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DETERMINANTS OF ADHERENCE TO ANTI-GLYCAEMIC DRUGS AMONG PATIENTS WITH DIABETES ATTENDING A DIABETIC CLINIC OF A TERTIARY HOSPITAL IN SOUTH-SOUTH, NIGERIA.

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ABSTRACT

INTRODUCTION: Adherence to anti-glycaemic drugs are important to achieve optimal glycaemic control and desirable patient health outcomes. Poor adherence could increase diabetic-related morbidities and mortality. This study aimed to assess adherence to anti-glycaemic drugs and its determinants among patients with diabetes who attended the diabetic clinic in the University of Calabar Teaching Hospital, Calabar, Nigeria from January 2018 to December 2021.
METHODS: Cross-sectional descriptive study design was used. Systematic sampling technique was used to select 167 study participants. Adherence to diabetic treatment was determined through self-reports of how patients had been taking their medications within the past one week before the interview. Data was analysed using SPSS version 25.0, p-value set at 0.05 and Confidence Interval was set at 95%.
RESULTS: of the 167 patients studied, 46.1% were males while 53.9% were females. The prevalence of adherence to anti-glycaemic medication was 61.7%. Forgetfulness, side effects of drugs, feeling that the dose is high, multiple drugs, how/when to take the drug, type of medication and comorbidities were significantly associated with adherence. Binary logistic regression showed that forgetfulness, side effects and comorbidities were significant determinants of adherence.
CONCLUSION: There is need for targeted interventions to promote adherence to anti-glycaemic drugs.

KEYWORDS: Type 2 diabetes mellitus, anti-glycaemic drugs, self-reporting, prevalence, medication, comorbidities

INTRODUCTION

Diabetes mellitus is a major public health problem that is approaching epidemic proportions globally[1]. According to the International Diabetes Federation (IDF), the global diabetes prevalence is 9.3% and, to reach 10.2% by 2030 and 10.9% by 2045.[2] In Africa, it is estimated that about 15.9million adults are living with diabetes, which is a regional prevalence of 3.1%.[3] A recent meta-analysis also reported that approximately 5.8% of adult Nigerians are living with Diabetes Mellitus[3] although it is posited that these figures could be far below the actual prevalence, due to low testing and access to health facilities.

In Cross River State, a study in the southern senatorial district shows a type 2 diabetes mellitus prevalence of 6.9%.[4] Adherence to prescribed drugs is one of the essential aspects of health care quality. According to World Health Organization (WHO) [5], adherence is the extent to which a person's behaviour, taking drugs, following a prescribed diet, and/or executing lifestyle changes corresponds with agreed recommendations from the health care provider. Adherence to drugs has significant economic and therapeutic consequences[6], because non-adherent patients have a higher possibility of coming down with complications that adversely affects the overall quality of life [7].

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Patient's adherence to anti-glycaemic drugs is a critical and important factor to prevent undesirable complications thereby reducing healthcare burden. Poor adherence to therapies is common especially when comorbidities exist [8]. There is a need to further explore this issue in order to identify factors associated with adherence to anti-glycaemic drugs.

The specific objectives of this study were to assess prevalence of adherence to anti-glycaemic drugs and to identify its determinants among diabetic patients attending the diabetic clinic, University of Calabar Teaching Hospital, Calabar, Cross River State, Nigeria.

METHODS

Study design, setting and population: A cross-sectional descriptive study design was used to carry out this facility-based study in the diabetic clinic of the University of Calabar Teaching Hospital (UCTH), Calabar, Cross River State, Nigeria. The UCTH, has its permanent site at Eastern highway, off IBB way in Calabar municipality. It is a Tertiary health institution that renders patient-centred care to citizens of the state and the neighbouring states. It also serves as a centre for the training of medical students of the college of medical sciences of the University of Calabar and other health professionals such as nursing and medical laboratory science students. Its functions include developing manpower at both undergraduate and postgraduate levels, teaching, conducting research, and, most importantly, providing tertiary-level patient care. The study population consisted of all diabetic patients who attended the Diabetic Clinic at the University of Calabar Teaching Hospital over the past three years (from January 1, 2018, to December 31, 2021).

Sample size estimation: Minimum sample size of one hundred and sixty seven (167) was determined using the Cochran formula[9].

$$N = \frac{z^2pq}{d^2}$$

Where, N is minimum sample size, z is the standard normal deviate for 95% confidence interval which is 1.96, p is prevalence in the target population [which is 11%, representing prevalence of good adherence in previous study among type 2 diabetic patients in a Tertiary Hospital in Iddo Ekiti, Southern Nigeria] [10], q= 1-p = 0.89 and d assumed to be 5%.

Sampling method and eligibility Systematic sampling technique was used to select the 167 type 2 diabetic patients from a sampling frame of 450 that visited the clinic over a period of three months, giving a sampling interval of 3. The starting point was determined through simple random sampling by balloting. Paper was cut into three equal sizes, numbered '1' to '3', and put into a non-transparent bag, shuffled. One was picked blindly and found to be '2'. Every second patient with type 2 diabetes mellitus who visited the clinic for routine follow-up and had been diagnosed for at least six months were eligible for the study, and therefore included until the calculated sample size was realized. Patients with type 1 diabetes, gestational diabetes, severe psychiatric disorders or mental retardation, or end-stage organ failure were excluded from the study.

Data collection and instruments: Interviewer-administered, pretested structured questionnaire was used to collect data on dependent and independent variables from study participants.

Dependent variable: The dependent variable is adherence to anti-glycaemic drugs. According to the WHO, adherence is defined as the extent to which a person's behaviour, taking drugs, following a prescribed diet, and/or executing lifestyle changes corresponds with agreed recommendations from the health care provider.[5] Therapeutic adherence means that the patient observes the medical recommendations, taking the medications, and maintaining a lifestyle as recommended by managing clinicians [11]. In the current study, the focus is on medication adherence. Operationally, adherence to diabetic treatment was determined through self-reports of how patients had been taking their medications within the past one week before the interview. Patients were specifically asked to recall if they missed any dose of medication on a day by day basis. The number of times doses were missed was calculated according to the patient's medication regimen from their medical forms. Patient who took at least 80% of prescribed medications over the past 7 days was considered to be adherent to anti diabetic medications [12,13,14].

The independent variables were sociodemographic characteristics (sex, age, marital status, highest level of education, occupation, religion and tribe), duration of disease (stratified into below 10 years and 10 years and above), number of medications, class of medication (oral only, basal insulin only, and mixed) and comorbidities (hypertension, congestive cardiac failure, arthritis, asthma).

Side effects refers to any undesirable effect resulting from any drug or medical treatment. In the current study, side effects sought for included nausea, vomiting, abdominal pain, cough, poor appetite, muscle pain, sleepiness, as well as insulin injection-related side effects such as redness, swelling, itching and change in the feel of skin.

Data analysis: Collected data was entered into Statistical Package for Social Sciences (SPSS) version 25.0 for cleaning and analysis. Descriptive statistics were presented as frequency, proportions, means and standard deviation. Chi-square test statistics was used to test the association between the outcome variable (adherence) and the independent variables (reasons for not taking anti-glycaemic drugs). Level of significance was fixed at 5%. Independent variables that showed significant association with adherence during bivariate analysis were subjected to multivariate binary logistic regression model to identify independent determinants of adherence and others as possible

confounders. This was done at 5% level of significance and 95% Confidence Interval.

Ethical consideration: Ethical approval was obtained from the Research Ethics Committee of the University of Calabar Teaching Hospital, Calabar, prior to the commencement of the study, with approval number UCTH/HREC/33/594. Informed and written consent was also obtained from each participant before inclusion into the study. Permission was also obtained from the head of department where the Diabetic Clinic is domiciled. During data collection all research assistants, study participants, and the principal investigator adhered to the COVID-19 prevention protocol

RESULTS:

Table 1 shows socio-demographic, clinical, prescribed medications and adherence characteristics among type 2 diabetics. A total of 167 diabetes mellitus patients participated in the study out of which 77(46.1%) were males while 90(53.9%) were females. Those aged more than 60 years (31.7%) accounted for the most common age group. Out of the total study participants, 68 (40.7%) had comorbid medical conditions, the most common was hypertension (26.9%), followed by congestive heart failure (4.7%). The proportion who had developed chronic diabetes complications was 12(7.2%) out of which 7(5.4%) was diabetic nephropathy and the remaining 3(1.8%) was peripheral neuropathy. Out of the total participants, 104 (62.0%) of them were taking one anti-glycaemic medication, out of which metformin and basal insulin accounts for 68(40.7%) and 29(17.2%) respectively. Mixed anti-glycaemic medications were used in 63(38.0%) cases, out of which metformin with Glibenclamide were used for 46 (27.6%) cases, metformin with basal insulin were used for 14 (8.4%) cases while Glibenclamide with basal insulin were used for 3(2.0%) cases. As seen from the patients' case note, a total of 103 participants were on other medications for comorbid conditions. The other medications included Enalapril 37(36.3%), nifedipine 24(23.5%) and vasopirin 21(20.6%), anti-asthmatic medication 8(7.8% and furosemide 12(11.8%). The prevalence of adherence to anti-glycaemic medication was 61.7%.

Table 1: Socio-Demographic, clinical characteristics, prescribed medications and adherence among type 2 diabetics

Variable	Frequency (N=167)	Percentage (%)
Sex		
Male	77	46.1
Female	90	53.9
Age group/years		
<30	21	12.6
31-40	21	12.6
41-50	32	19.2
51-60	40	24.0
≥61	53	31.7
Marital status		
Single	34	20.4
Married	104	62.3
Separated	11	6.6
Widowed	18	10.8
Anti-glycaemic medications		
Metformin	68	40.7
Metformin + Glibenclamide	46	27.6
Basal insulin	29	17.2
Metformin + basal insulin	14	8.4
Glibenclamide	7	4.1
Glibenclamide + basal insulin	3	2.0
Total		
Other medications		
Enalapril	37	36.3
Nifedipine	24	23.5
Vasoprin	21	20.6
Antiasthmatics	8	7.8
Furosemide	12	11.8
Total	102	100
Adherence category		
Adherent	103	61.7
Not adherent	64	38.3
Comorbidity*		
Hypertension	45	26.9
CHF	10	6.0
Dyslipidemia	5	3.0
Others**	8	4.8
Complication***		
Nephropathy	9	5.4
Peripheral neuropathy	3	1.8

*=68(40.7%); **=include asthma and COPD; ***=12(7.2%); CHF=congestive heart failure

Table 2 shows that personal reasons that were significantly associated with adherence were forgetfulness (p<0.001), side effects of drugs (p<0.001), feeling that the dose is high (p<0.001), multiple drugs (p<0.001), how/when to take the drug (p=0.001), type of medication (p=0.012) and comorbidities (p=0.004). Other reasons as presented in table 3 were not statistically associated with adherence (p>0.05).

Table 2: Relationship between personal reasons and adherence among type 2 diabetics

Variable	Adherence to anti-glycaemic drugs				
	Adherent 103(61.7%)	Not adherent 64(38.3%)	Total 167(100.0%)	Chi square test	p-value
Lack of finance					
Yes	61(58.7)	43(41.3)	104(100.0)	1.066	0.302
No	42(66.7)	21(33.3)	63(100.0)		
Feels drug is not effective					
Yes	20(50.0)	20(50.0)	40(100.0)	3.034	0.082
No	83(65.4)	44(34.6)	127(100.0)		
Forgetfulness					
Yes	50(50.0)	50(50.0)	100(100.0)	14.378	<0.001*
No	53(79.1)	14(20.9)	67(100.0)		
Side effects of drugs					
Yes	33(44.0)	42(56.0)	75(100.0)	17.997	<0.001*
No	21(22.8)	71(77.2)	92(100.0)		
Feeling dose is high					
Yes	16(35.6)	29(64.4)	45(100.0)	17.781	<0.001*
No	87(71.3)	35(28.7)	99(100.0)		
Multiple medication					
Yes	44(50.0)	44(50.0)	88(100.0)	17.019	<0.001*
No	59(74.7)	20(25.3)	79(100.0)		
How and when to take the drug					
Yes	24(40.7)	35(59.3)	59(100.0)	11.206	0.001*
No	79(73.1)	29(26.9)	108(100.0)		
Poor family support					
Yes	19(55.9)	15(44.1)	34(100.0)	0.606	0.436
No	84(63.2)	49(36.8)	133(100.0)		
Duration of diabetes/years					
<10	63(64.3)	35(35.7)	98(100.0)	0.683	0.409
≥10	40(58.0)	29(42.0)	69(100.0)		
Comorbidities					
Present	33(48.5)	35(51.5)	68(100.0)	8.388	0.004*
Absent	70(70.1)	29(29.3)	99(100.0)		

*=statistically significant

The multivariate binary logistic regression presented in table 3 shows that independent determinants of adherent to anti-glycaemic drugs were forgetfulness, side effects and comorbidities. Those who were forgetful (OR: 0.154; CI: 0.036 – 0.670) compared with those who were not forgetful, those who had side effects (OR: 0.346; CI: 0.136 – 0.883) compared with those with no side effects, and those with comorbidities (OR: 0.350; CI: 0.157 – 0.780) compared with those with no comorbidities were significantly less likely to be adherent to their anti-glycaemic drugs.

Table 3: Multivariate binary logistic regression of predictors of adherence to anti-glycaemic drugs among type 2 diabetics

Variable	Odd ratio	95% Confidence interval		p-value
		Lower	Upper	
Forgetfulness				
Yes	0.154	0.036	0.670	0.013*
No	1			
Side effects				
Yes	0.346	0.136	0.883	0.026*
No	1			
Feeling the dose is high				
Yes	0.640	0.245	1.673	0.363
No	1			
Multiple medication				
Yes	2.551	0.856	7.598	0.093
No	1			
How and when to take the drugs				
Yes	0.684	0.277	1.693	0.412
No	1			
Diabetes duration				
<10 years	1.055	0.483	2.304	0.893
≥10 years	1			
Comorbidities				
Yes	0.350	0.157	0.780	0.010*
No	1			
Sex				
Male	0.529	0.242	1.155	0.110
Female	1			

*=statistically significant

DISCUSSION

In the current study, adherence to diabetic treatment was determined through self-reports of how patients had been taking their medications within the past one week before the interview. Patient who took at least 80% of prescribed medications over the past 7 days were considered to be adherent to anti diabetic medication. The prevalence of adherence was found to be 61.7%. The current outcome (61.7%) of medication adherence in Calabar, Cross River State was low compared to that of a previous study in Eastern Uganda which reported 88.3%[15] and in Malaysia which reported 84%[16] as prevalence of adherence to anti-diabetic medication among the study participants. Patients' non-adherence to diabetes medication is associated with poor glycaemic control and suboptimal benefits from prescribed medications, which can lead to worsening of the medical condition, development of comorbidities, reduced quality of life, elevated health care costs, and increased mortality.[17,18] Some previous studies had reported adherence rate as low as 19.8% in Southern Nigeria[19] and 27% in Northern Nigeria[20]. Again, another cross-sectional study carried out using the eight-item Morisky Medication Adherence Scale (MMAS-8) with medication adherence classified as good, medium, and poor for 40.6%, 32.8%, and 26.6% patients, respectively.[21]

A Nigerian study using another tool, the Adherence and Self-Management Monitoring Tool, found 59% of its sample diabetes patients to be non-adherent. [22]
A study that adopted medication adherence category of “good” (>80%), “moderate” (50–80%) and “poor” (<50%) reported that 46.4% had good, 28.8% had moderate, and 24.8% had poor adherence.[23], Faisal and colleagues used the Hill-Bone Medication Adherence Scale and reported that 61.9% were adherent to their anti-diabetic medication.[24], while Matsewal and fellow researchers in their study in Ethiopia, used the Morisky Medication Adherence Scale for labelling patients as adherent or non-adherent, and the level of adherence was found to be 85.1%.[25] Several previous studies had all showed differences in the proportion of adherence to anti-diabetic drugs. The differences may be attributable to differences in tools used for measuring adherence. The self-reported tool used in the current study is more straight-forward in a resource poor setting like ours. Besides, it assesses level of adherence in a manner that can be explained to clients, thus ensuring patients participation in their management.
The current study found factors significantly associated with adherence to anti-glycaemic drugs were forgetfulness, side effects of drugs, feeling dose is high, multiple medication, how/when to take drug, comorbidities and sex of diabetic patient.

This finding corroborate with several other studies within and outside Nigeria. [19,20,25] A previous study similarly found that patients attributed their non-adherence to forgetfulness, side effects and lack of finances.[26] This finding could be an indication of ineffective communication between patients and health care professionals and inadequate knowledge of the disease, medications or awareness of its complications could contribute to non-adherence among type 2 diabetics. Although recall bias would have been an issue, the chronic nature of type 2 diabetes mellitus and need for daily intake of medication could reduce recall bias. The sample included was selected through probability sampling technique, and the diabetic clinic is the only tertiary health care facility in Cross River State, and receives referral from across the State and beyond. Therefore, findings could be applied to all the study population. Binary logistic regression of these significant independent factors showed that forgetfulness (OR: 0.154; CI: 0.036 – 0.670), side effects of medications (OR: 0.346; 95% CI: 0.136 – 0.883) and comorbidities (OR: 0.350; 95% CI: 0.157 – 0.780) were significantly determinants of adherence to anti-glycaemic drugs. This finding is in consonance with that of Abebaw et al[25] as well as that of Al-Ramahi.[27].

Conclusion This study has demonstrated that adherence to anti-glycaemic medications is more prevalent in this region than in other geopolitical areas of Nigeria and is comparable to rates observed in some other countries. Forgetfulness and gender were identified as independent factors influencing adherence to anti-glycaemic medications.

What is already know on this topic

1. Prevalence of adherence to anti-glycaemic drugs in some other states and countries.
2. Factors associated with adherence to anti-glycaemic drugs in some other location

What this study adds

1. The prevalence of adherence to anti-glycaemic drugs in Calabar and Cross River State, which was previously not known since there had not been any published article in this regard
2. Determinants of adherence to anti-glycaemic drugs in current study location which was previously not known.
3. Given that the University of Calabar Teaching Hospital is a referral tertiary healthcare center, and a probability sampling technique was employed to recruit study participants—ensuring each member of the population had an equal chance of inclusion—the findings can be generalized to the study population.

Competing interests

The authors declare no competing interest.

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AUTHORS' CONTRIBUTIONS

Iwasam Elemi Agbor: Conceptualization of the work, wrote initial draft of manuscript and did data analysis; Ugochi: Reading and modified the manuscript for correction to give a final draft; Enagu Akwa Mpama: Improved on proposal concept also reviewed manuscript draft; Benson Obu: reviewed draft manuscript. All the authors have read and consented to the final manuscript.

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TABLES

Table 1: Socio-Demographic and clinical characteristics of type 2 diabetics

Table 2: Socio-Demographic, clinical characteristics, prescribed medications and adherence among type 2 diabetics

Table 3: Multivariate binary logistic regression of predictors of adherence to anti-glycaemic drugs among type 2 diabetics

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