetic patients recruited through systematic random sampling. A structured questionnaire was used to collect data through self-report. Descriptive and Logistic regression analyses were conducted using STATA version 15.0, and a 5% level of significance. Most of the study participants were female (63.8%) with an average age of 52.3 years (SD 13.8). The prevalence of adherence to self-care was 36.5%. The factors associated with adherence to self-care were good diabetes knowledge (AOR=2.5; 95% CI= 1.2-5.3, p = 0.016), and high self-efficacy (AOR=3.9; 95% CI= 1.8 – 8.7, p = 0.001). Less than half of the patients attending the diabetic clinic at Mbale Regional Referral Hospital in Eastern Uganda adhere to self-care practices. Patients ought to receive comprehensive, consistent, and contextualized diabetes education to enrich their knowledge, as well as a boost of their self-efficacy through interventions like counseling, positive feedback, role models, and peer education.

Keywords: *Diabetes, Self-care, Adherence, Eastern Uganda, Prevalence, Factors associated.*

Introduction

Diabetes Mellitus (diabetes) is a global health problem associated with substantial morbidity and mortality. It is an endocrine system disorder characterized by high blood sugar arising from either a defect in insulin secretion (type 1 diabetes), insulin action (type 2 diabetes), or both [1-3]. The global prevalence of diabetes in 2019 was estimated at 9.3%—predominantly in adults—with over 79% of the cases occurring in low- and middle-income countries [4, 5]. In that year, diabetes was associated with over 4.2 million deaths globally [5], and global direct health expenditure of USD 760 billion [6]. In Uganda, the prevalence of diabetes is currently estimated to be 1.6% among adults [7], a slight increase from 1.4% during the year 2017 [8]. With a prevalence of 7.4%, Eastern Uganda has the highest reported regional prevalence of diabetes across the country [9].

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Inadequate diabetes management is often associated with elevated blood sugar, which can lead to serious micro and macrovascular complications that may compromise the quality of life for diabetic patients [10]. To maintain glycemic control and thereby prevent diabetes-related complications, effective diabetes management necessitates a combination of both continuous medical care and self-care [3, 11, 12].

Adherence to self-care practices among diabetes mellitus patients is vital in achieving optimal glycemic control and delaying the onset and progression of diabetes complications [13, 14]. Self-care refers to a set of activities conducted by the affected individuals to maintain health and well-being in everyday life [15]. The six essential domains of diabetes self-care practices include healthy eating, physical exercise, self-monitoring of blood glucose (SMBG), adherence to medication, foot care, and smoking habits [16-18]. According to the Theory of Diabetes Self-Care Management (TDSCM), the practice of diabetes self-care activities is associated with both individual and environmental factors [11].

According to the published studies, the common individual factors that have been found to be associated with diabetes self-care adherence include age, sex, education level, income, diabetes duration, diabetes knowledge, and self-efficacy [19, 21]; while the environmental factors include social support, diabetic health education, patient-health care provider communication, and type of diabetes treatment [11, 19, 20, 22]. The available data from a Ugandan study suggested that adherence to self-care practices among diabetics in the Eastern region was determined by factors such as self-efficacy, diabetes education, social support, and the patient-healthcare provider relationship [23], however the study was only qualitative and therefore did not quantify the association.

Data on adherence to diabetes self-care in Uganda remains scarce especially for the Eastern region where the diabetes prevalence is highest, yet adherence to self-care is associated with positive outcomes including delaying the onset and progression of complications associated with diabetes mellitus [13, 14]. The available limited data for Uganda showed that only 38% of patients adhere to home-based SMBG [8], 39% adhere to a regular program of exercise, 41% have their feet checked by a health worker [24] while about 70% of adult patients adhere to their medication [25, 26]. In Eastern Uganda, — where the diabetes prevalence is currently highest in the country, self-care adherence data was deficient for all the components save for medication adherence [83.3%] [25]. Understanding the self-care adherence practices among diabetics in Eastern Uganda could facilitate the moderation of diabetes-related complications. This study, therefore, sought to determine the level of adherence to self-care practices and associated factors among diabetics at a tertiary hospital in Eastern Uganda. This study will inform effective diabetes management and also add to the existing literature from studies in similar contexts.

Materials and Methods

Study Design and Study Setting

This was a cross-sectional study conducted at Mbale Regional Referral Hospital located about 222 kilometers Northeast of Kampala City, Uganda's capital. At the time of the study, the hospital was the largest in the region, with a 400-bed capacity and a catchment population of over 2.5 million people spread across eleven districts within the region [27, 28].

The hospital runs a diabetic clinic with an attendance of approximately 55 patients per week. The dependent variable was diabetes self-care comprising of six domains- Physical exercise, Diet, Medication, Smoking, Self-monitoring of Blood Sugar and Foot care, while the independent variables were various defined socio-demographic and clinical characteristics of the study participants.

Study Population and Sampling

The study population consisted of adult diabetic outpatients (≥18 years of age) attending the hospital's Diabetic clinic over six weeks between September and October 2020. This population was selected because available data showed that diabetes was highly prevalent among adults, compared to children and adolescents [5].

Participants were included in the study if they were aged 18 years and above, had clinically diagnosed type 1 or type 2 diabetes, had lived with diagnosed diabetes for at least one month, and had signed an informed consent form to participate in the study. Four (04) participants who were unable to comprehend and speak English, Luganda, and Lumasaba, the predominant languages that are spoken in the region, were excluded.

A sample size of 156 participants was used in this study, calculated using Yamane's formula for proportions [29].

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, and e is the acceptable sampling error or absolute precision.

Considerations were made for the average monthly diabetic clinic attendance (N =220), a 5% absolute precision level, and a 10% upward adjustment to cater for participation refusals and incomplete responses [30-32]. Additionally, the planned four (04) weeks data collection period was extended by two (2) weeks to attain the calculated sample size.

The systematic random sampling technique was used to obtain a representative sample of study respondents [33, 34], with a sampling interval of two (2) which was obtained by dividing the expected monthly number of patients on routine follow-up review (N=220) by the calculated sample size (n=156). On each clinic day, the patient register was used to perform the sampling. On every clinic day, a random start was determined by selecting randomly between the first and second patient and thereafter, every other patient was selected as they arrived.

Data Collection Procedures and Instruments

Research ethics approval was granted by the Uganda Christian University Research Ethics Committee (Reference number: UG-REC_26UCUREC) and administrative clearance by the Mbale Regional Referral Hospital Research and Ethics Committee (Reference number: MRRHREC-OUT-06/2020).

Data were collected by trained research assistants from the study participants through self-report after obtaining informed consent. Other data regarding the type of diabetes and the medication details were abstracted from the clinical records.

Data were collected using a structured questionnaire comprising of measures adapted from the Summary of Diabetes Self-Care Activities (SDSCA) measure [18], the validated 24-item version Diabetes Knowledge Questionnaire (DKQ-24) [35], the validated 8-item Self-efficacy for Diabetes Tool and the validated 9-item measure of social support [13]. The SDSCA measure showed a content validity index of 0.83 and a Cronbach's alpha reliability of 0.69 [11]; the DKQ-24 exhibited construct validity and reliability, with a reliability coefficient of 0.78 [35]; the 8-item Self-efficacy for Diabetes Tool demonstrated a Cronbach's coefficient, α of 0.85 and a test-retest validity of 0.8 [13]; and the 9-item measure of social support demonstrated a Cronbach's coefficient, α ranging from 0.74 – 0.93, as well as construct validity [13].

Data Management and Analysis

The Data was entered in EpiData version 4.4.1.0, cleaned, and analyzed using STATA version 15.0. Descriptive statistics were used to summarize the data. Due to the absence of an overall validated cutoff for adherence to all self-

care components, the mean (4.4 days) of the cut-offs used for each of the six self-care components assessed was used to classify participants into those that were adherent and those that were non-adherent to all self-care practices. We used the mean because it considers all the values in the series. The cutoffs used to classify adherence to each of the individual self-care components including diet, physical exercise, SMBG, foot care, medication, and smoking habits were 3.5, 3.0, 3.5, 3.5, 6.0, and 7.0 days, respectively and these were derived from existing literature [36, 37]. Due to the absence of recommended cutoffs in existing literature, the factors such as diabetes knowledge, self-efficacy, and social support were dichotomized about their respective means. Logistic regression analysis was done to assess for factors associated with adherence to self-care practices. The independent variables included in the multivariable logistic regression model were selected by considering a p-value cut-off point of 0.25 after bi-variate analysis, as recommended [38]. Factors that had p-values less than 0.05 at multivariable analysis were considered to be significantly associated with adherence to self-care practices. The missing data discovered after data collection and processing were regarded as missing completely at random (MCAR), and then the pairwise deletion approach was used during analysis [39].

Results

Table 1. Patients' Socio-demographic Data

Variable	Frequency	Percentage
Sex		
Male	55	35.3%
Female	97	62.2%
Missing	4	2.5%
Age		
<40	31	20.0%
40-49	28	17.9%
50-59	49	31.4%
≥60	47	30.1%
Missing	1	0.6%
District of Residence		
Budaka	17	11.0%
Mbale	96	61.5%
Sironko	18	11.5%
Other	24	15.4%
Missing	1	0.6%
Marital Status		
Single	11	7.1%
Married	112	71.8%
Divorced/Separated	7	4.5%
Widowed	25	16.0%
Missing	1	0.6%
Highest Education Level Attained		
No formal education	36	23.1%
Primary education	69	44.2%

Secondary education	36	23.1%
Tertiary education	15	9.6%
Self-efficacy		
Low self-efficacy	82	52.6%
High self-efficacy	74	47.4%
Social support		
Poor social support	66	42.3%
Good social support	90	57.7%
Caregiver		
None	3	1.9%
Spouse	110	70.5%
Other family members	6	3.9%
Health Worker	35	22.4%
Friend	1	0.6%
Missing	1	0.6%

Table 2. Patients' Clinical Data

Variable	**Frequency**	**Percentage**
Type of diabetes		
Type 1	29	18.6%
Type 2	125	80.1%
Missing	2	1.3%
Duration with Diabetes		
<5 years	73	46.8%
5-10 years	40	25.6%
>10 years	34	21.8%
Missing	9	5.8%
Type of Medication Used		
Oral hypoglycemic drugs	104	66.7%
Insulin alone	30	19.2%
Both insulin and oral hypoglycemic drugs	18	11.5%
Missing	4	2.6%
Level of Diabetes Knowledge		
Poor Knowledge	81	51.9%
Good Knowledge	75	48.1%
Frequency of diabetes education		
Never	27	17.3%
Rarely	31	19.9%
Occasionally	66	42.3%
Often	31	19.9%
Missing	1	0.6%
Type of Diabetes Education received		
None	27	17.3%
Individual session	14	9.0%
Group session	103	66.0%

Instructional Material	0	0.0%
Both Group and Individual session	5	3.2%
Missing	7	4.5%
Education on self-care components		
None	28	18.0%
1-3 components	52	33.3%
≥4 components	76	48.7%
Diabetes Education Provider		
None	25	16.0%
Health Worker	123	78.9%
Missing	8	5.1%

Social-demographic and Clinical Characteristics

The majority 97(62.2%) were female and had a mean (SD) age of 52.3(13.8) years, with 49(31.4%) aged 50 – 59 years. The majority 125(80.1%) had type 2 diabetes mellitus, and 73(46.8%) had lived with diabetes mellitus for less than 5 years. Less than half 75(48.1%) of the participants had good diabetes knowledge, and the mean (SD) score for diabetes knowledge was 10.4(3.0) out of 24. Self-efficacy was low among 82(52.6%) of the participants, and the majority 90(57.7%) reported having good social support (Table 1 and 2).

Table 3. Level of Adherence to Diabetes Self-care Practices

Variable	**Adherence to Diabetes Self-Care practices**	
	Adherent n (%)	**Non-adherent n (%)**
Overall	57(36.5)	99(63.5)
Diet	145(92.9)	11(7.1)
Physical exercise	107(68.6)	49(31.4)
Self-monitoring of Blood Sugar	11(7.1)	145(92.9)
Foot care	68(43.6)	88(56.4)
Adherence to Medication	122(78.2)	34(21.8)
Cigarette Smoking	152(97.4)	4(2.6)
The prevalence of adherence to diabetes self-care was 36.5%. Diet and Cigarette Smoking had the highest adherence, while foot care and self-monitoring of blood sugar had the lowest adherence.		

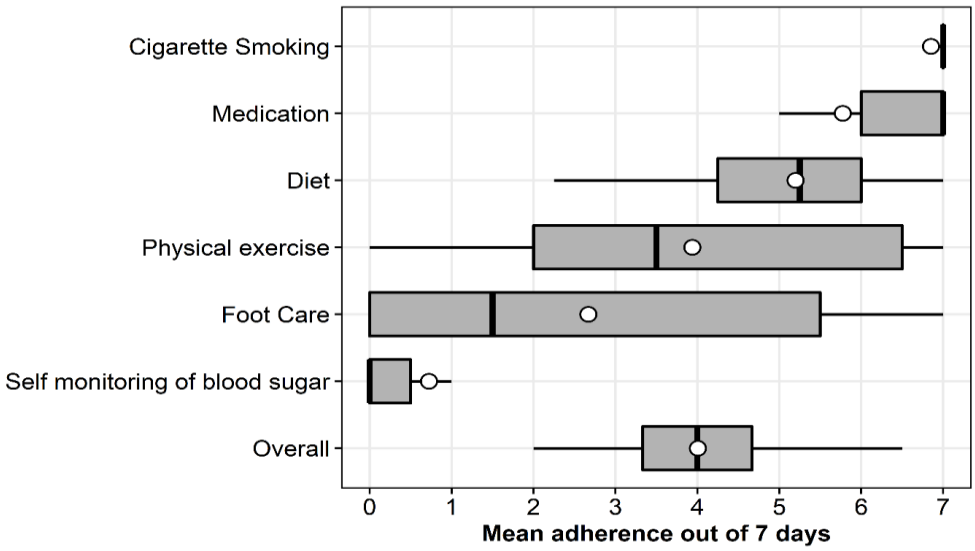

Figure 1. Mean Adherence Out of 7 Days

Level of Adherence to Diabetes Self-care Practices

Less than half of the participants 57 (36.5%) reported adhering to all diabetes self-care practices. The participants adhered most to the cigarette smoking recommendations (97.4%), and least to self-monitoring of blood sugar (7.1%) (Table 3).

The mean (SD) of adherence to all self-care practices was 4.0(0.9) days out of 7 days. Cigarette smoking had the highest mean (SD) of 6.9(1.0) days; while SMBG had the lowest mean (SD), of 0.7(1.6) out of 7 days (Figure 1).

Factors Associated with Adherence to Diabetes Mellitus Self-Care Practices

Diabetes knowledge and self-efficacy were found to be associated with adherence to diabetes self-care practices. Participants with good diabetes knowledge were 2.5 times more likely to adhere to diabetes self-care practices compared to those with poor diabetes knowledge (P=0.016), while participants with high self-efficacy were 3.9 times more likely to adhere to diabetes self-care practices compared to those with low self-efficacy (P=0.001) (Table 4).

Table 4. Factors Associated with Adherence to Diabetes Self-care Practices at Multivariable Analysis

Variable	COR (95% CI)	AOR (95% CI)	p-Value
Diabetes Knowledge			
Poor Knowledge	-	-	-
Good Knowledge	2.1 (1.1, 4.1)	2.5 (1.2 - 5.3)	0.016*
Self-Efficacy			
Low Self-efficacy	-	-	-
High Self-efficacy	3.9 (1.9, 7.9)	3.9 (1.8 - 8.7)	0.001*
Social Support			
Poor social support	-	-	-
Good social support	2.6 (1.3, 5.3)	1.5 (0.7 - 3.5)	0.306
Education on Self-care Components			
None	-	-	-
1-3 components	0.5 (0.2, 1.2)	0.8 (0.3 - 2.3)	0.661
≥4 components	0.5 (0.2, 1.2)	0.7 (0.2 - 1.8)	0.432

COR=Crude Odds Ratio, AOR=Adjusted Odds Ratio, CI=Confidence Interval, ***** = Significant p-Values ($p<0.05$)

Discussion

The study revealed sub-optimal adherence, with diabetes knowledge and self-efficacy associated with adherence to diabetes self-care practices. This study considered all the recognized diabetes self-care components and used validated measures to assess adherence to self-care practices, and the factors of diabetes knowledge, self-efficacy, and social support.

In this study, the overall prevalence of adherence to all diabetes self-care practices was 36.5% (95% CI: 29.3 - 44.5). This low prevalence of adherence was consistent with similar studies done in Malawi [13], Ethiopia [1], India [40], and Iran [21], where the adherence rates were found to be 33%, 28.4%, 46%, and 36.4%, respectively. Contrary to the findings of this study, a slightly higher prevalence of adherence to self-care of 54.3% was reported in a study done in Ethiopia [3]. This disparity may be due to methodological differences, particularly the lower cut-off point for the classification of self-care adherence that was used in the Ethiopian study. Consistent with most published literature, the findings of the current study show that self-care among diabetics is generally inadequate which predisposes them to complications.

Failure to adhere to all the recommended self-care practices is attributed to various barriers like inadequate resources, inadequate information, social-cultural beliefs, and limited self-efficacy, among others; hence necessitating improved knowledge, skills, and motivation [13]. In the current study, only self-efficacy and diabetes knowledge were significantly ($P<0.05$) associated with adherence to diabetes self-care, somewhat consistent with the other studies reviewed.

Participants with high self-efficacy were 3.9 times more likely to adhere to all diabetes self-care practices, compared to those with low self-efficacy. This finding is consistent with findings from studies done in Malawi [13], Ethiopia [3, 11], and China [41] which found self-efficacy to be a predictor of adherence to diabetes self-care practices. Individuals with high self-efficacy usually set high goals for themselves, are positive-minded and possess better analytical skills [13]. Additionally, self-efficacy regulates feelings, motivation, thoughts, expectations, and goals, thereby being essential for adherence to self-care. Some studies have also established an association between self-efficacy and other predictors of good diabetes self-care, for example, health literacy and social support [13]. The current study did not examine these inter-factor associations though. The findings from the current study and other prior studies suggest that self-efficacy is an important predictor of adherence to diabetes self-care practices, and interventions to enhance patient self-efficacy could go a long way in improving adherence to diabetes self-care.

Effective management of diabetes depends largely on the patient's knowledge about the disease and aspects of care [42]. A well-informed patient is more likely to adhere to self-care and thus attain and sustain glycemic control, thereby averting diabetes complications [43]. In the current study, more than half of the participants (51.9%) had poor diabetes knowledge. This could be attributed to the limited formal education reported among the study participants, which could potentially affect comprehension of the information provided. We found that diabetes knowledge was significantly associated with adherence to diabetes self-care practices ($p=0.016$) and that participants with good diabetes knowledge were 2.5 times more likely to adhere to self-care compared to those with poor diabetes knowledge. This finding is consistent with findings from studies done in Ethiopia [11, 44], Nigeria [45], Peru [46], Pakistan [42], and Iran [47], which all found a

positive association between diabetes knowledge and self-care. This concurrence in findings could be due to the use of a similar tool to assess diabetes knowledge, in both our study and these studies. Contrary to the findings in this study, however, studies that were done in Ethiopia [48], Malawi [13], and Malta [49], did not find any significant association between diabetes knowledge and self-care. The explanation for the difference in findings between our study and these studies could be the use of a different tool to measure diabetes knowledge in the Ethiopian study, and not categorizing diabetes knowledge during analysis in the Malawi and Malta studies.

Even though improving knowledge alone may not be solely sufficient to enhance adherence to self-care, especially the aspects involving behavioral change [49], it is still indispensable and should be the beginning point in offering care for diabetics. It may be very hard for a patient to adhere to or practice what they do not know. Thus, patients require education about diabetes and the various aspects of self-care in order to enhance their knowledge. Additionally, the necessary resources for providing diabetes self-management education programs should be readily available as well. Patient education should also take into consideration key patient characteristics, as some factors like patient attitude, sex, age, educational status, duration of diabetes, and type of medication were associated with diabetes knowledge in other studies [43, 50]..

This study provides a deeper understanding of the self-care adherence behavior and associated factors among diabetics in Eastern Uganda, the region with the highest diabetes prevalence.

The findings of the current study might have been limited by social desirability bias and recall bias given that the data were collected through self-reports. Social desirability and recall biases were minimized through anonymity and confidentiality provisions and using a short recall period of 7 days respectively. There were some missing data on some variables, however this may not have affected the study validity due to the earlier 10% upward adjustment on the calculated sample size which catered for the missing data, and the pairwise deletion approach which was used to handle missing data during data analysis. Lastly, this study was conducted at only one center —the largest tertiary hospital in Eastern Uganda, and this could pose some limitations in terms of generalizability of these findings to the entire Eastern region of Uganda.

Conclusion

The findings of this study were consistent with most published studies from similar settings, which have shown that the adherence to self-care among diabetic patients is generally sub-optimal. Less than half of the adult diabetic patients attending Mbale Regional Referral Hospital in Eastern Uganda adhered to all diabetes self-care practices. Adherence was particularly low for self-monitoring of blood sugar and foot care. Good diabetes knowledge and high self-efficacy were significantly associated with adherence to self-care, among the diabetic patients in this region. The key findings of the study are summarized in Figure 2.

We recommend the following key interventions to improve self-care adherence among diabetic patients, based on our findings: First, diabetic patients ought to receive well-structured, consistent, comprehensive, accurate and contextualized diabetes education to enrich their knowledge. Second, the diabetes management protocols used should extensively include interventions aimed at enhancing patients' self-efficacy, such as providing role models, peer education, positive feedback, and counseling. These could go a long way in enhancing adherence to diabetes self-care practices. Thirdly, integration of these findings in the review and design of clinical and policy interventions to improve diabetes mellitus management and therefore avert diabetes complications, improve quality of life, and reduce healthcare expenditure.

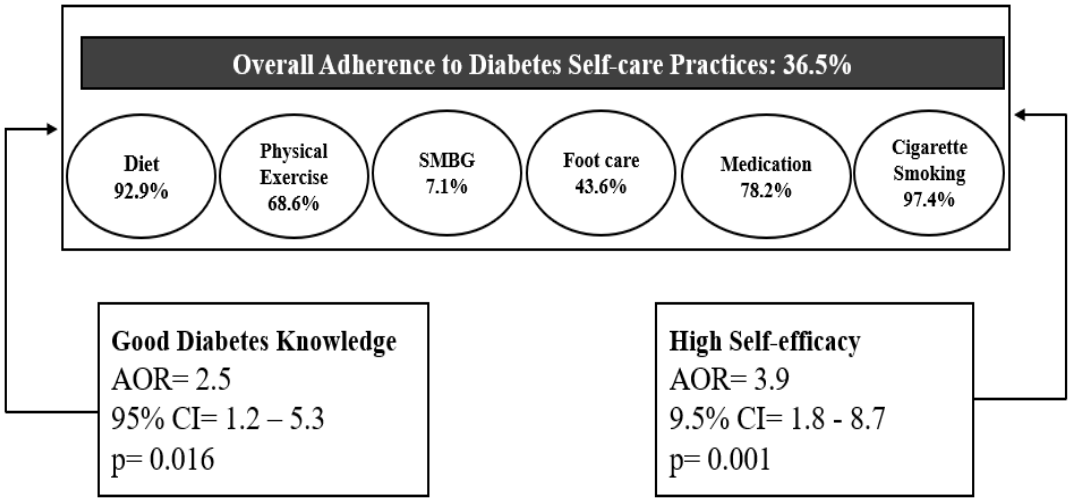

Figure 2. A Schematic for the Study Findings

Conflict of Interest

The authors declare that they have no conflict of interest.

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