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(RESEARCH ARTICLE)

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An assessment of perceived patient satisfaction and glycaemic control pattern among adult diabetics attending a tertiary care clinic in north central Nigeria

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Abstract

Background: Patient satisfaction as one of the indicators of patient centered care, has taken a central point in the management of chronic diseases such as diabetes mellitus.

Aim/objectives: This study aimed to assess perceived patient satisfaction and glycaemic control among adult diabetics attending the General Out-Patient Clinic.

Methodology: This was a cross-sectional study conducted between September 2021 and November 2021 involving 134 adult diabetic patients selected by systematic random sampling. Data was collected by interviewer administered questionnaire. Height, weight, blood pressure measurements and fasting blood glucose assay were done. Data was analyzed with the Statistical Package for Social Sciences (SPSS) version 25. Analysis was done at the 5% level of significance with $p < 0.05$ considered statistically significant.

Results: A larger population (81) of the participants were females representing 60.4%. The mean age of the patients was 51.82 ± 12.19 years. The level of perceived patient satisfaction and glycaemic control were 88% and 37.3% respectively. Blood pressure status was the only independent predictor for patient satisfaction. Ethnicity, level of education, occupation and average monthly income showed statistically significant relationship with glycaemic control. Furthermore, comorbidity, perceived patient satisfaction, medication adherence, BMI and blood pressure status also showed statistically significant association with glycaemic control.

Conclusion: Less than 40% of participants achieved good glycaemic control despite high level of perceived patient satisfaction (88%) in this study.

Keywords: Diabetes mellitus; Glycaemic control; Patient satisfaction; Tertiary hospital; Nigeria

1. Introduction

Patient satisfaction has been recognized to have effect on health outcomes of metabolic disorders and chronic illnesses [1-3] such as Diabetes mellitus. Diabetes mellitus (DM), is assuming an epidemic proportion and is one of the biggest global health challenges of the 21st century [4-5]. It has been considered to be a chronic disease in which only a little has been achieved in terms of prevention and control, despite its burden. The goal of management of diabetes is to achieve glycaemic control and to prevent early onset of micro and macro vascular complications as well as the achievement of quality of life and longevity equivalent to people without diabetes [6]. Good glycaemic control however, is not an easy

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task for many patients. It is well known that, even in clinical trials and routinely in clinical practice, the majority of patients fail to achieve good glycaemic control [7].

Sendekie et al., in a multicentre cross sectional study of 403 patients at a tertiary diabetic clinic in Northwestern Ethiopia found that the prevalence of good glycaemic control was 25.1%. In their study, patients with normal BMI and those treated with premixed insulin achieved better glycaemic control compared with the obese and those on NPH insulin [8]. A lebanese prevalence study using HbA1c reported good glycaemic of 37% [9]. However, a study by Iloh et al in a cross sectional study in Umuahia, Nigeria reported a higher glycaemic control prevalence of 61.7% [10].

Sociodemographic characteristics are one of the identified factors influencing glycaemic control. A retrospective study by Pettus et al in USA, reported good glycaemic control in older persons [11], which is congruent to findings in a meta-analysis by Fina Lubaki and colleagues where those older than 60 years also had better glycaemic control [12]. Conversely a review by Cheng et al in Singapore reported younger people with better glycaemic control [13]. Odoh et al in Jos and Adamu et al in Zaria, Nigeria found that women had poorer glycaemic control than men in their studies [14, 15].

Some studies have found a relationship between anthropometric indices and glycaemic control. In an Australian study, a significant inverse correlation between glycated haemoglobin (HbA1c) and BMI was found [16]. Similar observation was reported by Chetoui et al in Morroco and Caballero et al in US and they attributed the findings to their lifestyle, diet, and other specific factors in different nations [17, 18]. Statistically significant relationship between good glycaemic control and normal BMI was found in studies in Singapore [13] and Nigeria [14] but was inconsistent with some other studies in India [19] and Morocco [17].

Patient satisfaction is one of the concepts used to assess and interpret patient centered care. It can be measured using Diabetic Treatment Satisfaction Questionnaire (DTSQ) that can be affected by more than provider performance [20]. Generally, level of patient satisfaction among studied population are usually high both in developed and developing countries but it's correlation to patient outcome and quality of care, and quality of life is not clearly understood [21,22]. Chen et al assessed relationship between patient satisfaction and patient reported health out-comes and reported 89.3% level of satisfaction (28.2% as optimal, 61.1% average and 10.7% poor) among the studied population [23]. In that study, older age, female and patient with high socioeconomic status reported high satisfaction level. However, patient with poor mental health, male, younger age, black African/American and those with at least two emergency visits were associated with poor satisfaction level. Umoke A and colleague in a descriptive study carried out in secondary health facilities in Ebonyi State, South east Nigeria showed an association between patient satisfaction and quality of care [24].

Patient satisfaction measurement has become a veritable tool in the measurement of quality of care and quality improvement not only in developed nations but also in developing nations like Nigeria. It is one of the key tools used to assess patient centered care and quality of care. It also aids in healthcare utilization and reduces litigation against healthcare provider [25]. Other importance of patient satisfaction in healthcare services include influence on medication adherence, health promotion and education and good health outcome [18].

There is, however, paucity of local studies that assessed patient satisfaction and treatment outcome. Hence, this study aimed to assess perceived patient satisfaction and glycaemic control among adult diabetics attending the General Out-Patient Clinic. Specifically, the study assessed the prevalence of good glycaemic control, determined the association between glycaemic control and participants demographics and assessed perceived patient satisfaction and its association with glycaemic control.

2. Methodology

2.1. Study area

The study was conducted in the General Out-Patient Clinic (GOPC) of Federal Medical Centre (FMC), Makurdi, Benue State. Benue State is located in North Central Nigeria and its capital is Makurdi an urban town. Federal Medical Centre, Makurdi is the one out of two tertiary health institutions in Makurdi.

2.2. Study design

The study was a hospital based cross-sectional analytical study.

2.3. Study population

The study population were made up of diabetics, aged 18 years and above that attended the General Out-patient Clinic who had been on treatment and had been consistent with follow up for at least three (3) consecutive months prior to the time of study.

2.4. Estimation of sample size

The minimum sample size required was calculated using the Leslie Fisher's formula for single proportion [26].

$$N = Z^2pq/d^2$$

Where
N = Minimum sample s
Z = A constant at 95% confidence level = 1.96
P =Prevalence of variable of interest which is patient satisfaction to care in Jos (88.3%) [27]. =0.883%.
q = I – p (i.e. 1 – 0.883) = 0.117
d = desired precision of 5% = 0.05

$$N = (1.96)^2 (0.883 \text{ X } 0.117)/ (0.05)^2$$

$$= 158.4$$

$$= \sim 158.0$$

However, the study population for this study is less than 10,000. Hence, the final sample estimate, nf, for proportions with population less than 10,000 was calculated using the formula given below [26].

$$\text{nf} = \frac{n}{1 + (\text{n}) / (\text{N})}$$

Where,
nf = desired sample size when population is less than 10,000
n = the desired sample size when the population is more than 10,000 = 158
N = the estimate of the study population for the period of study =528 (Number of adult diabetic patients expected to visit within a period of three months).
Hence nf = 158/1+158/528=121.6

This was approximated to 122.

Ten percent (10%) of the sample size for estimated non-response and missing questionnaire was added to the total estimated sample size. Therefore, a total number of 134 patients were recruited for the study.

2.5. Sampling technique

A systematic sampling method was used and a sample frame was calculated in approximation to the number of diabetics that presented at the GOPC within three months of the study.

2.6. Method of data collection

A combination of structured interview and clinical measurements were used for data collection. A pre-test of the questionnaire was conducted at the National Health Insurance Scheme (NHIS) Clinic of the hospital where it was administered to 13 diabetic patients recruited consecutively.

2.7. Study tool

The questionnaire was in four sections. The first section collected information about the socio-demographic characteristics, second section was relevant history. The third part contained the Diabetic Treatment Satisfaction Questionnaire status version (DTSQs) [28]. It consist of eight (8) items scored on 7-points scales. Six items (question 1 to 6) measures treatment satisfaction (dealing with current treatment, convenience of the treatment, flexibility, satisfaction with own understanding of their diabetes, how likely they are to recommend their present treatment, and

how satisfied they were to continue with their treatment). These are summed to produce a total treatment satisfaction score of between 0 and 36. Score of 24 and above were considered as satisfied (high and medium level satisfaction combined) while score of 23 and below were considered non satisfied or dissatisfied.

Question 7 and 8 of DTSQs which correspond to question 19 & 20 of the study questionnaire were concerned with perceived frequency of hyperglycemia and perceived frequency of hypoglycemia respectively and were treated separately from satisfaction items and from each other. Each item scores from 0 to 6. Score of 3 and below signify good perceived glucose control while higher scores signifies poor perceived glucose control which were function of glycaemic control burden [28, 29]. The last section was for Physical examination (height, weight and blood pressure measurement) and laboratory result (fasting blood glucose) measurement were recorded.

2.8. Measured variables

- **Body weight measurement:** The weighing scale (ZT 120 Health Scale) was placed on a flat surface. Zero mark calibration was ensured before each measurement. Participants were requested to remove their footwear and empty their pockets of accessories such as cell phones, keys and pocket dairies. Study participants stood still on the weighing scale at the center of the scale's platform to distribute weight evenly to both feet. The weight measurements were recorded with the resolution of the scale to the nearest 0.1 kilogram (kg) [30]. The average of three measurements were taken.
- **Height measurement:** The standing height of study participants were measured using a stadiometer (ZT 120 Health Scale). They were asked to remove their footwear and headgear. The back of the head (occiput), buttocks and heels were against the vertical board of the stadiometer. The investigator asked them to look straight so that the top of the external auditory meatus (ear canal) were leveled with the inferior margin of the bony orbit (check bone). The head piece of the stadiometer were lowered so that the hair (present) pressed flat. "Height measurments'' recorded to the resolution of the height rule of the nearest 0.1 centimetre (cm) [30]. The average of three measurements were taken. The body mass index (BMI) was calculated using the formula:

$$\text{BMI} = \text{Wt (kg)/Height 2 (m2)}$$

The individuals were classified on the basis of their BMI into underweight (BMI< 18.5), normal (BMI of 18.5 to < 25), overweight (BMI of 25 to < 30) and Obese (BMI ≥ 30).

Blood pressure measurement: Blood pressure were measured using Accuson (R) mercury sphygmomanometer and a 3M Littman (R) stethoscope. Blood pressure were measured with the subject seated and relaxed for about five minutes, with back support, legs uncrossed and the arm supported at heart level. An appropriate sized cuff which covered 2/3rd of the upper arm length was tied on the patients arm. The stethoscope placed gently over the brachial artery at the point of maximal pulsation in the cubital fossa. Then the cuff inflated rapidly to about 30mmHg above the palpated systolic pressure and deflated at a rate of 2mmHg per second during which the Korotkoff first and fifth sounds were heard which correspond to systolic and diastolic blood pressure respectively. The average of two blood pressure measurements taken at an interval of at least 2 minutes was used [31]. Based on blood pressure readings, participants were classified as having (1) Normal blood pressure when SBP < 130mmHg and DBP < 90mmHg or (2) Hypertension when SBP ≥ 130mmHg and/or DBP ≥ 90mmHg [32].

- **Fasting blood glucose measurement**: This was measured using an Accu check glucometer by the laboratory assistant at the GOPC side laboratory. Patients were expected to have abstained from food at least eight hours before the measurement. This was possible because most diabetic patients on follow up visits usually present fasted in order to have a fasting blood glucose performed. The procedure was explained to the patients. The pulp of the patients' finger were cleaned (after ensuring that the patient had fasted) using a spirit swab then pierced with a lancet. The first blood on the finger following the prick was cleaned with a dry swab then the subsequent one to two blood dropped into one of the testing strips which had been fixed to the meter. The meter then displayed the results within five seconds. The result of the FBG were taken and recorded. Those values less or equal 7 mmol/l (126mg/dl) were considered controlled while uncontrolled FBG were those values greater than 7mmol/l (126md/dl) [33].

2.9. Data analysis

Data obtained was analysed using the Statistical Package for Social Sciences (SPSS Version 25) for analysis. Results were presented using frequency, tables and charts. Qualitative variables were expressed as proportions while quantitative variables were expressed as mean and standard deviation. Chi-square test and fisher exact test were used to test association between dependent variable and independent variables. A multiple logistic regression analysis was done

with all the variables that meet the criteria (0.1%) from the bivariate analysis on contingency or association tables. Adjusted Odds ratio (OR) and its 95% confidence interval (CI) were calculated. All analysis were done at the 5% level of significance P< 0.05 considered statistically significant.

2.10. Ethical approval

Ethical approval was gotten from Federal Medical Centre, Makurdi, Health Research Ethics Committee with number FMH/FMC/MED/105/1/X. Written informed consent was obtained from the participants.

3. Results

Table 1 shows the socio-demographic characteristics of the participants. The mean age was 51.52+12.19 years, with a higher proportion aged 40-50 [40(29.9%)]. Majority of the participants were females [81(60.4%)]. Those with tertiary education [52(38.8%)] made up the highest proportion. One-third of the participants [45(33.6%)] were unemployed. Fourty-seven (35.1%) of the participants had average monthly income less than 18,000.00 naira.

Relevant diabetes history and clinical measurements revealed that majority of the participants [55(41.0%)] had duration of illness of more than 10 years and over two third of the participants [102(76.1%)] had a pill burden of more than two types of medication. Fifty-seven of the participants [57(42.5%)] had comorbidities and majority [121(90.3%)] used out of pocket financing. Only 37 (27.6%) had normal weight. The rest were either overweight or obese. Blood pressure control was recorded in 67.9% of the participants. See table 2.

Figure 1 shows pie chart of level of glycaemic control of the participants. Nearly two-third of the participants [84(62.7%)] had not achieved good glycaemic control.

Bar chart showing level of perceived patient satisfaction revealed that majority of the participants [118(88%)] were satisfied with care (Figure 2).

Table 3A and 3B shows association between glycaemic control and studied variables. Relationship between glycaemic control and level of education (Fisher's exact=11.12, p=0.010), occupation (Fisher's exact=14.37, P=0.002) and income (Fisher's exact=17.56, P<0.01) were found to be statistically significant.

Satisfaction was found in over 70% of the participants on all the socio-demographic measures. However, there was no statistically significant association between satisfaction and socio-demographic variables.

All participants [50(100.0%)] who had glycaemic control and normal weight [37(100.0%)] were satisfied with care. This was not the case with those who did not achieve glycaemic control [68(81.0%)], overweight [48(92.3%)] and Obese participants [33(73.3%)]. Participants [89(97.8%)] who had blood pressure controlled were satisfied with care when compared to those without blood pressure control [29(67.4%). Unlike demographic variables, there was statistically significant relationship between patient satisfaction and glycaemic control, BMI and Blood pressure control (Tables 4A and 4B**).**

Table 5 shows a regression model predicting satisfaction. Here, only blood pressure status was an independent predictor of perceived patient satisfaction. Those with controlled blood pressure were nearly fifteen times more likely to be satisfied with care received [(AOR = 14.67, CI = 2.78 – 77.34, p = 0.002)] compared with those without blood pressure control. Level of education, comorbidity and anti-diabetic medication were not independent predictors of perceived patient satisfaction.

Table 1 Socio-demographic characteristics of respondents

Variables	Frequency	Percent (%)
Age (in years)		
18-30	7	5.2
31-40	19	14.2
41-50	40	29.8
51-60	30	22.4

>60	38	28.4
Mean= 51.52 +/- 12.19		
Gender		
Male	53	39.6
Female	81	60.4
Marital status		
Single	11	8.2
Married	94	70.1
Separated/divorced	4	3.0
Widowed	25	18.7
Ethnic group		
Tiv	63	47.0
Idoma	28	20.9
Igede	18	13.4
Hausa	16	11.9
Others	9	6.7
Religion		
Christianity	109	81.3
Islam	24	17.9
Others	1	.7
Level of Education		
No formal education	38	28.4
Primary	10	7.5
Secondary	34	25.4
Tertiary	52	38.8
Occupation		
Unemployed	45	33.6
Unskilled labour	11	8.2
Skilled labour	36	26.9
Professional	42	31.3
Average monthly income (in Naira)		
Less than 18,000	47	35.1
18,000 - 49,000	15	11.2
50,000 - 99,000	43	32.1
1000,000 and above	29	21.6

Table 2 Relevant history of diabetes mellitus and clinical measurements

Variables	Frequency	Percent
Duration of illness		
3-11 months	6	4.5
1-5 years	37	27.6
6 - 10 years	36	26.9
More than 10 years	55	41.0
Pill burden		
Less or equal 2	32	23.9
More than 2	102	76.1
Morbidity		
No co-morbidity	50	37.3
Comorbidity	57	42.5
Multi-morbidity	27	20.1
Mode of healthcare financing		
Health Insured	13	9.7
Out of pocket	121	90.3
BMI Status		
Normal weight	37	27.6
Overweight	52	38.8
Obese	45	33.6
Blood pressure status		
Controlled	91	67.9
Not controlled	43	32.1

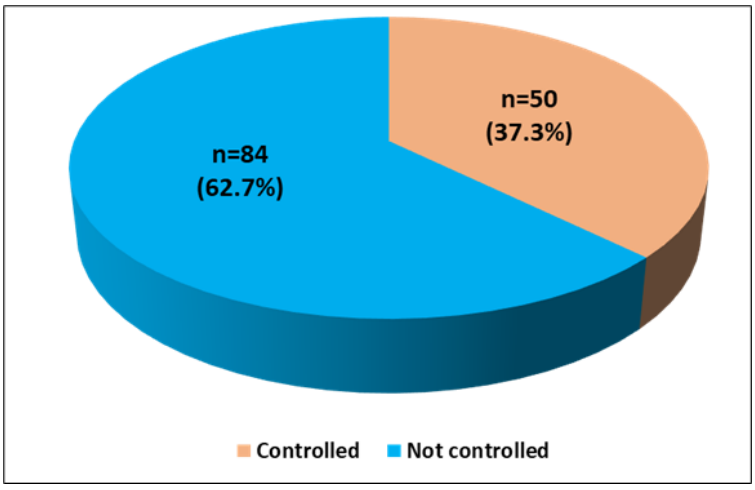
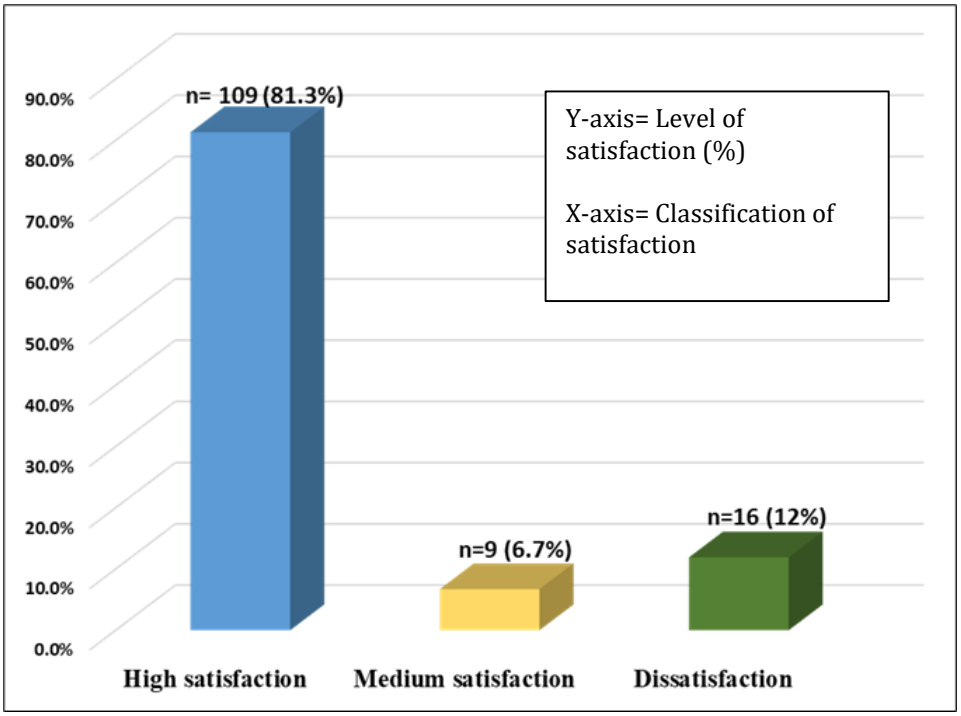


Figure 1 Glycaemic control status of the respondents



SATISFACTION = High+ Medium satisfaction, DISSATISFACTION= Dissatisfied

Figure 2 Level of perceived patient satisfaction

Table 3 Association between glycaemic control and studied variables

Table 3A					
Variables	**Glycaemic control**		**Test Statistic**	**df**	**p-value**
	Controlled n(%)N=50	**Uncontrolled n(%)N=84**			
Age (in years)			Fisher's exact=1.98		0.757
≤30	3(42.9)	4(57.1)			
31-40	7(36.8)	12(63.2)			
41-50	16(40.0)	24(60.0)			
51-60	13(43.3)	17(56.7)			
>60	11(28.9)	27(71.1)			
Gender			$\chi 2$=3.04	1	0.081
Male	15(28.3)	38(71.7)			
Female	35(43.2)	46(56.8)			
Marital status			Fisher's exact=5.77		0.110
Single	3(27.3)	8(72.7)			
Married	41(43.6)	53(56.4)			
Separated/divorced	0(0.0)	4(100.0)			
Widowed	6(24.0)	19(76.0)			

Ethnic group			Fisher's exact=11.12		0.022*
Tiv	21(33.3)	42(66.7)			
Idoma	17(60.7)	11(39.3)			
Igede	7(38.9)	11(61.1)			
Hausa	2(12.5)	14(87.5)			
Others	3(33.3)	6(66.7)			
Religion			Fisher's exact=4.03		0.080
Christianity	45(41.3)	64(58.7)			
Islam	5(20.8)	19(79.2)			
Others	0(0.0)	1(100.0)			
Level of education			Fisher's exact=11.12		0.010*
No formal education	12(31.6)	26(68.4)			
Primary	1(10.0)	9(90.0)			
Secondary	9(26.5)	25(73.5)			
Tertiary	28(53.8)	24(46.2)			
Occupation			Fisher's exact=14.37		0.002*
Unemployed	11(24.4)	34(75.6)			
Unskilled labour	5(45.5)	6(54.5)			
Skilled labour	9(25.0)	27(75.0)			
Professional	25(59.5)	17(40.5)			

*statistically significant

Table 3 B					
Variables	**Glycaemic control**		**Test Statistic**	**df**	**p-value**
	Controlled n(%)N=50	**Uncontrolled n(%)N=84**			
Average monthly income (in Naira)			Fisher's exact=17.56		<0.01*
Less than 18,000	11(23.4)	36(76.6)			
18,000 - 49,000	3(20.0)	12(80.0)			
50,000 - 99,000	16(37.2)	27(62.8)			
1000,000 and above	20(69.0)	9(31.0)			
			$\chi 2$=1.68	1	0.195
Health insured	7(53.8)	6(46.2)			
Out of pocket	43(35.5)	78(64.5)			
Duration of illness			Fisher's exact=2.70		0.446
3-11 months	3(50.0)	3(50.0)			
1-5 years	17(45.9)	20(54.1)			
6 - 10 years	13(36.1)	23(63.9)			
More than 10 years	17(30.9)	38(69.1)			

Pill burden			χ2=0.00	1	0.980
Less or equal 2	12(37.5)	20(62.5)			
More than 2	38(37.3)	64(62.7)			
Morbidity			χ2=10.09	2	0.006*
No co-morbidity	23(46.0)	27(54.0)			
Comorbidity	24(42.1)	33(57.9)			
Multi-morbidity	3(11.1)	24(88.9)			
Perceived satisfaction			χ2=10.81		<0.01*
Satisfaction	50(42.4)	68(57.6)			
Dissatisfaction	0(0.0)	16(100.0)			
Medication adherence			χ2=102.32	1	<0.01*
Adherence to anti-diabetic medication	47(90.0)	5(9.6)			
Non-Adherence to anti diabetic medication	3(3.7)	79(96.3)			
BMI Status			χ2=8.84	2	0.012*
Normal weight	20(54.1)	17(45.9)			
Overweight	20(38.5)	32(61.5)			
Obesed	10(22.2)	35(77.8)			
Blood pressure status			χ2=9.47	1	0.002*
Controlled	42(46.2)	49(53.8)			
Not controlled	8(18.6)	36(81.4)			

Table 4 Association between patient satisfaction and studied variables continued

Table 4 A					
Variables	**Satisfaction**		**Test Statistic**	**df**	**p-value**
	Satisfaction n(%)N=118	**Dissatisfaction n(%) N=16**			
Age (in years)			Fisher's exact=4.82		0.264
≤30	7(100.0)	0(0.0)			
31-40	19(100.0)	0(0.0)			
41-50	34(85.0)	6(15.0)			
51-60	27(90.0)	3(10.0)			
>60	31(81.6)	7(18.4)			
Gender			χ2=0.13	1	0.714
Male	46(86.8)	7(13.2)			
Female	72(88.9)	9(11.1)			
Marital status			Fisher's exact=1.99		0.551
Single	10(90.9)	1(9.1)			

Married	84(89.4)	10(10.6)			
Separated/divorced	3(75.0)	1(25.0)			
Widowed	21(84.0)	4(16.0)			
Ethnic group			Fisher's exact=3.10		0.525
Tiv	56(88.9)	7(11.1)			
Idoma	25(89.3)	3(10.7)			
Igede	17(94.4)	1(5.6)			
Hausa	12(75.0)	4(25.0)			
Others	8(88.9)	1(11.1)			
Religion			Fisher's exact=2.90		0.266
Christianity	98(89.9)	11(10.1)			
Islam	19(79.2)	5(20.8)			
Others	1(100.0)	0(0.0)			
Level of education			Fisher's exact=6.77		0.062
No formal education	30(78.9)	8(21.1)			
Primary	9(90.0)	1(10.0)			
Secondary	29(85.3)	5(14.7)			
Tertiary	50(93.2)	2(3.8)			
Occupation			Fisher's exact=6.88		0.058
Unemployed	35(77.8)	10(22.2)			
Unskilled labour	11(100.0)	0(0.0)			
Skilled labour	32(88.9)	4(11.1)			
Professional	40(95.2)	2(4.8)			
Average monthly income (in Naira)			Fisher's exact= 4.35	3	0.211
Less than 18,000	38(80.9)	9(19.1)			
18,000 - 49,000	15(100.0)	0(0.0)			
50,000 - 99,000	38 (88.40)	5(11.6)			
1000,000 and above	27(93.1)	2(6.9)			
Mode of healthcare financing			$\chi 2$=0.16	1	0.687
Health Insured	11(84.6)	2(15.4)			
Out of pocket	107(88.4)	14 (11.6)			

Table 4B					
Variables	**Satisfaction**		**Test Statistic**	**Df**	**p-value**
	Satisfaction n(%)N=118	**Dissatisfaction n(%)N=16**			
Duration of illness			Fisher's exact=2.86		0.387
3-11 months	6(100.0)	0(0.0)			
1-5 years	35(94.6)	2(5.4)			
6 - 10 years	30(83.3)	6(16.7)			
More than 10 years	47(85.5)	8(14.5)			
Pill burden			$\chi2$=1.29	1	0.255
Less or equal 2	30(93.8)	2(6.3)			
More than 2	88(86.3)	14(13.7)			
Morbidity			Fisher's exact=5.33		0.074
No co-morbidity	48(96.0)	2(4.0)			
Comorbidity	48(84.2)	9(15.8)			
Multi-morbidity	22(81.5)	5(18.5)			
Glycemic Control			$\chi2$=10.81	1	<0.001*
Controlled	50(100.0)	0(0.0)			
Not controlled	68(81.0)	16(19.0)			
BMI Status			$\chi2$=15.19	2	0.001*
Normal Weight	37(100.0)	0(0.0)			
Overweight	48(92.3)	4(7.7)			
Obese	33(73.3)	12(26.7)			
Blood Pressure Status			$\chi2$=25.59	1	<0.001*
Controlled	89(97.8)	2(2.2)			
Not controlled	29(67.4)	14(32.6)			

*Statistically Significant

Table 5 Regression model predicting satisfaction

Variables	**Adjusted odds ratio (AOR)**	**95% confidence interval (CI)**	**P-value**
Level of Education			
No formal education	0.67	0.09 – 4.98	0.704
Primary	1.98	0.11 – 33.64	0.634
Secondary	0.82	0.11 – 6.01	0.847
Tertiary	Reference		
Morbidity			
No co-morbidity	1.46	0.17 – 12.37	0.724
Comorbidity	0.94	0.23 – 3.87	0.936

Multi-morbidity	Reference		
Adherence to medication			
Adherence to anti-diabetic medication	7.79	0.88 – 68.74	0.065
Non-Adherence to anti-diabetic medication	Reference		
Blood Pressure Status			
Controlled	14.67	2.78 – 77.34	0.002*
Not controlled	Reference		

Note: *P<0.05, Hosmer-Lemeshow goodness of fit test: $\chi 2 = 1.93$, df = 7, p =0.964 Nagelkerke R2=0.401

4. Discussion

This was a cross sectional study that assessed factors affecting perceived patient satisfaction, and glycaemic control among adult diabetic patients.

An analysis of the glycaemic control among the study population indicated that less than half of the participants had good glycaemic control. The prevalence of good glycaemic control in the present study aligns with that reported by Ayoub et al in Beirut from a retrospective cross-sectional study aimed at developing Lebanese medication adherence scale for evaluation of medication adherence of the Lebanese population [9]. Conversely, higher levels of glycaemic control were recorded in studies from United States [34] and Umuahia, Nigeria [35]. Variations in glycaemic control have been reported in several studies. Some of the studies have identified some confounders that affect patterns of glycaemic control. These include co-morbidities, family history of diabetes mellitus, exercise behaviour, dietary habits, duration of illness, therapeutic regimen, family support, self-management of diabetics, smoking and adherence to anti-diabetic regimen [7,13,14,36].

In this study, glycaemic control was found to be lower in persons above 60 years of age. This showed that level of glycaemic control declined with age which contrasts the finding by Pettus et al [11]. However, the finding in this study is agreement with a review by Cheng et al in Singapore where younger age group had better glycaemic control compared to older age group [13]. The decline in glycaemic control in the older group as seen in the current study may be attributed to challenges of non-adherence due to pill burden as a result of comorbidities, poor understanding of regimen due to declined cognitive power, lack of exercise, lack of family support etc.

Females were found to have higher prevalence of good glycaemic control compared to males in this study, however there was no statistical significance association between sex and glycaemic control. This finding was in consonance with observations in USA by Sam et al, where females had higher proportion of good glycaemic control [37]. This may be due to better health seeking behaviour among women and characteristics of the study population like age distribution where over 60% of the respondents were female. A reverse scenario has been reported from Brazil and Venezuela [38], by Odoh et al in Jos [14] and Adamu et al in Zaria Nigeria [15] where female gender had poorer glycaemic control compared to men.

The level of education showed a statistically significant association with glycaemic control. Those having tertiary education had the highest proportion of good glycaemic control as against those with primary education and shared the same outcome with some studies [13, 19]. A possible reason for this present finding may be a tendency for people with a higher educational level to be able to understand treatment regimen and adjuncts to care. On the contrary, studies in Singapore, Fiseha et al, and Fasil et al in Ethiopia, and Afroz et al in Bangladesh found no such association [13, 40-42]. The variation in the relationship between education and glycaemic control could be due to dissimilarities of the studied population and age distribution in the various studies. There is therefore need for more studies on this.

Occupation showed statistically significant association with glycaemic control and more than half of professional workers achieved good glycaemic control. This corroborates studies in Bangladash [42], USA [18], and Jos [14], as against findings in Australia and Abuja where there was no association between occupation, income and glycaemic control [16, 43]. The problems of high cost of managing diabetic patients by developing nations like Nigeria have put people living with diabetic mellitus in a very huge financial burden of coping with their families and health financing among other societal needs. According to Cheng and Colleagues, persons with more income have better glycaemic control [13]. This may explain why professional workers, who are assumed to have better financial capacity, had better glycaemic control in the current study.

There was a statistically significant relationship between income and glycaemic control which was dissimilar with findings from Abuja by Odume et al [43] and Pathiraja et al in Australia [16].The highest prevalence of good glycaemic control was found among those who earned 100,000 naira and above. The odds of achieving good glycaemic control decreased as the average monthly income of the respondent decreased. More studies may have to be done to unravel the cause of this trend but it may be due to eating pattern. However, it was believed that those with higher income may have better healthcare resource and quality of care as most of our healthcare financing are mostly out of pocket.

Among respondents in this study, those with normal weight had good glycaemic control compared to the over-weight and obsessed. BMI was a statistically significant factor of glycaemic control. This finding was in consonance with the finding in an Australian study where a significant inverse correlation between decrease glycated haemoglobin (HbA1c) and increased BMI was found[16] but was inconsistent with some other studies in India [19] and Morocco [17].

In tandem with the finding by Pettus et al, comorbidity adversely affected glycaemic control [11]. In the present study, achievement of glycaemic control was seen to be higher in those with no comorbidities than those with multi-morbidity. There was statistical significant association between glycaemic control and comorbidity which was congruent with the findings by Cheng et al [13] and Chetoui Ahmed et al [17] where comorbidity was associated with poor glycaemic control. All the studies showed that comorbidity is associated with poor glycaemic control which may be due to burnout syndrome.

Hypertension as a comorbidity may make it difficult for patients to achieve good glycaemic control due to high pill burden, poor quality of life and increased health costs. In our study, blood pressure control was found to have statistically significant association with glycaemic control. This result was, however, in contrast with the finding in Owerri [44] where there was no statistically significant association between glycaemic and blood pressure controls. Factors such as the demographic variations of participants and study design may be seen as possible reasons for the variations in the outcomes of the studies.

Patients' satisfaction has been considered a treatment outcome. It is expected that as the clinical condition of the patient improves, their satisfaction should also increase. A bivariate analysis showed a statistically significant relationship between satisfaction and level of glycaemic control. It was noted that 42.4% of the respondents that were satisfied with care had good glycaemic control while none out of the respondents who were dissatisfied with care achieved good glycaemic control. This finding was in agreement with findings by some studies which reported positive association between patient satisfaction and glycaemic control [45, 46]. A possible reason for all these findings may be that people with a higher satisfaction level have better understanding of treatment regimen and adjuncts to care. On the contrary, a study in Belgium found negative association between patient satisfaction and glycaemic control [47]. The variation in the relationship between patient satisfaction and glycemic control in the various studies remains a mystery. A standardized multi-sited study will help to unravel the mystery behind these variations.

An analysis of perceived patient satisfaction among the study population showed 88% of the participants were satisfied while 12% were dissatisfied with the care received during the period under review. Compared to this study where 81.3% of the participants had high level satisfaction and 6.7% had medium level satisfaction, Chen et al in USA recorded 28.2% optimal (high) level of satisfaction and 61.1% average (medium) level of satisfaction in a 5 year retrospective study that was done to determine the association between patient satisfaction and patient reported outcomes [23]. Such differences may be due to the characteristics of the studied population and the study design.

5. Conclusion

The study found less than half of the study participants achieved glycaemic control. The respondents' ethnicity, level of education, occupation and average monthly income showed statistically significant relationship with glycaemic control. Furthermore, comorbidity, perceived patient satisfaction, medication adherence, BMI and blood pressure status also showed statistically significant association with glycaemic control.

Glycaemic control, normal BMI and blood pressure control had significant effect on perceived patient satisfaction. Blood pressure status was found to be the only independent predictor for patient satisfaction.

Compliance with ethical standards

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We want to acknowledge every participant that consented to participate in the study.

Disclosure of conflict of interest

The Authors had no conflict of interest to declare

Statement of ethical approval

Approval for the study was given by the Hospital Research Ethical Committee before commencement of data collection

Statement of informed consent

Informed consent was obtained from all individual participants

Authors Declaration

All Authors made substantive contributions to the conduct of the study and have approved the copy to be published promising to take public responsibility for the work.

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