ASSOCIATION BETWEEN SOCIAL SUPPORT AND GLYCAEMIC CONTROL AMONG OLDER TYPE 2 DIABETES PATIENTS ATTENDING THE FAMILY MEDICINE CLINIC, LAGOS STATE UNIVERSITY TEACHING HOSPITAL

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Abstract

Background: Poor glycemic control is a major health problem that greatly contributes to the development of diabetes-related complications. especially in older adults. Social support among older diabetics has been linked with many health outcomes including glycemic control.

Aim: This study aims to determine the association between social support and glycemic control among older T2DM patients with a view to improve clinical outcomes of older T2DM patients.

Method: This was a descriptive cross-sectional hospital-based study involving 384 consenting older type 2 diabetes patients recruited using the systematic random sampling method. The Multidimensional Scale of Perceived Social Support (MSPSS) and The Morisky Medication Adherence Scale (MMAS-8) were used to obtain information on social support and medication adherence. Glycosylated Hemoglobin (HbA1c) was used to assess glycemic control. Data were analyzed using SPSS 27.

Results: Forty nine point seven percent (49.7%) of the respondents had high overall perceived social support. About 50% percent of respondents had poor glycaemic control. Overall, 60.6% of those with moderate/low support had poor glycemic control (OR 2.253, p- < 0.001), other identified predictors of poor glycaemic control were; duration of diabetes less than 5 years (OR 2.386 p- 0.002), low medication adherence (OR-1.746, p-0.031), and treatment with oral medication and insulin (OR- 2.734, p-0.001).

Conclusion. Close attention should be paid to older diabetics with low and moderate perceived social support. In addition, those with the duration of diabetes < 5 years who have poor medication adherence and are treated with oral medication and insulin, as they are more likely to have poor glycaemic control.

Key words: Perceived Social Support, Glycemic control, Older adult

INTRODUCTION

The term Diabetes characterizes a group of metabolic disorders described and identified by the presence of hyperglycemia in the absence of treatment.[1]. t results from either impaired insulin secretion or impaired insulin ability or, most often, both. [2]

Type 2 Diabetes mellitus (T2DM) prevalence is high in older adults and is expected to keep rising. Diabetes in the population of older adults is abetted by functional disability, several comorbidities, and premature mortality. A comprehensive geriatric assessment, as well as functional, clinical, mental and social sphere status, are essential enquiries for identifying factors affecting glycemic targets.[3]

Diabetes in older adults is an increasing public health burden. Individuals diagnosed with diabetes are living longer and are prone to micro vascular and macro vascular complications of diabetes but are also at higher risk for developing geriatric syndromes.[4] The Centers for Disease Control and Prevention estimated that including undiagnosed patients, 10.9 million, or 26.9% of the population of the older adults worldwide have diabetes. [5]

The main purpose for the treatment of diabetes are for patients to maintain stable glycemic control and to reduce the likelihood of health complications.[6] Good glycemic control which is defined as HbA1c < 7.0% in the general populace is essential in diabetes care.[7] [8] This includes the elderly population.

A recent qualitative population studies have reported that patients with type 2 diabetes who have strong social support encounter lower psychosocial stress and mortality rates. [9]

Social support is not a personal attribute but rather a nexus of processes between a person and his social network.[10] Social support is seen as either directly fostering health and health behaviors, or as mitigating the untoward effect of stressors,[11] in order to fulfill the challenge of management and care; family, friends, and the community can be a major support system. On the other hand, Perceived social support (PSS) refers to the beliefs or evaluations that one has about the relationships in one's life i.e. the feeling of being supported, cared for, esteemed, cherished and loved or being able to count on other people if a situation arises.[13] Perceived social support has been shown as a promoter of health behaviors and positive health outcomes, within the general population and for persons suffering from chronic illnesses such as diabetes.[14] Poor social support to the older adults may lead to unexpected complications, inconsistent treatment, and poor self-care behavior (e.g., diet, exercise, medication, blood glucose monitoring). [15]

The relationship between disease management and social support has been researched extensively in the social and behavioral sciences. Research does suggest, that social support can benefit patients' health by lessening stress, changing mental states, building self-efficacy, improve clinical outcomes, reduce psychosocial symptomatology, and modifying change in negative health behaviors. [16],[17]

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This study aims to determine the association between social support and glycemic control among older T2DM patients with a view to recognize and improve clinical outcomes of Older T2DM patients.

Secondary Objectives
1. To determine the form of social support older T2DM patients perceive to be adequate.
2. To determine the relationship between medication adherence and glycaemic control

METHODOLOGY

This cross-sectional study was carried out at the family medicine outpatient clinic of The Lagos state University Teaching Hospital (LASUTH) between June 10th and September 9th, 2022. Three hundred and eighty-four consenting older adults with T2DM were drawn from the following clinics under the Family Medicine Outpatient Clinics (Care of the older persons' clinic, Chronic medical disorder clinic and the Life style medicine Clinic).

The inclusion criterion included; Older persons aged 60 years and above with T2DM diagnosed ≥ 6 months at presentation and consented to participate in the study.

Exclusion criteria; (a) Patients with impaired cognitive functioning who found it difficult to give accurate answers, (b) Patients who required emergency care or who were too ill to participate (c) Patients with haematological disorders such as haemoglobinopathies and other haematological abnormalities (d) Those whose diagnosis of T2DM is <6 months at presentation

SAMPLE SIZE DETERMINATION

The minimum sample size was determined using the formula.[16]

$$n = \frac{Z^2 pq}{d^2}$$

n = Minimum sample size, Z = Standard normal deviation at 95% confidence level = 1.96, p =Proportion with the attribute of interest in a previous study. 50% was used as it will give the highest sample size where no suitable previous study was found.[17], q= 1-p, d = Desired maximum margin of error = 0.05, n = $\frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$ = 384.16

Interviewer based questionnaire was used to obtain sociodemographic and clinical information, including age, gender, education, monthly income, duration of illness, treatment type, and level of physical activity. The, perceived social support, and medication adherence were also assessed.

The multidimensional scale of perceived social support (MSPSS) comprises of 12 items rated on a 7-point Likert scale (response form ranges from, 1 = very strongly disagree to 7 = very strongly agree). The MSPSS assessed satisfaction with social support from family (FA), Friends (FR), and significant others (SO).[18] Each domain is divided by 4. In this approach any mean scale score ranging from 1 to 2.9 is considered low support; a score of 3 to 5 were considered moderate support; a score from 5.1 to 7 is considered high support.[18]

The total MSPSS was computed using the 12 questions with minimum and the maximum score for each question being 1 and 7 respectively and a total possible score range from 12 to 84. The categorization of the overall perceived score is as follows: Low, medium and high perceived support, which has been reported to have high internal consistency with Cronbach's alpha of 0.86.[18]

Morisky medication adherence scale was used to assess the patient's experience with medications during the last two weeks before answering the questions. It is an eight item structured, self-reported questionnaire. The response categories are "Yes" or "No" for items 1 to 7. The questions are reverse-coded (Yes= 0, No=1) except for item 5(Yes=1, No=0). Item 8 has a 7-point Likert response from never/rarely to always. A score of 8 signifies high adherence, 6-<8 signifies medium adherence while <6 signifies low adherence.[19]

Glycosylated hemoglobin (HbA1c) was used to assess glycemic control. The blood samples were analyzed using the Infopia Clover A1c machine (Clover A1C)-Made in Korea. which works by the boronate affinity method spectrophotometry. It has been validated by the International Federation of Clinical Chemistry, HbA1c values of <7% is good glycemic control while HbA1c of ≥7% is poor glycemic control.[20]

Ethical approval was obtained from the Health and Research Ethics Committee of LASUTH with HREC number: LREC/06/10/1772. The participants were provided with both written and verbal information regarding the study. Informed consent forms were signed by the study participants and they were free to withdraw from the study at any time.

DATA ANALYSIS

Data entering, cleaning, and analysis were done using the Statistical Package for Social Sciences (SPSS) version 27. Mean and standard deviation was used to present normally distributed continuous data Frequency, percentages, and charts were used to present categorical data. Chi-square and Fishers exact test were used in bivariate analysis to access the association between categorical variables. Glycemic control was the dependent variable while the independent variable was social support. Logistic regression was used to assess the determinants of glycemic control. The level of statistical significance was set at a p-value < 0.05.

RESULTS

Sociodemographic Characteristics Of Participants
The age range of the participants was 60 to 92 years, with the most represented group being 60 to 64. The mean age was 68.64±7.2 years. About two third of the participants were females with a female-to-male ratio of 2.1:1. About one-third (31.0%) of the respondent had secondary education while about half (51.0%) were married. About three-quarters were Christians (74.2%), while 71.4% were of the Yoruba tribe. About one-third (36.7%) had an average monthly income of 50,000 to 100,000 naira, while almost half (40.1%) spent over 200,000 naira on drugs in the last 1 year, almost half (46.9%) of the participants had duration of diabetes <10 years. Other details of the sociodemographic characteristics are displayed in table I.

Clinical Characteristics Of Participants
Over nine tenth (92.7%) of the respondents were non-

current smokers at the time of the interview while almost three-quarters (74.7%) did not consume alcohol. Almost two-thirds (65.8%) of the participants were sedentary. More than four-fifths (83.3%) of the respondent were on oral medications alone while over three-quarters (79.4%) had co-morbidity. Hypertension was the commonest co-morbidity recorded (63.3%). About two-fifths (42.2%) were overweight. Almost half (44.6%) had high medication adherence. Other details of the clinical characteristics are displayed in table II.

Pattern Of Social Support Among Participants

In the family Subscale, about three quarters (71.4%) had high support, In the friend's subscale, only (18.2%) had high support, while in the other subscale almost three quarters (71.9%) had high support. Other details of the PSS subscales are displayed in table III.

Relationship Between Subscales Of Social Support And Glycaemic Control

In the family subscale, of those with high support 58% had good glycemic control and the relationship was statistically significant. Those with low to moderate support were 2 times likely to develop poor glycemic control.

In the friends' subscale, 51.6% of those with low/moderate support had poor glycemic control. The relationship was not statistically significant.

In the Others subscale, 72.2% of those with moderate/low support had poor glycemic control. The relationship was found to be statistically significant. Those with low to moderate support were 2 times likely to develop poor glycemic control.

Concerning, the Overall Perceived Social Support, 60.6% of those with moderate/Low support had poor glycemic control. The relationship was statistically significant. Those with low to moderate support were 2.3 times likely to develop poor glycemic control. As displayed in table IV

Relationship Between Glycaemic Control And Socio-demographic Characteristics

From table V and VI, gender, duration of diabetes, treatment type, medication adherence and perceived social support were found to be associated to glycaemic control. These factors were entered into a multiple logistic regression model to determine the independent predictors of glycemic control.

Female gender was about one and half times more likely to have poor glycemic control compared to the males. Duration of diabetes less than five years were 2.4 times more likely to have poor glycaemic control compared with those with duration of diabetes between five and ten years (OR-2.386, p-0.002; 95% CI: 1.358-4.192), as displayed in table V

Relationship Between Glycaemic Control And Clinical Characteristics

From Table VI, those who were treated with both oral and insulin therapy were almost three times more likely to have poor glycemic control compare to those who were treated with oral therapy alone (OR-2.734, p- 0.001; 95% CI: 1.478-5.059). Those with low medication adherence were almost two times more likely to have poor glycaemic control compared with high medication adherence (OR 1.746, p-0.031, CI: 1.051-2.901).

DISCUSSION

As the world's diabetic and aging populations have grown in recent years, the requisite for health upgrades and planning to improve all aspects of life in this group of individuals has become apparent. [21],[21] Poor glycemic control of DM leads to macro- and micro-vascular complications. Therefore, it is necessary to determine the factors influencing glycemic control, including the essential role of social support in the improvement of glycemic control.[23]

This study found that 49.7% of the respondents had high overall perceived social support. About 50% of respondents had poor glycaemic control. Overall, 60.6% of those with moderate/low support had poor glycaemic control. Other significant predictors of poor glycaemic control were; duration of diabetes less than 5 years, poor medication adherence and treatment with oral medication and insulin.

The American Diabetic Association (ADA) reports glycosylated hemoglobin (HbA1c) as the best tool for measuring glycemic control to prevent complications and reduce its cost for management. The ADA standard of care in older adults 2023 states that older adults who are otherwise healthy with few coexisting chronic illnesses and intact cognitive function and functional status should have lower glycemic goals (such as A1C <7.0–7.5%).[24] HbA1c of <7% was set as glycemic control target in this study which was similarly used in several studies done around the world. However, a few other studies used fasting plasma glucose {FPG}for assessing glycemic control. [10],[15]

Concerning perceived social support, in the family subscale, of those with high support, 58% had good glycemic control. This is similar to findings from a Ugandan study by Onyango *et al* who reported that Perceived social support from family was significantly associated with glycemic control. This could be as a result of financial contribution and/or cohesive action from family members to provide support for management needs which is seen as an important determinant of perceived support in both studies which were both conducted in Africa where social economic status is low and financial contribution can be easily perceived as high support.

In the friends' subscale, there was no association with glycemic control. This is contrary to the findings from Maki *et al* in the United States, who reported that social support from friends was associated with lower HbA1c levels, indicating better glycemic control. [29] However, social support from family members was not related to HbA1c in the that study. This outcome may be due to the differential importance of relationships throughout the lifespan with varied roles and relative importance shifting throughout one's life. The age range of study participants in the U.S study was 33 to 83years which is different from this study with age range of 60years and older, who have been known to require, need and cherish family support. A study of college students found that friends' support was most impactful on personal growth when family support was low, and as impacts from negative life events increased, students reported lower perceived family support. These findings suggest that sources of support shift over time with relative importance

waxing and waning with life cycles.

More so, low and moderate overall perceived social support were found to be a significant predictor of glycemic control. This is in contrast to a study by Maki *et al* who reported that social support from family members and spouses/partners did not have a direct association with HbA1c. However, social support from friends had a negative direct relationship, with none of the sources of strain having statistically significant direct relationship with HbA1c. The difference in study findings is most likely due to the cultural difference among the study population, In Nigeria and indeed most African countries, the family plays an important role in offering support. The extended family system widely practised in Africa including Nigeria is an important contributor to having strong family support. This implies that despite increasing westernization, Nigerians still have strong family systems and values. Most of the study participants in this study received social support from family.

This study found a statistically significant relationship between glycaemic control and gender, duration of diabetes, treatment type, as well as medication adherence of the participants.

About half (50.5%) of the study participants had poor glycaemic control contrary to the findings from a cross-sectional study by Ayonote et al who found (34.2%) of the study participants had 'poor' glycaemic control. This may be due to the different cut off scores for glycaemic control. The study by Ayonote *et al* used a HBA1c cut of score of >8% while this study used a cut off score for poor control of ≥ 7%. Female were found to be one and half times more likely to develop poor glycemic control compared to males, However, the association was not found to be an independent predictor of glycemic control. This is in contrast to a cross sectional analytical study by Yahaya *et al* who found that males had higher likelihood to have poor glycemic control compared to females. This could have been because the study by Yahaya had fewer male participants (29.8%) compared to this study where male participants were 32.3%. Duration of diabetes of less than 5 years was found to be an independent predictor of poor glycemic control This is contrary to an Ethiopian cross sectional study by Gebrie et al who reported that duration of diabetes >10 years was found to be an independent predictor of glycemic control This may be as a result of the difference in the study population, as the study included participants from the ages 18 and older while in this present study, participants were ages 60years and older.

Most of the study participants on insulin and oral medications had higher likelihood of almost three times of having poor glycemic control. This is similar to a study by Turner et al., comparing insulin with sulfonylurea, insulin therapy gave an increased likelihood of requiring additional therapy to achieve HbA1c levels below 7%.[12] The similarity in these findings could be because, those with poor glycaemic control are those that are frequently commenced on insulin to improve control.

Unsurprisingly, the relationship between medication adherence and glycemic control was significant, where those with low medication adherence were more likely to have poor glycemic control compared to those with high medication adherence which was similar to findings from other studies.[33,34] An Ethiopian cross sectional study by

Sendekie *et al* reported that Patients who had a high level of medication adherence were found less likely to have poor glycemic control compared with patients who were low adherent to their medications, [33] implying that medication adherence of patients could maximize the effectiveness of the pharmaceutical therapy resulting in better control.

CONCLUSION

In this study, the overall glycaemic control was poor 194 (50.5%). Compared to the friend's subscale (18.2%), the family subscale (71.4%) had higher support, with about half of the respondents (49.7%) having high overall perceived social support. Moderate and low perceived social support, duration of diabetes <5 years, poor medication adherence and treatment with oral medication and insulin were found to be independent predictors of poor glycaemic control, with treatment with oral medications and insulin being the most significant predictor of poor glycaemic control. Close attention should be paid to older adults living with T2DM and with the above significant predictors, as they are more likely to have poor glycaemic control. Modifying these factors early in their treatment is essential as it will prevent cardiovascular complications and improve quality of life.

LIMITATION

This study being a cross-sectional hospital-based study was subject to some limitations. The various significant associations between the variables tested in this study were not necessarily causal. 1.051-2.901).

Table I. Sociodemographic pattern of the Study Participants

Variable	Frequency (n=384)	Percentage (%)
Age group (Years)		
60-64	111	28.9
65-69	90	23.4
70-74	87	22.7
75-79	54	14.1
≥80	42	10.9
Mean±SD	68.64±7.2	
Gender		
Male	124	32.3
Female	260	67.7
Education		
None	61	15.9
Primary	107	27.9
Secondary	119	30.9
Tertiary	97	25.3
Marital status		
Single	3	0.8
Married	196	51.0
Separated	16	4.2
Widowed	166	43.2
Divorced	3	0.8
Religion		
Christianity	285	74.2
Islam	99	25.8
Ethnic group		
Yoruba	274	71.3
Igbo	97	25.3
Hausa	5	1.3
Others	8	2.1
Average monthly income (Naira)		
<50,000	160	41.6
50,000-100,000	141	36.7
101,000-200,000	49	12.8
>200,000	34	8.9
Amount spent on drugs in the last year (Naira)		
<50,000	27	7.0
50,000-100,000	96	25.0
101,000-200,000	107	27.9
>200,000	154	40.1
Duration of diabetes (Years)		
<5	110	28.6
5-10	94	24.5
>10	180	46.9

SD=Standard deviation

Table II: Clinical Characteristics of Participants

Variable	Frequency (n=384)	Percentage (%)
Smoking status		
Yes	28	7.3
No	256	92.7
Alcohol consumption		
Yes	97	25.3
No	287	74.7
Physical activity level		
Athletic	6	1.6
Active	125	32.6
Sedentary	253	65.8
Treatment of diabetes among participants		
Oral alone	320	83.3
Oral and Insulin	64	16.7
Presence of comorbidity		
Yes	305	79.4
No	79	20.6
Type of comorbid condition**		
Hypertension	243	63.3
Dyslipidemia	173	45.1
Glaucoma/ cataract	94	24.5
Osteoarthritis	21	5.5
BPH	13	3.4
Others	16	4.2
BMI class		
Underweight	5	1.3
Normal	89	23.2
Overweight	162	42.2
Obese	128	33.3
Mean±SD	28.65±5.8	
Medication adherence		
High	171	44.6
Medium	110	28.6
Low	103	26.8

**Multiple Reponses **

Table III. Pattern of Social support among participants

Variable	Frequency (n=384)	Percentage (%)
Family Subscale		
Low support (1-2.9)	4	1.0
Moderate support (3-5)	106	27.6
High support (5.1-7)	274	71.4
Friends' Subscale		
Low support (1-2.9)	110	28.7
Moderate support (3-5)	204	53.1
High support (5.1-7)	70	18.2
Other Subscale		
Low support (1-2.9)	5	1.3
Moderate support (3-5)	103	26.8
High support (5.1-7)	276	71.9

Fig 1: Overall Perceived Social Support
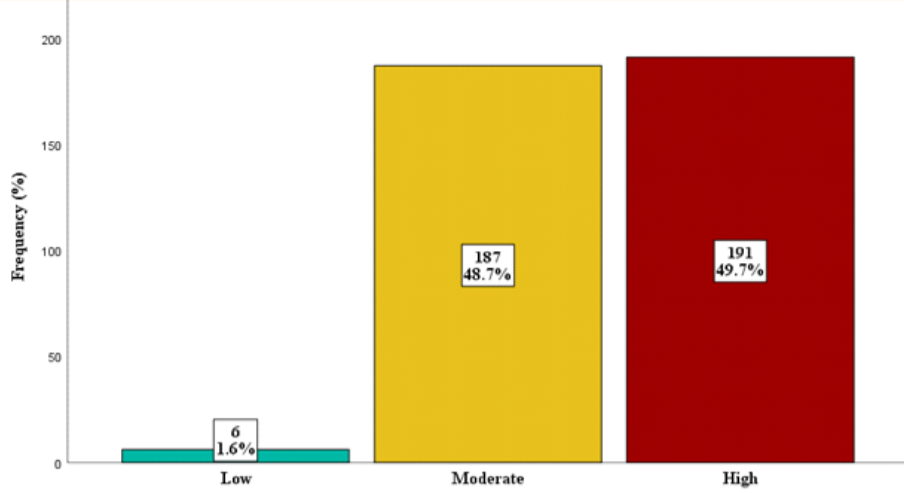
About half (49.7%) of the respondents had high overall perceived social support, with 1.6% of respondents having low overall perceived support.

Fig 2: Diabetes control status of study participants
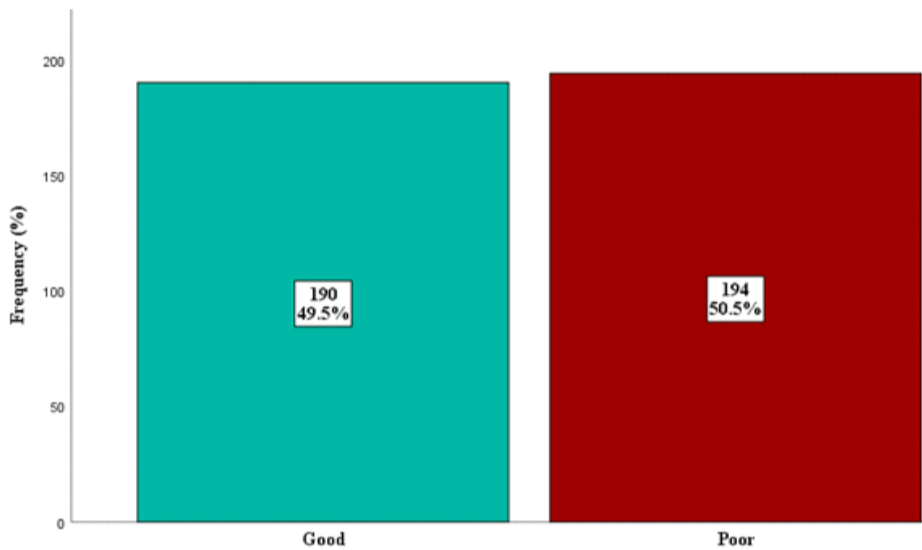
About half (50.5%) of the study participants had poor glycaemic control.

Table IV: Relationship between domains of social support and glyceamic control

	Bivariate			Multivariate	
	Good control	Poor control	p-value	AOR (95% CI)	p-value
Family Subscale					
High support	159(58.0)	115(42.0)	<0.001*	1	
Moderate/Low support	31(28.2)	79(71.8)		2.002(1.023-4.274)	0.001*
Friends' Subscale					
High support	38(54.3)	32(45.7)	0.374		
Moderate/Low support	48(48.4)	162(51.6)			
Other Subscale					
High support	160(58.0)	116(42.0)	<0.001*	1	
Moderate/Low support	30(27.8)	78(72.2)		2.079(1.007-4.508)	0.007*
Overall PSS					
High support	114(59.7)	77(40.3)		1	
Moderate/Low support	76(39.4)	117(60.6)	<0.001*	2.253(1.468-3.458)	<0.001*

Table V: Relationship between Glycaemic Control and Socio-Demographic Characteristics

	Bivariate			Multivariate	
	Good	Poor	p-value	AOR (95% CI)	p-value
Age group (Years)					
60-64	50(45.0)	61(55.0)	0.055		
65-69	42(46.7)	48(53.3)			
70-74	54(61.1)	34(38.6)			
75-79	21(38.9)	33(61.1)			
≥80	23(56.1)	18(43.9)			
Gender			**0.035***		
Male	71(57.3)	53(42.7)		1	
Female	119(45.8)	141(54.2)		1.443(0.913-2.828)	0.116
Education					
None	32(52.5)	29(47.5)	0.794		
Primary	50(46.7)	57(53.3)			
Secondary	57(47.9)	62(52.1)			
Tertiary	51(52.6)	46(47.4)			
Marital status					
Married	105(53.6)	91(46.4)	0.101		
Unmarried	85(45.2)	103(54.8)			
Average monthly income (Naira)					
<50,000	73(45.6)	87(54.4)	0.134		
50,000-100,000	76(53.9)	65(46.1)			
101,000-200,000	20(40.8)	29(59.2)			
>200,000	21(61.8)	13(38.2)			
Duration of diabetes					
<5	42(38.2)	68(61.8)	**0.008***	2.386(1.358-4.192)	**0.002***
5-10	56(59.6)	38(40.4)		1	
>10	92(51.1)	88(48.0)		1.410(0.851-2.336)	0.183

Table VI. Relationship between glycaemic control and clinical characteristics

	Bivariate			Multivariate	
	Good	Poor	p-value	AOR (95% CI)	p-value
Smoking status					
Yes	11(39.3)	17(60.7)	0.263		
No	179(50.3)	177(49.7)			
Alcohol consumption					
Yes	41(42.3)	56(57.7)	0.100		
No	149(51.9)	138(48.1)			
Physical activity level					
Athletic	3(50.0)	3(50.0)	0.703		
Active	58(46.4)	67(53.6)			
Sedentary	129(51.0)	123(49.0)			
Treatment of diabetes among participants					
Oral alone	171(53.4)	149(46.6)	**0.001***	1	
Oral and Insulin	19(29.7)	45(70.3)		2.734(1.478-5.059)	**0.001***
Presence of comorbidity					
Yes	148(48.5)	157(51.5)	0.462		
No	42(53.2)	37(46.8)			
BMI	28.33±5.9	28.97±5.8	0.286		
Medication adherence					
High	96(56.1)	75(43.9)	**0.044***	1	
Medium	48(43.6)	62(56.4)		1.373(0.805-2.342)	0.274
Low	46(44.7)	57(55.3)		1.746(1.051-2.901)	

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