

ASSESSMENT OF PATIENTS KNOWLEDGE AND ATTITUDE TOWARDS DIABETES AND ITS RELATIONSHIP WITH GLYCEMIC CONTROL: A CROSS-SECTIONAL STUDY IN A NIGERIAN TERTIARY HOSPITAL

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ABSTRACT

BACKGROUND: It is postulated that increased knowledge of patients about diabetes as well as a positive attitude will lead to improved glycaemic control and better outcome. The aim of this study was to determine the knowledge and attitude of diabetic patients in a tertiary hospital in Enugu and the relationship with their glycaemic control.

METHODS: A cross-sectional study was done using a structured questionnaire to obtain socio-demographic data and assess knowledge and attitude to diabetes on consecutive patients attending the outpatient clinic in a tertiary hospital. Responses were scored with equal weighting. The fasting blood glucose of the patients was measured and recorded.

RESULT: There were 51(60.7%) females and 33 (39.3%) males, with majority (63.1%) in the age range 41-64 years and 32(38.1%) had only primary education. The mean knowledge score was 6.19 ± 2.08 and 33(39.3%) demonstrated good knowledge. Knowledge did not differ between males and females ($p=0.34$), but was highest in those with tertiary education ($p = 0.02$). Positive attitude to the condition was recorded in 63(75%) subjects. There was poor correlation between knowledge and attitude ($r = -0.161$, $p= 0.14$). Those with good knowledge scores were 2 times more likely to have good glycaemic control compared with those with poor knowledge; $OR = 2.015$, $p = 0.02$. There was no significant difference between the glycaemic control of those with good attitude and those with poor attitude ($p=0.08$).

CONCLUSION: Although overall knowledge was poor, patients had a good attitude to their illness. Knowledge, but not attitude was significantly positively associated with glycaemic control.

KEYWORDS: Diabetes mellitus, Knowledge, Attitude, Glycaemic control

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INTRODUCTION

Globally, diabetes is a health problem of public importance as both the incidence and the prevalence of diabetes have been steadily increasing over the past few decades.¹ An estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980.¹ This figure is projected to increase to 629 million by 2045.² The prevalence of diabetes in Nigeria has

risen from as low as 2.2% in 1999³ to figures as high as 5.77% reported as a pooled prevalence from a recent systematic review and meta-analysis of prevalence studies.⁴ The increasing prevalence of diabetes also reflects an increase in linked risk factors such as being overweight or obese.^{1, 2} It has been reported that diabetes has risen faster in low- and middle-income countries including Nigeria than in high-income countries and this trend is expected to continue.²

Knowledge of disease condition is an important aspect of management of chronic diseases like diabetes. A paper by Inzucchi in 2011 rightly

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stated that a well-informed patient will have the best advantage to attain and maintain glycemic and cardiovascular risk factor control.⁵ Hence, education of the patient becomes an important element in the effective management of diabetes.⁶ Knowledge of Diabetes Mellitus- its risk factors, symptoms, as well as complications, is important to control the disease. Knowledge is necessary to guide decisions about lifestyle modification (diet, exercise, weight control), blood glucose monitoring, compliance to treatment, foot and eye care, as well as prevention of microvascular and macrovascular complications.⁷ Studies have shown diabetic patients with knowledge of the disease have the right attitude, and are empowered to take charge of their disease and seek proper health care services⁸ leading to improved treatment compliance and favourable outcomes.

The implication is that with effective education on diabetes care, improved knowledge and attitude of the patient will lead to better control of the disease. This has been widely accepted as an essential part of a comprehensive management of T2DM.⁹⁻¹² In other words, patients who are not adequately informed about the disease will most likely be exposed to diabetic complications, with consequences of higher burdens and high costs of care. In fact, lack of patients' knowledge and poor self-care has been partly blamed for the increasing severity of diabetes annually.¹³ This underscores the need for patients to pursue adequate self-care over time to reduce incidence of diabetic complications and improve quality of life. Knowledge is always known to have an effect on attitude, practice and outcome. It was reported that an investigation on the effect of education to improve knowledge of diabetes self-management on glycemic control produced varied results.¹⁴

On the other hand, findings that assessed knowledge of diabetes among diabetes patients have shown a positive correlation with blood glucose control.¹²⁻¹⁴ Therefore, adequate knowledge of diabetes, its causes, management and effects can help people assess their risk of diabetes, inspire them to seek proper treatment and care, and motivate them to take charge of their disease for their lifetime.^{12, 13} While previous studies in Nigeria have reported low levels of knowledge among T2DM patients in the general

population¹⁴ there is a gap in studies which have identified diabetes related knowledge among diabetes patients in Nigeria where their attitude toward what they know is not assessed. An important factor affecting proper blood glucose control among diabetic patients is their attitude towards the information they have received about their health condition.

A common phenomenon among people with chronic disease in Nigeria is some of them go through the denial stage at the first time they are diagnosed diabetic. Thus, this affects their attitude towards their management of the disease. The stress of being a patient all through their lifetime and having to take drugs daily, brings depression and despair. This study set out to assess through a questionnaire based interview, the knowledge and attitude of patients with diabetes mellitus seen in a tertiary hospital setting in Nigeria. We also sought to find out how patients knowledge and attitude affected the control of their blood glucose.

METHODOLOGY

Study Site

The study was conducted at the diabetes outpatient clinic of the University of Nigeria Teaching Hospital, Ituku/Ozalla, Enugu in the south eastern part of Nigeria. The diabetes clinic is a weekly clinic, which caters for about 50 to 80 patients with diabetes mellitus weekly on referral from other clinics and other hospitals and healthcare facilities. The clinic records about 6 -8 new patients every week.

Study Population

The study population consisted of patients already on treatment for diabetes mellitus for at least 12 months prior to the study. Consecutive patients who fulfilled the inclusion criteria and did not have any of the exclusion criteria were enrolled into the study.

Inclusion criteria was a diagnosis of diabetes mellitus and already commenced treatment for at least 3 months. Non-pregnant, adult (> 18 years) patients who gave informed written consent were enrolled into the study.

Patients who were acutely ill, had metabolic decompensation and those who declined consent were excluded.

Sample Size

The minimum sample size was calculated as follows:

The minimum sample size (Nf) of patients required for the study was calculated using the formula:

$$Nf = n/1 + n/N, \text{ where } n = Z^2 pq / d^2$$

Where Nf = final sample size, n = The desired sample size (when population is greater than 10,000), z = The standard normal deviation, usually set at 1.96, which corresponds to the 95% confidence level, p = proportion of likely patients with diabetes, estimated at 6.8%, q = 1.0-p. = 0.932, d = degree of accuracy desired, 0.05, N = estimation of population size i.e. new patients with diabetes managed in the diabetic clinic annually about 360.

$$n = (1.96)^2 \times 0.068 \times 0.932 / (0.05)^2 = 97.386$$

$$Nf = 97.386 / 1 + (97.386) / 360 = 80.8$$

Minimum sample size = 80.8. A total of 84 patients completed the study.

Study Design

The study was a questionnaire-based cross-sectional study. The questionnaire was developed by the researchers and pre-tested on a pilot of 10 patients. It was administered by 2 trained research

assistants. The questionnaire collected information on demographic data, risk factors for diabetes, knowledge and attitude of the subjects towards diabetes. The questionnaire was adapted from a previously validated questionnaire obtained from literature and modified¹⁵. The questionnaire was administered on 102 patients, but only 84 gave complete answers, giving a response rate of 82.4%. There were 12 several possible correct responses for knowledge and each was given an equal score of one. Other possible responses were allowed and were recorded for each patient, but these were not scored.

The questions that tested knowledge were divided into Knowledge of the patient's diagnosis and the risk factors, knowledge of symptoms and knowledge of complications. There were multiple correct answers, each weighted equally, and the correct answers totalled 12. The scores were not assigned with a Likert scale but using a point scoring system. Only the major risk factors, symptoms and complications of diabetes were included in the questionnaire as possible correct responses and were scored.

Table 1: Study Questionnaire showing sections and scoring of different tested domains of knowledge and attitude

QUESTIONS ON KNOWLEDGE		
A. Knowledge of the diagnosis and risk factors		
Question	Correct Response(s)	Score
1. What are you being treated for?	Diabetes	1
2. What blood sugar measurement is best for making a diagnosis of diabetes?	Fasting Blood Sugar	
3. What factors do you know that can lead to diabetes?	Obesity, Lack of exercise, Family history of diabetes	1 each, Maximum 3
B. Knowledge of symptoms of diabetes		
1. What do you think are the symptoms of diabetes?	Excessive urination, excessive thirst, weight loss	1 each, Maximum 3
C. Knowledge of complications of Diabetes		
1. What do you think are the complications of diabetes?	Kidney failure, Stroke, Blindness/poor vision, Limb loss, Heart failure	1 each. Maximum 3
Total		12
QUESTIONS ON ATTITUDE		
	Correct Response (Yes/No)	
1. Do you think having vegetables and fruits in your diet will improve your diabetes?	Yes	1
2. Do you think that avoiding carbohydrates completely in your diet is good for you?	No	1
3. Do you think that regular exercise can improve your diabetes?	Yes	1
4. Do you think that having diabetes will greatly make you less successful in life?	No	1
5. Do you think that having to control your blood glucose always is a great burden?	No	1
Total		5

The total possible correct responses for knowledge was 12, and subjects who scored 7 and above were regarded as having good knowledge, while those with a score of 6 and below were regarded as having poor knowledge of diabetes. There were a total of 5 possible correct answers for attitude and a score of 3 or more was recorded as a positive attitude towards diabetes. Secondary data was also collected from the case notes. The highest fasting blood glucose recorded in the previous 3 months and the previous 12 months were obtained from the case notes and recorded. The measured FBG on the study date was also recorded.

Ethical considerations

The study was carried out in accordance with the Helsinki Declaration of 1975, as revised in 2000. Ethical approval was obtained from the Ethics Committee of the University of Nigeria Teaching Hospital before the commencement of the study. Informed written consent was obtained from each study participant.

Statistical Analysis

Statistical analysis of the obtained data was done using SPSS v 22. Continuous data were summarised as means and standard deviation and compared with students T test, while categorical data were reported as frequencies and compared with Chi test. A p value of < 0.05 was considered significant. Knowledge and attitude responses were summarised as composite scores and Pearson's correlation coefficient was used to assess the correlations between them and age, fasting blood glucose.

RESULTS

There were 84 respondents made up of 51 (60.7%) females and 33 (39.3%) males. Their ages ranged from 28 to 94 years, 53 (63.1%) being in the age group 41-64 years. The most frequent highest level of education was primary education in 32 (38.1%) and the mean number of years spent in school was 9.96 (7.57) years of schooling (Table 2).

Table 2: Percentage distribution of respondents' socio-demographic characteristics

Variables	Frequency	Percentage (%)	Mean
Age Group(years)			
18-39	4	4.8	
40-64	53	63.1	60.37±10.93
≥ 65	27	32.1	
Gender			
Male	33	39.3	
Female	51	60.7	
Highest education Level			
Primary	32	38.1	
Secondary	18	21.4	
Tertiary	26	31.0	
No formal Education	8	9.5	
Number of years spent in school			
Minimum	0		
Maximum	43		
Major occupation			
Government employed	20	23.8	
Employed with private sector	4	4.8	
Self employed	6	7.1	9.96±7.57
Petty trading/ artisan	17	20.2	
Unemployed (Students)	12	14.3	
Farmers	10	11.9	
Retired	6	7.1	
Clergy	2	2.4	
No response	11	8.4	
Marital Status			
Married	58	69.0	
Widow	20	23.8	

Risk factors for diabetes and clinical features

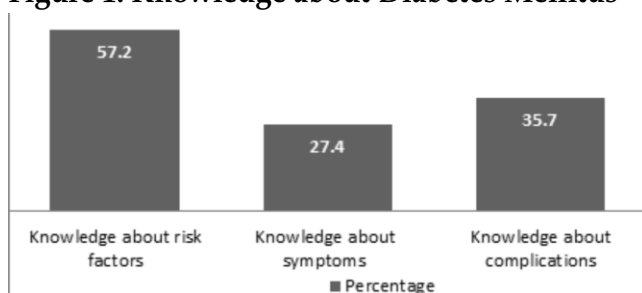
A family history of diabetes mellitus was present in 43(51.2%) of the subjects. Although 19(22.6%) reported that they took some alcohol, significant alcohol intake was present in only 5 of them. Seventeen of them carried out regular physical exercise of up to 30 minutes daily at a frequency of more than 3 times a week.

Knowledge about diabetes

The knowledge about various aspects of diabetes was tested in the subjects. Knowledge of the

causes of diabetes was sought for using several possible responses. Out of all the 84 subjects, 69(82.1%) responded that they knew they were being treated for diabetes mellitus. Knowledge about the major symptoms of diabetes including frequent urination, excessive thirst and weight loss were recorded in 59(70.2%), 46(54.8%) and 32(38.1%) respectively. Using a fasting blood sample for diagnosis was known by 78(92.9%) of the study subjects. The percentage of subjects who had good knowledge of diabetes in various aspects were recorded and are shown in Fig 1.

Figure 1: Knowledge about Diabetes Mellitus



Further details about knowledge of diabetes by the subjects are shown in Table 3.

Table 3: Percentage distribution of respondents' on Knowledge of Diabetes by gender

Knowledge Parameter	Males	Females	Total
Know about what they are being treated for			
Hypertension	16 (48.5)	21 (41.2)	37 (44)
Diabetes*	24 (72.7)	45 (88.2)	69 (82.1)
Malaria	17 (51.5)	19 (37.3)	36 (42.9)
Psychological disorder	0	1 (2.0)	1 (1.2)
Eye disease	2	2	4
Do not know	0	0	0
What blood sugar measurement is mostly used to diagnose diabetes			
Fasting*	33 (100)	45 (93.8)	78 (92.9)
Do not Know	0	3 (6.2)	6 (7.1)
Factors that lead to diabetes			
Obesity*	12 (36.4)	18 (35.3)	30 (35.7)
Lack of exercise*	9 (27.3)	11 (21.5)	20 (23.8)
Smoking cigarette	6 (18.2)	6 (11.8)	12 (14.3)
Excessive sugar intake	22 (66.7)	34 (66.7)	56 (66.7)
Stress	5 (15.2)	10 (19.6)	15 (17.9)
Family history of diabetes*	20 (60.6)	27 (52.9)	47 (56.0)
Alcohol	1 (3.0)	0	1 (1.2)
Do not know	4 (12.1)	9 (17.6)	13 (15.5)
Symptoms of diabetes			
Excess urination*	24 (72.7)	35 (68.6)	59 (70.2)
Thirst*	17 (51.5)	29 (56.9)	46 (54.8)
Dizziness	17 (51.5)	31 (60.8)	48 (57.1)
Tiredness	2 (6.1)	6 (11.8)	8 (9.5)
Weight loss*	13 (39.4)	19 (37.3)	32 (38.1)
Excess hunger	6 (18.2)	8 (15.7)	14 (16.7)
Blurred vision	6 (18.2)	12 (23.5)	18 (21.4)

*Scored

A composite knowledge score was calculated using all the possible correct responses in all aspects of knowledge of diabetes that were tested. The mean knowledge score was 6.19 ± 2.08 . Overall, 33(39.3%) demonstrated good knowledge while 51(60.7%) had poor knowledge about diabetes.

Knowledge about diabetes and socio-demographic characteristics of the subjects

The knowledge scores were compared in males and females. Among the males 39.4% had good knowledge and 39.2% of the females had good knowledge ($p = 0.58$). There was no significant correlation between age and knowledge scores in the subjects ($r = -0.034$, $p = 0.76$). Subjects who were aged 65 years and more had a higher proportion of those with good knowledge (44.4%) than those of other age groups ($p = 0.54$). Those who had been educated up to tertiary level had higher knowledge scores than other levels ($p = 0.02$). These are described in more detail in Table 4 below.

Table 4: Knowledge about diabetes and socio-demographic characteristics of respondents

Parameter	Good knowledge No (%)	Poor knowledge No (%)	Total No (%)	P
Gender				
Male	13(39.4)	20(60.6)	33(100)	0.58
Female	20(39.2)	31(60.8)	51(100)	
Age Group				
18-39	1(33.3)	2(66.7)	3(100)	0.54
40-64	20(37.7)	33(62.3)	53(100)	
>65	12(44.4)	15(55.6)	27(100)	
Educational Level				
No formal education	1(16.7)	5(83.3)	6(100)	0.02*
Primary Level	8(25)	24(75)	32(100)	
Secondary level	7(38.9)	11(61.1)	18(100)	
Tertiary level	16(61.5)	10(38.5)	26(100)	

*Significant values

Similarly, there was a significant positive correlation between total number of years spent in school and the knowledge scores of the subjects ($r = 0.25$, $p = 0.034$).

Attitude towards diabetes by the study subjects

There were 69 (82.1%) subjects who responded that they believed that taking enough vegetables will improve their outcome, while only 31(36.9%) responded that regular exercise helps to improve their diabetic control. The mean score for attitude was 3.23 ± 1.10 . Positive attitude to the condition was recorded in 63(75%) subjects, while 21(25%) had a negative attitude using composite scores for attitude. Further parameters assessed are as shown in Table 5.

Table 5: Attitude of the respondents toward diabetes

Parameter	Male No (%)	Female No(%)	Total No(%)	P
Think that taking vegetables and fruits in your diet will improve your diabetes	26(78.8)	43(84.3)	69 (82.1)	0.36
Think that avoiding carbohydrates completely in your diet is good for you	2(6.1)	4(7.8)	6 (7.1)	0.56
Think that regular exercise can reduce your diabetes	12(36.4)	19(37.3)	31(36.9)	0.56
Having diabetes will greatly make you less successful in life	8(24.2)	19(37.3)	27(32.1)	0.16
Think that having to control your blood glucose is a great burden	16(48.5)	29(56.9)	45(53.6)	0.30

Socio-demographic variables and attitude towards diabetes

There was no significant correlation between attitude scores and age of patients ($r = -0.07$, $p = 0.52$). The attitude scores did not also differ between the males and females ($p = 0.35$). The scores for attitude also did not correlate significantly with years of schooling ($r = -0.16$, $p = 0.14$).

Relationship between knowledge and attitude

There was poor correlation between knowledge scores and attitude scores ($r = -0.161$, $p = 0.14$).

Glycemic control of the study subjects

The mean fasting blood glucose for the study subjects recorded on the study day was 153.2(72.3mg/dl). The mean of the highest FBG in the last 3 months was 207.5(99.2) mg/dl and in the last 12 months was 227.9 (100.8) mg/dl. The glycemic control of the subjects was investigated, using a cut-off of FBG < 130mg/dl as good control. There were 36 (42.9%) subjects with good glycaemic control.

Comparison of level of Fasting Blood Glucose and Knowledge of the subjects

There was significant negative correlation between the highest FBG values over the last 3 months ($r = -0.313$, $p = 0.006$) and their knowledge scores and also between the highest FBG levels over the previous 12 months and their knowledge scores ($r = -0.405$, $p < 0.001$). Students T test was used to compare the mean knowledge scores in subjects with good glycaemic control and those with poor glycaemic control. The mean knowledge scores for those with good control was

6.8(2.3), while in those with poor control was 5.6(1.8) and the difference was statistically significant ($p = 0.02$, $CI = 0.2 - 2.1$). Those with good knowledge scores were also found to be 2 times more likely to have good glycaemic control compared with those with poor knowledge ($OR = 2.015$, $p = 0.02$).

Comparison of level of Fasting Blood Glucose and Attitude of the subjects

There were no significant correlations between any of the measured fasting blood glucose levels with attitude scores ($p = 0.96$, $p = 0.96$, $p = 0.63$). Using students T test, there was no significant difference between the mean attitude scores of subjects with good glycaemic control (3.3 ± 1.0) and those with poor glycaemic control (3.1 ± 1.2), $p = 0.395$. Those who had a positive attitude towards diabetes did not differ significantly from those who did not in terms of their glycaemic control ($p = 0.08$).

DISCUSSION

The study examined the knowledge and attitudes of diabetes patients towards diabetes care and explored their relationship with glycemic control, using a cohort of patients attending outpatients' clinic in a tertiary healthcare facility. On the basis of the composite measure, findings suggest an overall poor knowledge of the patients about diabetes, in terms of the causes (risk factors), symptoms and diabetic complications. At a mean composite score of 6.19 ± 2.08 , less than half (39%) of the participants demonstrated good knowledge about diabetes while over 60% showed poor knowledge. The level of knowledge demonstrated by the participants did not vary significantly across the demographic categories, either by gender or age. Findings further showed that patients with higher education had better knowledge about diabetes care.

These findings are consistent with previous studies which have reported poor knowledge of diabetes among patients with T2DM, in both developed and developing countries.^{10,16-21} A study conducted recently in the same state by Ndibuagu et al.,¹⁷ documented similar findings where it was reported that less than only 35% of studied diabetes patients demonstrated good knowledge of diabetes, particularly in terms of the risk factors or causes. A previous study in Umuahia, also in

south east Nigeria reported that 57% of the patients showed poor knowledge of diabetes care, with only about 7.5% of the participants demonstrating good knowledge. In the same study, more than half (56.6%) of the patients showed good attitude towards diabetes care.¹⁸

A comparable study by Islam et al (2015) in Bangladesh showed that less than half (45.6%) of studied patients had poor knowledge of diabetes with a significant association between knowledge of diabetes with education, family history and duration of diabetes.¹⁰ Similarly the study by Saleh and colleagues, on newly diagnosed diabetes patients showed that only 16% of the patients had good knowledge while up to 66% demonstrated moderate knowledge of diabetes care, understandably given that the patients were newly diagnosed.¹⁹ These findings emphasise the general low level of knowledge about diabetes care among affected patients and the population at risk.

Knowledge of a disease condition is a right step in its effective management. Attitude which is a settled way of thinking or feeling about something affects how people accept the knowledge they have gathered about diabetes. In Nigeria, some patients tend to "spiritualize" every disease that affects them which affects how they accept or manage that disease. Positive attitude towards the knowledge a patient has gathered about diabetes plays a major role in its effective management. If a patient positively accepts the disease condition after having an adequate knowledge, the individual will implement medical and lifestyle recommendations by the health care providers. It will also enhance diabetes self-management.

There are a lot of myths and beliefs about diabetes in our environment, largely driven by ignorance and superstition. The concept of having an incurable, albeit manageable illness is generally a bitter pill to swallow in a largely illiterate society. Patients with diabetes have been reported to exhibit fears about the future and a general distaste because of the predominant misconceptions and superstitions about the disease and its management.²² It is arguable that these misconceptions lead to a strong aversion to seeking care and poor attitude to their condition.

This is why the concept of diabetes education in the care of patients cannot be over-emphasized. In this study, positive attitude to the diabetes was recorded in 63 (75%) subjects, while 21 (25%) had a negative attitude using composite scores for attitude. Thus, negative attitude will result in missing of appointments, non-adherence to medical prescriptions and lifestyle changes and ultimately result in poor glycaemic control. This assertion corroborates with a report that some resort to spiritual remedies because they believe their disease resulted from poison or evil spirit and thus do not comply with recommendations of the healthcare providers.²³ Knowledge however, has a strong influence on attitude, since most people's belief and thought pattern are as a result of their exposure early in their life. Thus, a concerted diabetes education for patients and their family members will certainly help to shape their attitude in the positive direction.

Given that good knowledge would obviously inform positive attitude towards self-care for diabetes, patients that demonstrated good knowledge in this study were similarly disposed to positive attitudes, however this was not statistically significant as there was only a weak correlation between knowledge and attitude ($r=-0.161$, $p=0.14$). It is expected that knowledge would lead to lead to better attitude that would ultimately translate to positive blood glucose level. This suggests that attitude may have been influenced by other factors, not captured in the study. This is important as it may negatively impact on the results of diabetes education in our patients. It was however not surprising that glycaemic control was adequate within the category of participants that showed good knowledge of diabetes care.

Our study further explored the relationship between the patients' knowledge and attitude towards diabetes and their glycaemic control. Findings show that while the patients' knowledge about diabetes care was strongly associated with their glycaemic control, their attitudes towards diabetic care did not show similar association. The patients with good knowledge of care were found to have 2 times better glycaemic control compared to those with poor knowledge who were found to have poor glycaemic control. This finding is consistent with those of similar studies in the past which demonstrated similar correlations.¹⁰ The study in Bangladesh by Islam et al. reported a

negative correlation between knowledge of diabetes and glycaemic control,¹² which indicated association as in this study.

Our study also demonstrated a negative correlation between knowledge and fasting blood glucose (FBG), i.e. the higher the knowledge of diabetes among our patients, the lower their FBG. Likewise, those with good knowledge were two times more likely to have good glycaemic control compared to those with poor knowledge (OR=2.015). This may be explained by the high educational level of those with good knowledge of which majority of our patients had attained tertiary education. This was similarly reported by Fatema et al that good knowledge correlated strongly with education.²⁴ Formal education may make health education easier to assimilate, which translates to better management and control of blood glucose levels as our study showed a significant difference in the knowledge score between patients with good and poor glycaemic control ($p=0.02$). Therefore, health awareness campaigns need to be redesigned to suit diabetic patients of no/lower educational background to improve their blood glucose control. The small sample size used in the study may also have contributed to the inability to detect a strong association between attitude and glycaemic control in the patients.

There was poor correlation between knowledge scores and attitude scores ($p = 0.14$). This differs from established data that good knowledge correlates strongly with attitude.^{24, 25} Kanwal et al showed that patients who were more educated, had better knowledge which was associated with positive attitude regarding their illness.²⁵

Despite the good attitude (75%) we observed in our study, there was no correlation between attitude and FBG. Indeed, good attitude surpassed good knowledge in the study, hence even some of those with poor knowledge still showed a good attitude to their illness. In the study by Kanwal et al, there was no difference in the attitude of those with good versus bad glycaemic control ($p=0.004$),²⁵ which is contrasting with our findings. This gap in our study was surprising but has also been reported by Maina et al where 49.3% had good knowledge of diabetes, but poor practices.²⁶ Also, Herath et al observed over 75% of their participants had

satisfactory knowledge but their attitude towards diabetes was very poor (88%).²⁷ This suggests that knowledge does not always result in behaviour change.²⁸ Herath et al identified 'improper and uncoordinated health education' as a plausible reason for their findings, and proffered innovative educational models to change the attitude of the general public.²⁷

LIMITATIONS OF THE STUDY

This study assessed patient's knowledge and attitude towards diabetes and its relationship with their glycaemic control in a Nigerian tertiary hospital. The study was not able to obtain data that were missing in the patient's case notes due to incomplete documentation. In addition, the study was limited to one site and a sample size of not more than 84 participants, hence, findings may not represent the general population of diabetic patients in Nigeria. However, as described in previous section, the mix of patients is diverse considering the status of the facility as a teaching hospital attending to a wide variety of patients from the states and surroundings.

The practices of the patients were not documented in this study to evaluate the effect of knowledge on practices. It is important to note that the study did not consider when the patients were diagnosed of diabetes.

Finally, as a descriptive survey, the study could not be used to infer the factors causing the potential association between knowledge and glycaemic control how they accepted their condition on the first day of diagnoses especially if they were already having diabetic complications before they were confirmed as diabetic in a health facility was not documented.

CONCLUSION

The study has demonstrated poor knowledge but a positive attitude towards diabetes in our patients. Knowledge about diabetes was significantly associated with their glycaemic control. There was no significant association however between attitude and glycaemic control, hence patients still had poor control despite good attitude towards the illness. There is an urgent need to introduce and inculcate innovative patient directed continuous education if the target of proper management of diabetes mellitus is to be achieved in Nigeria.

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