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Glycaemic Control, and Associated Practices among Diabetic Patients in Private Practice: A Focus on Rubaga Hospital, A Private Tertiary Hospital in Uganda

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Abstract

The control of blood glucose is critical in prevention of complication of diabetes and to improve the quality of life of these patients. However in a setting of patients attending care from a private setting, the access to inexpensive care may be a critical control of diabetes, a life-long chronic illness that requires optimal adherence to nutritional and medication. Such practices may ultimately heighten the financial burden associate with management of diabetes of complications such as hypertension and diabetic foot. In spite of this, the Glycaemic control practices in private health care settings in Uganda have not been well described and thus may negatively impact on the health outcomes.

The study aimed to describe the practices among diabetic patients attending the Rubaga hospital, determine the level of Glycaemic control and identify the factors associated with diabetics' patients monitoring indicators (Hb1Ac levels, blood glucose levels).

This is a Cross-sectional analytical study.

Patients were randomly selected during the period of April and May 2012. The laboratory determination of the blood glucose levels (RBG) and Glycosylated hemoglobin (HB1AC) was done using the COBAS 6000 clinical chemistry analyser. Analysis was done using the student T-test and Chi-square test with a level of significance of 0.05.

There was a significant statistical relationship between fasting plasma glucose and HbA1c (p-value = 0.000).
Factors influencing high HBA1C levels in diabetic patients at Rubaga hospital were high cost of diabetes mellitus treatment (p-value = 0.019), duration the study participant had had the disease (P = 0.003) and having another chronic illness alongside diabetes mellitus (p-value = 0.045).

The Republic of Uganda should make treatment of diabetes mellitus universally accessible and free. It should also put sensitization measures in place geared towards minimizing occurrence of some chronic disease conditions like hypertension which lead to co-treatment that lowers drug compliance.

Keywords: Glycaemic control; Practices; Diabetes; Rubaga; Uganda

Introduction

Diabetes has of recent become a major health burden in Uganda, with over million people affected and 8.1% of subpopulations in Kampala and Mukono districts [1]. More than 28.9% patients with diabetes mellitus in Uganda have poor access to quality care, medication and are non-compliant to treatment recommendations [2]. In Uganda, patients with diabetes in search for cure of the disease, consult both conventional and traditional medical treatments. Health seeking practices of consulting multiple health providers may impact negatively of Glycaemic control as some modalities have not been validated.

Though the glycated hemoglobin (HbA1c) is the recommended test for monitoring glycaemic control for the up to 6 to 8 weeks, most health facilities in Uganda routinely use the random blood glucose (RBG) assessments [3]. Thus the status the Glycaemic control for most patients attending private hospitals such as Rugaba may be unknown and thus lead to unknown treatment outcomes.

Practices to improve glycaemic control among patients receiving care at private health facilities has not been fully explored, thus factors such as; gender and age of the patient [4-7]; adherence to prescribed medication and clinic appointments [8,9]; comorbidities related pill burden [10] quality of diabetes care by provider, [11] whereas [12], patient satisfaction and multi professional care [13] and the costs of [14], influence the HbA1c levels.

Methods and Materials

Design and Setting

Mixed, descriptive cross-sectional and experimental designs were employed to determine the fasting blood glucose (FBG) and HbA1c and glycaemic control practices among diabetic out patients attending Rubaga hospital. Rubaga hospital with a 300 bed capacity, is a private not for profit faith based hospital, under the Catholic arch diocese of Kampala serves a catchment area of Kampala, Wakiso, Mpigi, Mukono districts.

Study Population and Sampling

The study population included all diabetic patients attending the out-patient clinic of Rubaga hospital with a known history of diabetes treatment of more than 6 weeks. Ninety six (96) patients [15] were recruited into the study using simple random sampling. Uniformly sized cards numbered with numbers 1 to192 were enclosed in a box for selection. Only patients picking numbers 1-96 were recruited into the study upon obtaining informed consent.

Data Collection and Management

Data was collected by the principal researcher, who is also a laboratory technologist. The study questionnaires were pre-tested and standardized. Upon consenting to participate in the study, patients were interviewed to complete the questionnaires on their glycaemic control practices and knowledge. History of the last meal was taken to ascertain the whether the blood sugar was fasting or random.

Following the interview, a blood specimen was obtained from the patient for FBG and HbA1c analysis. All blood specimens were collected in fluoride containers to minimize glycolysis which influences the FBG results. Controls were used to validate the results for each specimen using a COBAS 6000 clinical chemistry analyser- HBA1C <6.0% meant good glycaemic control while that of >6.0% meant poor glycaemic control.

All questionnaires were serialized and validated for completeness. Quantitative data was entered in Epidata v3.1 software for management and exported to SPSS v21 software for analysis. Categorical data was analyzed using Pearson chi-square test and continuous data using the T test.

Ethical Considerations

The study was approved by Mbarara University Research and Ethics committee and institutional research committee of Rubaga hospital. Only patients who consented were included in the study and their identifiers were not included, rather questionnaires were coded.

The participation of the study subject was voluntary after receiving explanation on the intended study aims, risks, benefits of the study and confidentiality was guaranteed. The participants signed an informed consent form agreeing to participate voluntarily in the study. This consent form and procedure was approved by the Ethical Committee.

Results

Ninety six (96) patients were participated in the study among them 39 (40.6%) participants were 46 to 60 years of age, 34 (35.4%) were over 60 years and 23 (24.0%) were 18 to 45years of age. Seventy five (78.1%) of the study participants were female and 21 (21.9%) were male.49 (51.0%) of the study participants were primary school drop outs, 25 (26.0%) were secondary school drop outs, 14 (14.6%) had attained tertiary education and 8 (8.3%) were completely illiterate. 55 (57%) of the study participants were peasants, 30 (31%) were business persons, 8 (9%) were civil servants and 3 (3%) were unemployed.

Twenty three (23) of the study participants who had glucose levels of less than 110mg/dl, 16 (69.6%) had normal HbA1c values of less than 6% and 7 (30.4%) had values greater than 6.0%. Of the 23 participants with glucose values of 110-140mg/dl, 11 (47.8%) had HbA1c values of less than 6.0% and 12 (52.2%) had values greater than 6.0%. The results further showed that of the 27 study participants with fasting blood glucose of 140-200mg/dl, 18 (66.7%) had HbA1c values of greater than 6.0% and 9 (33.3%) had one less than 6.0%. It is further revealed in that of the 23 study participants with fasting plasma glucose levels above 200mg/dl, 21 (91.3%) had HbA1c levels above 6.0 and only 2 (8.7%) had HbA1c levels below 6.0%.

The results further indicated that 35.3% of the study participants who had lived with diabetes mellitus for less than a year, 48.5% of those that had lived with the disease for 1 to 5years, 35.0% of those with it for 6 to 10 years and 34.6% of the ones who had had the disease for more than 10years

had HbA1c levels of less than 6%. HBA1C levels for those with recent diagnosis of diabetes mellitus to those of patients with a long history of having the disease were comparable with no significant variation (p = 0.81).

The results revealed that among the 23 study participants who were 18 to 45years of age, 9 (39.1%) had HbA1c of less than 6.0% and 14 (60.9%) had it greater than 6.0%. Of the 39 participants aged 46 to 60year old, 15 (38.5%) had HbA1c of less than 6.0% and 24 (61.5%) had one of greater than 6.0%. The table further shows that of the 34 study participants aged over 60years, 14 (41.2%) had HbA1c of less than 6.0% and 20 (58.2%) had it greater than 6.0%. HBA1C levels were comparable in all age groups (p = 0.833).

The results related to the study participant's level of education attained and their glycated haemoglobin levels presented that of the 49 study participants who stopped at primary education, 26 (53%) had HbA1c above 6.0% and 12 (47%) had it less than 6.0%. Of the 25 who had stopped at secondary level of education, 13 (52%) had HbA1c levels above 6.0% and 12 (48%) had values less than 6.0%. It is further revealed that for the 14 study participant who had attained tertiary education, 13 (92.9%) had HbA1c levels above 6.0% and 1 (7.1%) had values less than 6.0%. A similar pattern was revealed in the 8 study participants who were illiterate where, 6 (75%) had HbA1c levels above 6.0% and 2 (25%) had the levels below 6.0%. No systematic trend was observed about HBA1C levels based on level of education and hence no statistically significant relationship could be inferred from this (p = 0.426).

About the duration spent between last DM treatment doses related with HbA1c levels of the study participants, we found that duration spent without taking treatment of diabetes mellitus never revealed a definite significant trend with HBA1C levels of the study participants (p = 0.325). Of the 49 study participants who had taken their DM treatment that same day, 31 (63.3%) had HbA1c levels above 6.0% and 18 (36.7%) had levels below 6.0%, a similar trend with similar percentages for the 30 study participants who had missed treatment for about a day or two. The trend was reversed for the 11 participants of more than a week off treatment for DM who instead had 8 (72.7%) of them having HbA1c levels below 6.0% and 3 (27.3%) had it greater than 6.0%. For the 6 participants who had spent 3 to 7days off DM treatment, 5 (83.3%) had HbA1c levels above 6.0% and 1 (16.7%) had the levels less than 6.0%.

The results about missing of drug taking and Hb1Ac levels of study participants exposed that of the 82 study participants that never missed taking medication even once, 48 (58.5%) had HbA1c levels above 6.0% and 34 (41.5%) had the levels below 6.0%. It further reveals that of the 14 who at times missed taking treatment for DM, 10 (71.4%) had HbA1c values greater than 6.0% and 4 (28.6%) had values less than 6.0%. Hence, HBA1C levels of participants who at times failed to take medication for diabetes mellitus were comparable to those of participants who always regularly took their medication (p = 0.494).

Regarding the reason for the study participants failing to take DM medication at times, the results indicated that 82 (86%) of the study participants were always adherent to medication, 5 (5%) failed to take the medication because they were tired of taking it, 3 (3%) failed be because of poor timing which made them forget taking it, 3 (3%) was because of drug stock outs, 2 (2%) did so to allow their herbal remedies to work 1 (1%) did it because they felt well enough not to take the medicine.

On the type of medication and Hb1Ac levels of study participants the study showed that of the 82 study participants on oral hypoglycaemics alone for DM treatment, 46 (56.1%) had HbA1c levels above 6.0% and 36 (43.9%) had the levels below 6.0%. All the 4 (100%) on both oral plus parenteral hypoglycaemics had HbA1c levels above 6.0% whereas of the 10 participants on only parenteral hypoglycaemics, 8 (80%) had HbA1c levels above 6.0% and 2 (20.0%) had the levels below 6.0%. There was no statistically significant relationship between type of treatment for diabetes mellitus and glycaemic control based on HBA1C levels (p= 0.144).

Regarding taking of co-medication for another chronic illness and Hb1Ac levels of the study participants the results revealed that 60 study of participants who were taking co-medication for another chronic illness, 40 (66.7%) had HbA1c levels above 6.0% and 20 (33.3%) had the levels below 6.0%. The table further shows that of the 36 participants who were not taking co-medication for another chronic illness, there were as many having HbA1c above 6.0% as there were those with the value below 6.0%, which was 50.0%. HbA1c levels were higher in people taking medication for other chronic illness alongside that diabetes mellitus than in those on treatment for only diabetes mellitus (p = 0.045).

Concerning the distribution of other chronic diseases among the study participants, showed that 55 (57.3%) of the study participants were on treatment for hypertension, 36 (37.5%) were not on treatment for any chronic disease condition, 2 (2.1%) were on ARV treatment, 2 (2.1%) were on peptic ulcer disease treatment and 1 (1.0%) was on tuberculosis treatment.

The DM medication treatment fatigue and HbA1c levels of the study participants showed that drug fatigue among the study participants was not associated with poor glycaemic control (p = 0.877). Of the 84 study participants who felt that they were not tired or fatigued with the treatment of DM, 51 (60.7%) had HbA1c levels above 6.0% and 33 (39.3%) had the levels below 6.0%. Of the 12 participants who at times felt tired of taking the medication for DM, 7 (58.3%) had HbA1c levels above 6.0% and 5 (41.7%) had the levels below 6.0%.

About the adverse effect of DM treatment among the participants and their Hb1Ac levels shows that of the 73 study participants without adverse effects of DM treatment, 45 (61.6%) had HbA1c levels above 6.0% and 28 (38.4%) had the levels below 6.0%. Further on, it is revealed that of the 23 participants who were experiencing adverse effects of DM treatment, 13 (56.5%) had HbA1c levels above 6.0% and 10 (43.5%) had the levels below 6.0%. Based on the findings in this table, having adverse effects of drugs for DM treatment was not associated with poor glycaemic control (P = 0.86). The use of herbal treatment alongside medical prescriptions for DM treatment and HbA1c values of the study participants revealed that using herbs for DM treatment alongside medical prescriptions was not associated with high HBA1C

levels (p = 0.348). Of the 75 study participants who were only using medically prescribed treatment, 46 (61.3%) had HbA1c levels above 6.0% and 29 (38.7%) had the levels below 6.0%. The table further reveals that of the 21 participants using herbs for DM treatment alongside medical prescriptions, 12 (57.1%) had HbA1c levels above 6.0% and 9 (42.9%) had the levels below 6.0%.

BMI and HbA1c values of the study participants showed that of the 68 overweight or obese study participants by BMI classification, 40 (58.8%) had HbA1c levels above 6.0% and 28 (41.2%) had the levels below 6.0%. It was further revealed that of the 28 study participants that were normal or underweight by BMI classification, 18 (64.3%) HbA1c levels above 6.0% and 10 (35.7%) had the levels below 6.0%. Obesity was not a predisposing factor of poor glycaemic control defined by HBA1C levels above 6% (p = 0.598).

On the duration of having DM and FBS levels of study participants showed that the longer one had lived with DM, the higher were their chances of having elevated or high fasting blood glucose (P = 0.003). Of the 33 study participants who had had DM for 1 to 5 years, 21 (63.6%) had fasting blood glucose concentration of over 110mg/dl and 12 (36.4%) had it under 110mg/dl. Of the 26 participants who had had the disease for more than 10years, 25 (96.2%) had fasting blood glucose concentrations of over 110mg/dl and 1 (3.8%) had it under 110mg/dl. The table further shows that of the 20 participants who had had DM for 6 to 10years, 15 (75%) had fasting blood glucose concentration of over 110mg/dl and 5 (25%) had it under 110mg/dl with a similar trend registered in those who had had the disease for less than a year where, 12 (70.6%) of the participants had fasting blood glucose concentration of over 110mg/dl and 5 (29.4%) had it under 110mg/dl.

Finally the results showed that the 36 (53.7%), 18 (72%) and 4 (100%) study participants who rated the cost of diabetes mellitus treatment as expensive, affordable and cheap respectively had HbA1c levels above 6.0%. Glycaemic control deteriorated with perceived increase in costliness of treatment by the study participant (P = 0.019). This makes perceived increased cost of treatment by the participants a predisposing factor to poor glycaemic control (HbA1c levels >6.0%).

Distribution of the Respondents by Demographic Characteristics (n =96)

Table 1: Distribution of study respondents by socio-demographic characteristics (n =96)

Xteristic	Sex		Total (n= 96)	*P value
	Male (n= 21)	Female (n =75)		
Age of Patient (years)				
18 – 45 years	6	17	23	0.438
46-60 years	9	30	39	
> 60 years	6	28	34	
Marital status				
Married or Cohabiting	21	34	55	0.000
Widowed or Divorced	0	24	24	
Not married	0	17	17	
Highest Education level				
None	0	8	8	0.000
Primary	4	45	49	
Secondary	8	17	25	
Tertiary	9	5	14	
Occupation status				
Peasant	4	51	55	0.000
Civil servant	4	4	8	
Business person	11	19	30	
Unemployed	2	1	3	
Body Mass Index (BMI)				
Underweight (< 18)	2	0	2	0.006
Normal (18-25)	26	18	26	
Overweight (35-30)	25	19	25	
Obese (>30)	43	38	43	

**P value determined by Pearson chi-square test*

Distribution of Respondent by Blood Glucose Control (n =96)

Table 2: Distribution of study respondents by blood glucose and Glycosylated hemoglobin level

Xteristic	Sex		Total (n= 96)	*P value
	Male (n= 21)	Female (n =75)		
Blood Glucose (mg/dL)				
110 mg/dl	7	16	23	0.665
110-140 mg/dl	2	21	23	
140-200mg/dl	8	19	27	
> 200mg/dl	4	19	23	
HbA1c %				
< 6%	7	31	38	0.703
6-10%	10	29	39	
> 10%	4	15	19	
Years with diabetes				
< 1 year	5	12	17	0.247
1 to 5 years	8	25	33	
6 to 10 years	4	16	20	
> 10 years	4	22	26	

**P value determined by Pearson chi-square test*

Factors Influencing HB1Ac Levels in Diabetic Patients at Rubaga Hospital (n=96)

Table 3: Factors associated with Hb1Ac levels among diabetic patients at Rubaga

Xteristic	Glycosylatedhemoglobin (HbA 1c)			Total (n= 96)	*P value
	< 6%	6% - 10%	> 10%		
Blood Glucose (mg/dL)					
110 mg/dl	16	7	0	23	0.000
110-140 mg/dl	11	6	6	23	
140-200 mg/dl	9	16	2	27	
> 200 mg/dl	2	10	11	23	
Years with diabetes					
< 1 year	6	5	6	17	0.810
1 to 5 years	16	13	4	33	
6 to 10 years	7	11	2	20	
> 10 years	9	10	7	26	
Age of Patient (years)					
18 – 45 years	9	11	3	23	0.833
46-60 years	15	15	9	39	
> 60 years	14	13	7	34	
Highest Education level					
None	2	3	3	8	0.426
Primary	23	18	8	49	
Secondary	12	8	5	25	
Tertiary	1	10	3	14	
Date of last medication dose					
Today	18	22	9	9	0.325
1-2 days back	11	13	6	6	
3-7 days back	1	2	3	3	
>1 week back	8	2	1	1	

Ever fails to take medication					
Yes	4	7	3	14	0.494
No	34	32	16	82	
Type of Medication					
Oral hypoglycemic	36	31	15	82	0.144
Oral plus Parental	0	2	2	4	
Parenteral only	2	6	2	10	
Patient taking co-medication					
Yes	20	28	12	60	0.045
No	18	11	7	36	
Medication Fatigue					
Yes	5	4	3	12	0.877
No	33	35	16	84	
Experiencing Adverse effects					
Yes	10	7	6	23	0.86
No	28	32	13	73	
Use of Local medicines					
Yes	9	10	2	21	0.348
No	29	29	17	75	
Body Mass Index (BMI)					
Underweight (< 18)	2	0	0	2	0.598
Normal (18-25)	8	10	8	26	
Overweight (35-30)	12	8	5	25	
Obese (>30)	16	21	6	43	

**P value determined by Pearson chi-square test*

Factors associated with blood glucose levels among diabetic patients at Rubaga

Table 4: Factors associated with blood glucose levels among diabetic patients at Rubaga

Xteristic	Blood Glucose level (mg/dl)				Total (n= 96)	*P value
	<110	110-140	140-120	>200		
Years with diabetes						
< 1 year	5	4	6	2	17	0.003
1 to 5 years	12	9	8	4	33	
6 to 10 years	5	4	3	8	20	
> 10 years	1	6	10	9	26	
Age of Patient (years)						
18 – 45 years	8	1	8	5	23	0.974
46-60 years	5	15	9	10	39	
> 60 years	10	6	10	8	34	
Highest Education level						
None	3	0	1	4	8	0.778
Primary	10	15	15	9	49	
Secondary	8	6	4	7	25	
Tertiary	2	2	7	3	14	

Last medication dose						
Today	16	10	13	10	49	0.857
1-2 days back	4	5	12	9	30	
3-7 days back	0	3	0	3	6	
> 1 week back	3	5	2	1	11	
Fails to take medication						
Yes	2	5	3	4	14	0.655
No	21	18	24	19	82	
Type of Medication						
Oral hypoglycemic	19	20	25	18	82	0.826
Oral plus parenteral	1	1	1	1	1	
Parenteral only	3	2	1	1	4	
Patient taking co-medication						
Yes	12	15	17	16	60	0.86
No	11	8	10	7	36	
Has Medication Fatigue						
Yes	2	6	2	2	12	0.53
No	21	17	25	21	84	
Experiencing Adverse effects						
Yes	4	5	7	7	23	0.277
No	19	18	20	16	73	
Use of Local medicines						
Yes	5	5	5	6	21	0.812
No	18	18	22	17	75	
Body Mass Index (BMI)						
Underweight (< 18)	2	0	0	0	2	0.451
Normal (18-25)	5	5	10	6	26	
Overweight (35-30)	9	6	3	7	25	
Obese (>30)	7	12	14	10	43	

**P value determined by Pearson chi-square test*

Patients Medication Practices, Diabetes Care and Adherence to Diabetic Treatment (n =96)

Description	Number of Patients	Percentage of Patients
Day of last medication dose		
Today	49	51
1-2 days back	30	31
3-7 days back	6	6.3
> 1 week back	11	11.5
Reason for not taking medication today		
Adherent to dose	66	68.8
Medicine out of stock	13	13.5
Doctor's Advise	2	2.1
Medication got finished	1	1
Forgot to take	1	1
Felt normal/healthy	1	1
Patient was fasting	12	12.5

Patient ever Failed to take medication		
Yes	14	14.6
No	82	85.4
Reason for failing to take medication		
Adherent	83	86.5
Medication got finished	1	1
On support medication	1	1
Medication fatigue	4	4.2
Not convenient	1	1
Use herbal remedies	2	2.1
Timing of treatment	1	1
Forgot	1	1
Stock out	1	1
Felt well	1	1
Patients taking co-medications		
Yes	60	62.5
No	36	34.4
Types of other medication used		
None	33	34.4
Antihypertensive	55	57.3
Antibiotics (bone infection)	1	1
ART care	2	2.1
Headache medication	2	2.1
PUD treatment	2	2.1
TB medication	1	1
Patient Experiences Medication fatigue		
Yes	12	12.5
No	84	87.5
Patient experiences adverse effects		
Yes	23	24
No	73	74
Perceived cost of medication		
Expensive	67	69.8
Affordable	25	26
Cheap	4	4.2
Perception of consultation time at hospital		
Satisfactory	90	93.8
Fairly Satisfactory	4	4.2
Not satisfactory	2	2.1
Patient Know the name of medication		
Yes	24	25
No	72	75
Patient believes in informal traditional treatments for diabetes		
Yes	25	26
No	71	74
Patient uses local herbs or medicines alongside the medication given		
Yes	21	21.9
No	75	78.1

Patients Medication Practices, Diabetes Care and Adherence to Diabetic Treatment (n =96)

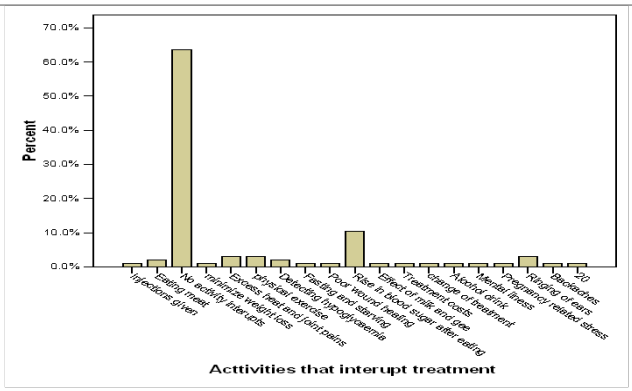

Figure 1 : Activitiesthatinterrupttreatment

Health Practice by Diabetic Patients Attending Rubaga Hospital (n =96)

Table 6: Distribution on practices of diabetics' patients

Foods patients avoid		
Sweet foods	62	64.6
Starch foods	10	10.4
Sweet and starchy	7	7.3
No food should be avoided	17	17.7
Occasional eating habits		
Yes	73	76
No	23	24
Last health education on diabetes		
Never	6	6.3
Last visit	62	64.6
A number of visits a go	22	22.9
Today	6	6.3

Discussion of Results

As a participant's fasting blood glucose rose beyond the normal upper limits, so was their HbA1c value in excess of the study's cut off of 6% thus revealing a strong association between the two (P=0.000). Our study findings revealed that there was poor glycaemic control in 58/96(60.4%) of the study participants which is a little higher than the 40% poorglycaemic control reported by Faiza, [16] but comparable with the findings of Sharon et al. [5].

No significant association was found between glycaemic control and gender (P value = 0.703) which agrees with the findings of Assiamira et al. [4], Sharon et al.[5] and Ana et al. [17] who also found no significant sex difference in the distribution of HbA1c levels for men and women. The findings are however contrary to those of Matthias et al. [18] who reported significantly poorer glycaemic control among male participants than their female counterparts.

A strong association was found between perceived high cost of treatment for diabetes mellitus and poor glycaemic control for the patient (P = 0.019). This made high cost of treatment a very strong predictor of poor glycaemic control of the patient, a comparable finding to those of Beran et al. [14].

Having another chronic disease requiring taking of medications alongside those of diabetes mellitus was significantly associated with poor glycaemic control (HbA1c levels above 6.0%) among this study's participants (P = 0.045) and hence made it a predisposing factor for poor glycaemic control which is in agreement with the findings of Schectman et al. [10]. However, the general feeling of being tired of taking medicine was not significantly associated with high HbA1c levels above 6.0% (P = 0.877).

The duration one had spent with diabetes mellitus as per our study was not significantly associated with poor glycaemic control based on HBA1C levels of our study participants (P value = 0.81). This is contrary to the findings of Blaum et al. [19] and Stephen et al. [20] who reported that a long history of the disease was significantly associated with poor glycaemic control. However long duration of having diabetes mellitus was significantly associated with high fasting blood glucose concentrations (P = 0.003).

Age of our study participants was not related with glycaemic control in any way (P = 0.833). This is contrary to the findings of Nichols et al. [21] and Harris et al. [6] who reported that glycaemic control deteriorated with increasing age of the diabetic patient. It is also contrary in another way to the findings of Matthias et al. [18], who reported that glycaemic control improved with increase in the age of the diabetic patient.

No association was found between level of education of study participants and their HbA1c levels or glycaemic control (P = 0.426). This is contrary to the findings of Kalyango et al. [2], who noted in their study in part that patients with lower education levels and those with low socio-economic status had poor glycaemic control.

The treatment regimen the participant was on for their diabetes mellitus was not statistically related with their extent of glycaemic control (P value = 0.144). However, the fact that all of the study participants who were on both oral plus parenteral hypoglycaemics had high HbA1c levels relates with the findings of Sharon et al.[5] who reported that taking of insulin alone or in combination with other drugs was significantly associated with poor glycaemic control among diabetic patients in their study.

Adverse effects of drugs for treatment of diabetes mellitus had no significant correlation with poor glycaemic control (P = 0.86) and is a contrary finding to that of Aburuz et al. [22], who reported poor drug compliance among diabetic patients attributed to its medication side effects.

No association was found between using informal herbal treatment and poor glycaemic control (P = 0.348). This is contrary to the findings of Pinkoane et al. [23] who reported that many a people with low socio-economic status in South Africa had poor glycaemic control because they preferred services of traditional and faith healers to the biomedical ones.

Obesity reflected by a high BMI was not a predictor of poor glycaemic control in this study (P = 0.598). This is contrary to the findings of Nichols et al. [21] who reported that increase in body mass index (BMI) led to increased poor glycaemic control.

No association was found between time when the participant had had the last treatment for diabetes mellitus and their HBA1C levels (P = 0.325). Similarly, no association was found between occasional missing of DM treatment with HBA1C levels of the study

Conclusions

A high fasting blood glucose was predictive of a high HbA1c value and glycaemic control was poor but with no significant variation between the different gender.

Factors associated with poor glycaemic control in diabetic patients at Rubaga Hospital were high cost of treatment (P = 0.019), long duration of having diabetes mellitus (P = 0.003) and taking co-medication for another chronic illness alongside that of diabetes mellitus (P = 0.045).

In this study unlike in other studies, level of education of the study participants, type of treatment they were on whether oral or parenteral, adverse effects of drugs for their treatment, occasionally missing to take treatment, BMI and using of informal herbal treatment were not significantly associated with poor glycaemic control.

Recommendations

The government of the republic of Uganda through the ministry of health and other stake holders should make treatment of diabetes mellitus universally accessible and free even in private establishments like Rubaga Hospital in order to improve glycaemic control and minimise its deleterious effects.

Further research need to be done in health establishments in other parts of the country particularly in rural and semi-urban settings for a generalization to be made about the disease and its challenges.

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