



**GLYCEMIC CONTROL AND ITS RELATIONSHIP WITH KNOWLEDGE, ATTITUDE  
AND PRACTICE OF SELF-CARE AMONG DIABETICS IN UNIVERSITY OF PORT  
HARCOURT TEACHING HOSPITAL, RIVERS STATE**

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**ABSTRACT**

**Background:** The prevalence of diabetes mellitus (DM) is in recent times increasing at a frightening rate particularly in developing countries. Poor awareness and practices among diabetic patients are some of the important variables prompting the progression of the disease and its complications, which are mainly avoidable through education and involvement of the patient. This study aimed to determine the glyceemic control and its relationship with knowledge, attitude and practice of self-care among diabetic patients in University of Port Harcourt Teaching Hospital. **Methods:** This was a cross-sectional study. Convenience sampling method was used to recruit 359 diabetic patients from the endocrinology clinic in UPTH between October and December 2017. A semi-structured interviewer-administered questionnaire was used to obtain data from the selected diabetic patients. Blood samples were collected for fasting blood glucose determination and estimation of glyceemic control. **Results:** The mean age of 359 patients enrolled was  $55.42 \pm 11.90$  years. A majority (54.6%) of the respondents had uncontrolled glyceemic levels while 45.4% were within controlled glyceemic levels. Females showed better attitude scores compared to males. Knowledge scores correlated strongly with age ( $p=0.001$ ), higher educational background ( $p=0.000$ ), monthly income ( $p=0.017$ ) and employment status ( $p=0.001$ ). It was as well observed that those with family history of diabetes ( $p=0.001$ ) and those that have a diabetic meal plan ( $p=0.000$ ) had good knowledge of diabetes self-care compared to those who do not. **Conclusion:** The glyceemic control was unsatisfactory among diabetic patients in UPTH. Patients who have knowledge about DM self-care, tend to have better long term glyceemic control Thus patient education on self-management skills should be intensified.

**KEYWORDS:** Knowledge, Attitude, Practice, Self-Care, Diabetes Mellitus, Glyceemic Control.

**INTRODUCTION**

The prevalence of diabetes is in recent times increasing at a frightening rate particularly in developing countries. Of all the chronic non-communicable diseases (NCDs), diabetes is connected with highest co-morbidities and complications and have effect on people from all socio-economic background. Complications due to diabetes are linked with disability, increased cost of care, reduced quality of life and death; most of which can however, be prevented with proper self-care, as emphasized in the standard treatment guidelines of Nigeria. However this seems to be more theoretical than practical as almost 80% of diabetes deaths occur in low and middle-income countries which includes Nigeria.<sup>[1]</sup>

Self-care is defined as the actions individuals take to ensure a healthy lifestyle, to meet their social, emotional and psychological needs, to care for their long-term condition and to prevent further illness.<sup>[2;3]</sup> Currently,

self-care is largely considered as an integral part of patient management in long term conditions.<sup>[4]</sup>

Studies have consistently revealed that improved glyceemic control can delay or prevent the progress of complications associated with diabetes. Evidences suggest that patients, who have knowledge about DM self-care, have better long term glyceemic control. Glyceemic control has been defined as Type 2 diabetics achieving a target of fasting plasma glucose level of 80-110 mg/dl, or glycosylated hemoglobin (HbA1C) of <7.0%. HbA1C is a test that ascertain the average amount of diabetic control over a period of about 3 months (the average red blood cell lifetime) and used as a significant indicator and marker of glyceemic control.<sup>[5]</sup>

It is important to determine the awareness level of a disease condition in a population. It aids in future development, early detection and prevention. Prevention is important because the strain of diabetes and its

complications on health care and its economic implications are huge, especially for a developing countries like Nigeria. Self-monitoring of glycemic control is a basis of diabetes care that can ensure patient involvement in achieving and maintaining exact glycemic targets. The most important aim of monitoring is the assessment of overall glycemic control and commencement of appropriate steps in a timely manner to attain optimal control. Self-monitoring provides evidence about recent glycemic status, allowing for evaluation of treatment and guiding modification in diet, exercise and medication in order to achieve optimal glycemic control.<sup>[6]</sup>

Since more than 95% of diabetes care is the responsibility of the patient<sup>[7]</sup>, the best treatment he or she can receive is not the treatment given by the best doctors, but that which the patient gives to him or herself. The self-care practices of individuals are subject to their knowledge about diabetes; the more they know about their ailment, the more they would have self-management skills. Many research work available have revealed that the diabetic populace don't have enough awareness of diabetes, the correct use of medications, life style modifications, dietary plans, myths associated with insulin and other education programs on health matter. Thus it is crucial to certify that patient's knowledge, outlook and practices are satisfactory. Poor sentience and practices among diabetic patients are some of the important variables prompting the advancement of diabetes and its complications. Often, people become aware of their diabetic status for the first time after developing diabetes associated complications.<sup>[1]</sup>

Evidences therefore suggest that patients, who have knowledge about DM self-care, have improved long term glycemic control. Thus it is absolutely essential to ensure that patient's knowledge, attitudes and practices are sufficient. This study sought to determine the glycemic control and its relationship with knowledge, attitude and practice of self-care among diabetics in UPTH.

## METHODS

### Study Location

The study was conducted at the Medical Out-Patient Department of University of Port Harcourt Teaching Hospital (UPTH) which is located at Alakahia, along the East –West Road of Port Harcourt metropolis, Rivers State, Nigeria. It was founded in 1980 but officially commissioned by the federal government in 1985. UPTH is one of the two tertiary hospitals in Port Harcourt with teaching and research facilities and affiliated to the federal University of Port Harcourt. It runs several specialist clinics among which is the Endocrinology clinic which holds on Wednesdays.

### Study Population

This study was a cross-sectional study conducted among confirmed diabetic patients who were registered and receiving care in the medical out-patient clinic of the

Endocrine Unit in the University of Port Harcourt Teaching Hospital. Diagnosed diabetics for at least six months were included in the study while diabetic patients who were too ill or pregnant were ineligible to participate.

### Sampling Method

The sample size of 359 was determined using Cochran formula for determining minimum sample size. This study employed a convenience sampling method due to the very short time available for data collection phase of the research. On each clinic day (once a week), all consenting diabetic patients who met the inclusion criteria were enrolled into the study until the end of the 8<sup>th</sup> week when all the 359 participants were obtained for the study.

### Study Procedure

The questionnaire was administered by the researcher and 3 trained interviewers. The interviewers were trained during a two-hour session, whereby the aim and objectives of the study were explained to them. They were told possible challenges they might encounter while administering the questionnaires and how to tackle them (For instance, those that may wish not to disclose information to a researcher should not be coerced). On each clinic day as patients await their turns to see the doctor, the researcher politely engaged them generally, explained the aim of the research and craved their indulgence to provide the information needed. The researcher and assistants then meet patients individually for data collection. The result of patients' previous and current (as at the day of interview) fasting blood sugar level were obtained from patients' files.

### Study Instrument

The instrument for data collection was a semi- structured interviewer-administered questionnaire written in English Language comprising of 36 items. The tool was developed based on literature and the Michigan Diabetes and Research Training questionnaire.<sup>[8]</sup> A pre-test of the questionnaire was done with sample of 30 diabetic patients who were attending diabetes clinic at Military Hospital, Port Harcourt. Questions that were not well understood by respondents were reframed, before interviewing the study sample. The questionnaire was also scrutinized by experts and inputs made were effected. The tool was divided into five sections: Section A dealt with socio-demographic information which includes patient's age, gender, monthly income, occupational and educational status. Section B was based on medical and social history including the duration of the disease, presence of co-morbidities, family history and data on previous and current fasting blood glucose levels while Sections C, D and E were for data on knowledge, attitude and practice of self-care in diabetes management respectively.

A total of 14 items were used to ascertain the level of knowledge of self-care among diabetic patients which

included basic knowledge of diabetes, advantages of exercise, complications of diabetes, groupings of food, ideal body weight and obesity. For the 14 items on knowledge question, the maximum possible score was '14' and the minimum score was '0'. Poor knowledge corresponded to a score of (0- 4); fair knowledge corresponded to a score between<sup>[5-9]</sup>; good knowledge corresponded to a score of.<sup>[10-14]</sup>

A total of 12 items were included and used to assess respondents' attitude towards self-care of diabetes. A five point likert scale was used to measure attitude. Questions evaluating attitude towards the treatment of diabetes were associated with the five categories of response: 'strongly agree', 'agree' 'neutral' 'disagree' and 'strongly disagree'. Each positive response (agree) was assigned a score of '1', and each negative response has a score of '0'. For the 12 attitude related questions the maximum attainable score was '12' and the minimum score was '0. Poor attitude corresponded to a score between (0-8); good attitude corresponded to a score of.<sup>[9-12]</sup>

A total of 10 items were used to assess self-care practice towards management of diabetes. Questions covered areas such as glucose monitoring, physician visit, weight management, exercise, foot care, smoking, consumption of alcohol, compliance to drug and dietary plan. The

maximum attainable score was '10' and minimum was '0'. Poor self-care practice corresponded to a score between (0-6); good self-care practice corresponded to a score of.<sup>[7-10]</sup>

#### Data Analysis

Data was coded into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS version 23.0). Descriptive data was presented in frequency distribution tables. Summary statistics was done using mean and standard deviation for continuous variables. Chi-square test was used to ascertain association between variables. Significance level was set at 95% confidence interval, hence  $P < 0.05$  was considered statistically significant.

#### Ethical Considerations

This study was conducted with adherence to ethical standards. Written informed consent was obtained from participants. Approval for this study was obtained from the Ethics and Research Committee of the University of Port Harcourt. Confidentiality was maintained in line with standard medical practice.

#### RESULTS

Three hundred and fifty nine fasting blood sugar test results were obtained and analyzed giving a response rate of 100%.

#### Glycemic control among diabetic patients

**Table 1: Level of glycemic control among respondents.**

Characteristics	Frequency(n=359)	Percentage (%)
<b>Last fasting blood sugar reading</b>		
Controlled (4.0-7.0)	160	44.6
Uncontrolled (>7.0)	199	55.4
Mean	<b>8.11 ± 3.54(mmol/dl)</b>	
<b>Current fasting blood sugar reading</b>		
Controlled (4.0-7.0)	163	45.4
Uncontrolled (>7.0)	196	54.6
Mean	<b>8.21 ± 3.38(mmol/dl)</b>	

Table 1 reveals that 196(54.6%) of the respondents had uncontrolled glycemic level (> 7.0mmol/dl) while

163(45.4%) had controlled glycemic level within (4.0-7.0mmol/dl).

**Table 2: Relationship between the knowledge, attitude and practice of self-care and glycemic control among diabetic patients.**

Variable	Level of glycemic control			Df	$\chi^2$	p-value
	Controlled n(%)	Uncontrolled n(%)	Total n(%)			
<b>Level of knowledge</b>						
Poor	41(53.9)	35(46.1)	76(100)	2	3.493	0.174
Fair	54(42.9)	72(57.1)	126(100)			
Good	65(41.4)	92(25.6)	157(100)			
<b>Total</b>	<b>160(44.6)</b>	<b>199(55.4)</b>	<b>359(100)</b>			
<b>Level of attitude</b>						
Poor	82(45.6)	98(54.4)	180(100)	1	0.142	0.706
Good	78(43.6)	101(56.4)	179(100)			
<b>Total</b>	<b>160(44.6)</b>	<b>199(55.4)</b>	<b>359(100)</b>			
<b>Level of self-care practice</b>						
Poor	60(41.1)	86(58.9)	146(100)	1	1.201	0.273

Good	100(46.9)	113(53.1)	213(100)			
<b>Total</b>	<b>160(44.6)</b>	<b>199(55.4)</b>	<b>359(100)</b>			

\*statistically significant ( $p < 0.05$ )

Table 2 shows that level of glycemic control was not significantly associated with level of knowledge, attitude and practice of diabetes self-care ( $p > 0.05$ ).

**Table 3: Relationship between socio-demographic factors and level of knowledge.**

Variable	Level of knowledge				df	$\chi^2$	p-value
	Poor n(%)	Fair n(%)	Good n(%)	Total n(%)			
<b>Age</b>							
≤25	0(0)	1(100)	0(0)	1(100)	10	30.31	0.001*
26-35	5(31.3)	6(37.5)	5(31.3)	16(100)			
36-45	21(27.6)	13(17.1)	42(55.3)	76(100)			
46-55	13(16.3)	28(35.0)	39(48.8)	80(100)			
56-65	26(25.5)	48(47.1)	28(27.5)	102(100)			
>65	11(13.)	30(35.7)	43(51.2)	81(100)			
<b>Total</b>	<b>76(21.2)</b>	<b>126(35.1)</b>	<b>157(43.7)</b>	<b>359(100)</b>			
<b>Sex</b>							
Male	32(20.6)	50(32.3)	73(47.1)	155(100)	2	1.368	0.505
Female	44(21.6)	76(37.3)	84(41.2)	204(100)			
<b>Total</b>	<b>76(21.2)</b>	<b>126(35.1)</b>	<b>157(43.7)</b>	<b>359(100)</b>			
<b>Marital status</b>							
Single	11(23.9)	15(32.6)	20(43.5)	46(100)	8	12.493	0.131
Married	57(21.3)	96(36.0)	114(42.7)	267(100)			
Separated	4(50.0)	1(12.5)	3(37.5)	8(100)			
Divorced	3(17.6)	11(64.7)	3(17.6)	17(100)			
Widow/widowed	1(4.8)	11(52.4)	9(42.6)	21(100)			
<b>Total</b>	<b>76(21.2)</b>	<b>126(35.1)</b>	<b>157(43.7)</b>	<b>359(100)</b>			

\*statistically significant ( $p < 0.05$ )

Table 3 shows that self-care practice towards management of diabetics was strongly associated with age but no statistical association was observed with sex

and marital status. Those within 36-55 age group were more knowledgeable.

**Table 4: Relationship between socio-demographic factors and level of knowledge.**

Variable	Level of knowledge				Df	$\chi^2$	p-value
	Poor n(%)	Fair n(%)	Good n(%)	Total n(%)			
<b>Level of education completed</b>							
None	14(37.8)	13(35.1)	10(27.0)	37(100)	6	29.735	0.000*
Primary	12(15.6)	39(50.6)	26(33.8)	77(100)			
Secondary	34(26.8)	42(33.1)	51(40.2)	127(100)			
Tertiary	16(13.6)	42(33.1)	70(59.3)	118(100)			
<b>Total</b>	<b>76(21.2)</b>	<b>126(35.1)</b>	<b>157(43.7)</b>	<b>359(100)</b>			
<b>Employment status</b>							
Un-employed	37(28.)	51(39.5)	41(31.8)	129(100)	4	18.942	0.001*
Employed	36(20.1)	53(29.6)	90(50.3)	179(100)			
Retired	3(5.9)	22(43.1)	26(51.0)	51(100)			
<b>Total</b>	<b>76(21.2)</b>	<b>126(35.1)</b>	<b>157(43.7)</b>	<b>359(100)</b>			
<b>Monthly income</b>							
<50,000	56(26.3)	80(37.6)	77(36.2)	213(100)	6	15.474	0.017*
50,001-250,000	20(14.4)	44(31.7)	75(54.0)	139(100)			
≥250,001	0(0)	2(58.3)	5(141.7)	7(100)			
<b>Total</b>	<b>76(21.2)</b>	<b>126(35.1)</b>	<b>157(43.7)</b>	<b>359(100)</b>			

\*statistically significant ( $p < 0.05$ )

Table 4 revealed that level of knowledge of diabetes self-care was significantly associated with monthly income, level of education, and employment status ( $p < 0.05$ ). It was observed that, as level of education increases, knowledge increases. As expected, the least educated were the least knowledgeable about diabetes self-care. Likewise level of knowledge was higher in those with higher monthly income and the employed.

## DISCUSSION

### Glycemic control

The level of glycemic control among diabetic patients in this study was poor. It was observed that a higher proportion (54.6%) of the respondents had uncontrolled glycemic levels. The high percentage of respondent with good attitude and practice of self-care did not reflect in improved glycemic control as hypothesized. This finding is similar to reports from a study done by Ufuoma *et al.*<sup>[9]</sup> among type 2 diabetic patients visiting the Central Hospital Warri, which showed that more than half (55%) of the study participants had poor glycemic control. This is also similar to reports from other countries with prevalence of poor glycemic control ranging from 50% to 60% in Ethiopia<sup>[10]</sup> but lower than those reported in Bahrain<sup>[11]</sup> and Jordan with values between 65% and 79%. In the study conducted in seven tertiary institutions across the six geopolitical zones in Nigeria, the majority of patients (nearly 70%) did not achieve recommended targets for glycemic control and control of coexisting cardiovascular risk factors. This contrasted with findings in a cross-sectional study assessing quality care for diabetes among 40 medical groups in the USA.<sup>[12]</sup> It was observed that among Americans, only 20% had poor glycemic control.

The reasons for poor glycemic control among Nigerian diabetic patients are multi-factorial. Financial constraint is a key factor as most patients have to pay out-of-pocket for their drugs and for blood glucose tests, and at a price which has been found to be much higher than the cost of these drugs in other parts of the world. In Nigeria, a substantial portion of health care costs (74.5%) is borne by the patient, as the government provided only 25.5% of health care expenditure in 2003.<sup>[13]</sup> The WHO report estimates that 90.2% of Nigerians live below the poverty level of \$2 per day. Thus, accessing health care is a challenge for people living with diabetes in Nigeria.<sup>[14]</sup>

### Relationship between KAP of self-care and glycemic control

The study of Ufuoma *et al.*<sup>[9]</sup> revealed that knowledge is associated with glycemic control. This differs from the study of Sanchez<sup>[15]</sup> and this present investigation, which found no correlation between knowledge and glycemic control. The implication of the finding is that diabetes knowledge is an important factor on how patients will follow their management plan but should not be seen as an end in itself.

### Factors associated with knowledge, attitude and practice of self-care

In this study, it was observed that those with family history of diabetes had statistically higher proportion with good knowledge of self-care compared to those who do not (49.3% Vs 35.2%,  $p = 0.001$ ). Also those that have a diabetic meal plan had good knowledge of diabetes self-care compared to those who do not (52.4% Vs 32.0%,  $p = 0.000$ )

In addition, the present study indicated that educational level of respondents was associated with knowledge ( $p = 0.000$ ). This correlates with the findings of Idongesit *et al.*<sup>[16]</sup> and a KAP study of diabetes in Bangladesh and UAE which stated that knowledge was significantly associated with level of education. Previous studies by Moodley *et al.*<sup>[17]</sup> have also reported similar findings. A likely explanation is that those of a higher academic level (and hence of higher socioeconomic status) have a greater chance of obtaining knowledge from the mass media, books and the internet. In addition, they have fewer barriers in communicating with the health care team, and may have a good grasp of information. Expectedly, patients with no formal education were the least knowledgeable in this research.

In contrast to the report of Adibe and colleagues<sup>[18]</sup> which illustrated no relationship between monthly income and knowledge, the results of this study indicated a significant association of both variables. Patients with higher monthly income are likely to be able to afford their drugs and glucose meters, blood pressure monitoring machine, and other devices necessary for effective management of their disease. They are thus likely to know much about diabetes and attendant complications (such as hypoglycaemia, hyperglycaemia, and hypertension). The combined advantage of being highly educated, access to self-care machines, and more opportunities for exposure to information, could explain the association of self-care knowledge and monthly income.

Significant association in level of knowledge to age, education and family history of diabetes was reported by Anju *et al.*<sup>[19]</sup>

Results from this study showed that, patients with presence of co-morbidities had a statistically significant higher proportion with attitude towards diabetes self-care compared to those who do not ( $p = 0.003$ ). Those who do not smoke ( $p = 0.034$ ), have a family history of diabetes ( $p = 0.020$ ) and have diabetic meal plan ( $p = 0.016$ ), had good attitude compared to their counterparts.

However, Anju *et al.*<sup>[19]</sup> study revealed that increased level of education was significantly associated with insufficient level of attitude. Similarly the findings from Bangladesh and UAE reported that education was not significantly associated with the level of attitude towards diabetes. This was also observed in this present study,

where no association was observed between level of education and attitude. Conventional careless thoughts with over confidence might be the possible reason that there was no change of attitude toward diabetes care among educated people.

In this study, those who do not smoke ( $p=0.000$ ) and do not take alcohol ( $p=0.001$ ) had good self-care practice compared to those who smoke and take alcohol.

The increased duration of diabetes was associated with practice in Anju et al study which was similar to the findings of Adibe<sup>[18]</sup>, and Feleke<sup>[20]</sup> but no association was observed in this study. Adibe et al carried out an investigation in five states (Enugu State, Anambra State, Abia State, Imo State, and Ebonyi State) of south-eastern Nigeria to assess type 2 diabetic patients' knowledge of self-care practices. The study revealed that female patients were significantly knowledgeable in diabetes self-care than their male counterparts ( $t = 7.49$ ;  $P < 0.0001$ ). Knowledge of diabetes self-care was also associated with age ( $F = 81.29$ ;  $P < 0.0001$ ), younger patients (18-35 years) were most likely to be knowledgeable; marital status ( $F = 22.12$ ;  $P < 0.0001$ ), widowed were most likely to be knowledgeable; educational status ( $F = 47.15$ ;  $P < 0.0001$ ), patients who were in or stopped at secondary school were most likely to be knowledgeable; years with diabetes ( $F = 20.39$ ;  $P < 0.0001$ ), patients who had stayed many years with diabetes ( $> 10$  years) were most likely to be knowledgeable; type of hospital ( $t = 4.88$ ;  $P < 0.0001$ ), patients who were receiving treatment in tertiary hospitals were more likely to be knowledgeable. Knowledge of diabetes self-care was not significantly associated with monthly income ( $F = 2.17$ ;  $P = 0.10$ ), but patients in high economic class (monthly income greater than N50,000) were most likely to be knowledgeable; also occupation was not significantly associated with knowledge of diabetes self-care ( $F = 0.9563$ ;  $P = 0.41$ ).

## CONCLUSION

Diabetes, a chronic disease, needs lifelong commitment. Hence, it is vital to encourage self-care practices among diabetics, as these practices help in circumventing or delaying the complications. The self-care practices of individuals are influenced by their knowledge about diabetes; the more they know about their ailment, the more they possess self-management skills. Continuous health education is recommended.

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## CONFLICTS OF INTEREST

The authors declare no conflict of interest

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