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Clinical Characteristics of People Living with T2DM Attending the Family Medicine Clinic of FMC GUSAU

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Abstract:

- ***Background:***

Among patients seen in primary care, the combination of T2DM accompanied by hypertension and obesity represents the most prevalent cardiovascular condition. Coordinated management of this chronic medical condition mitigates the dangers of cardiovascular complications and death.

- ***Aim:***

To assess the clinical characteristics of T2DM attending the General Outpatient Clinic at the FMC, Gusau.

- ***Methods:***

This hospital-based descriptive cross-sectional study T2DM attending the General Outpatient Clinic at the FMC, Gusau. Semi structured questionaire was used to obtained relevant information from our respondents. Their anthropometric parameters, blood pressure and blood glucose were measured. Of the 120 adults' type 2 diabetics recruited, only data from 118 respondents was analysed due to incomplete data.

- ***Results:***

The participants had a mean age of 51.68 ± 8.88 years, about (67.8%) of the respondents were females. Hypertension was present in 99 (83.9%) of the respondents and 19 (16.1%) were not hypertensive. About one-third (33.9%) were overweight, and 45 (38.1%) were obese. A family history of diabetes was reported by 85 (72.0%), and 115 (97.5%) of them were on oral hypoglycaemic agent. About 48 (40.7%) had good medication adherence and good glycaemic control in 67

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(56.8%). Good glycaemic control was predominants among those with good adherence (72.9%) compere to those with moderate adherence (45.7%) or poor adherence (45.8%) p = 0.014.

➢ ***Conclusion:***

Hypertension and obesity were common in this group, and 43.2% had poor glycaemic control. Only 40.7% adhered well to their medication/s, and better adherence went with better control. Medication adherence, BP and BMI of the respondents should therefore be checked at every of T2DM patients presenting in primary care setting.

Keywords: *T2DM; Clinical Characterictics; Primary Care; General Outpatient Clinic; Hypertension; Obesity; Medication Adherence; Glycaemic Control; Nigeria.*

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I. INTRODUCTION

Diabetes mellitus (T2DM) is a chronic metabolic disorder caused by either reduction in the insulin secreation, insulin resistance or both .The resistance in the action of insulin and a gradual decline in insulin secretion led to persistent hyperglycaemia. Many patients with T2DM attending primary care setting tend to have co-morbid hypertension, obesity, and dyslipidaemia.[1] In such practice setting, these problems are managed together in the same patient not as a separate entity unless there is an indication of referral for specialist care. Non adherent to diabetic self-care practice and antidiabetic medications is associated with increase burden of microvascular and macrovascular complications of the disease. Because this disease can stay silent for a long time, complications and cardiovascular risk must be looked for even in patients without symptoms. Treatment needs to be combined with nutrition counselling, physical activity, medication adherence, glycaemic control monitoring, and the choice of their medications, this drug choices depends on cardiovascular risk, renal risk, cost, tolerability, accessibility and affordability.

About 589 million adults aged 20–79 years had diabetes mellitus worldwide in 2024.[2] Of these, 24.6 million lived in the African region, where a large share remained undiagnosed.[2] For Nigeria a 5.77% of the prevalence diabetes mellitus was estimated in 2017 with the lowest regional estimate in the North-West (3.0%).[3,4]Akinwale et al reported a T2DM prevalence of 9.5% among their respondents at a study in South-West Nigeria.[5]

In Bahrain's primary care diabetes clinics, 63.4% of adults with T2DM had hypertension, and only 39.3% had a glycated haemoglobin (HbA1c) below 7%.[6] In two hospitals in Abu Dhabi, hypertension affected 83.4% of 490 patients.[7]

A large outpatient study in China and a medical-record study in eight European countries likewise found that many patients failed to meet their glycaemic and blood pressure targets.[8,9] Hospital-based studies in sub-Saharan Africa show similar patterns, with hypertension in 63% of patients with T2DM in Kumasi, Ghana, and in 78.6% of those attending a tertiary diabetes clinic in Lagos.[10,11] Previous systematic reviews which shows that about 30% of patients with T2DM in the region achieved good glycaemic control.[12] The findings of Sada et al on their study on clinical profile of T2DM in a in Northwestern Nigeria reported a mean age of 53.5 years among its respondents and the study also looked at the glycaemic control, medication adherence and complications of their respondents.[13]

This study conducted at General outpatient clinic, among T2DM attending General outpatients attending the Federal Medical Centre Gusau.

The parameters measured in this reserch were disease duration, treatment modality, respondents BMI, blood pressure, adherence to medications, glycaemic control etc. Measuring these characteristics in these patients can help counselling the patients and also referral decisions to specialist care.

A previous study described the clinical profile of T2DM attending the hospital endocrinology clinic of FMC Gusau. There were few studies on the clinical characteristics of T2DM in primary care settings. Hence, this study determined the clinical characteristics of adults with T2DM who attended the Family Medicine Clinic (GOPC) of FMC Gusau.

II. METHODOLOGY

➢ *Design of the Study*

A descriptive cross-sectional hospital-based study.

➢ *Study Site*

The reserch took place in the Family Medicine Clinic (GOPC), FMC Gusau, Zamfara State, northwestern Nigeria. This clinic is the point of initial service delivery for outpatients attending the tertiary hospital.

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➢ *Study Population*

Adults with T2DM aged 18 years and above who attended the GOPC, had been taking a minimum of one antidiabetic medicine for at least three months and gave informed consent. Respondents with diabetes emergency and also pregnant women with T2DM.

➢ *Sampling Method*

An average of 10 patients T2DM are seen each day in GOPC, which was about 50 patients per week and 600 patients in 12-week clinic visits. We used systematic random sampling to recruit study participants. After each clinic, we marked selected participants' files with a sticker so no one was recruited twice. A selected participant who declined consent was dropped, and the next eligible participant was then recruited, and this continued until the desires sample size is achieved.

➢ *Data Processing:*

During data cleaning, two respondents with incomplete data on glycated haemoglobin were not analysed.

➢ *Calculation of Sample*

Leslie Kish formula, $n = Z^2pq/d^2$.

Where Z is 1.96 for 95% confidence, p is the expected prevalence, q is $1 - p$ and . For p = 9.5% (0.095), the prevalence of T2DM attending a hospital in southwestern Nigeria,[5] and d = 5% (0.05).

This gives $n = (1.96^2 \times 0.095 \times 0.905) / 0.05^2 = 132.1$.

To adjust the sample size. $n = n/ (1 + n/N)$, taking N as the sampling frame of 600 clinic visits over 12 weeks. This is approximately 109. We then added 10% (11 participants) for non-response and incomplete records, giving a target of 120.

The sampling interval now became (600/120) = 5

➢ *Study Protocol*

The first research assistant, was a registered nurse, who measured the BP after the respondents had rested for 5 minutes, using an Accoson sphygmomanometer with an appropriately sized cuff and a Littmann stethoscope. The participant's left arm was supported at mid-sternum (heart) level, and the sphygmomanometer was kept at the assistant's eye level to avoid parallax error. The brachial artery (about 2 cm above the cubital fossa) and the radial pulse were located, and the cuff was applied and inflated until the radial pulse disappeared. It was then deflated slowly, and the point where the pulse returned gave the estimated systolic pressure. The cuff was re-inflated to 20 mmHg above that estimate and deflated at about 2 mmHg per second with the stethoscope over the brachial artery. Systolic pressure was read at the first Korotkoff sound (phase I) and the diastolic BP was observed at the final disappearance of the sounds (phase V), and both values were observed. After 5 minutes another reading was also taken, and the mean of the two readings was recorded as the participant's blood pressure for that day.

➢ *Height*

Height was recorded close to 0.01 m with a Seca stadiometer. Participants stood erect, barefooted and without headgear, and the horizontal bar was lowered onto the vertex of the head to take the reading.

➢ *Weight*

Weight was recorded close to the nearest 0.5 kg on a Seca weighing scale. The respondents were instructed to take off their shoes and set aside items such as keys, phones and handbags before stepping on the scale.

➢ *BMI*

The BMI was categorized as underweight (<18.5), normal (18.5-24.9), overweight (25-29.9) or obese (≥30 kg/m^2).

➢ *Glycated Haemoglobin (HbA1c)*

After an overnight fast, the second research assistant, a laboratory scientist, wore gloves and drew 2 ml of venous blood into an EDTA container. The sample was taken to the laboratory and run on a Clover A1C machine. The reagent cartridge was shaken gently five times and its tip dipped into the tilted EDTA tube, so that blood was drawn in by capillary action. The cartridge was then placed in the machine, the lid was closed, and the result appeared on the screen after 5 minutes.

➢ *Data Collection*

The demographic and clinical profile of the respondents was collected with a pretested, interviewer-administered questionnaire. It included duration of diabetes of the disease, treatment modality, family history of diabetes and family history of hypertension, BMI category, blood pressure, medication adherence, glycaemic control etc. BMI was grouped as underweight, normal weight, overweight and obese using the cut-offs given above. The adherence to antidiabetic medication of the respondents was recorded with the MMAS which an eight item validated questionnaire: a value of 8 was graded as good adherence, 6 to <8 as moderate adherence and below 6 as poor adherence.HbA1c below 7% is optimal glycaemic control, and poor glycaemic control is HbA1c > 7%.

➢ *Analysis of the Data*

The IBM SPSS version 27 was utilised in analysis of complete data of respondents. Categorical variables are reported as frequencies and percentages, and continuous variables as means and standard deviations. BMI is shown in a bar chart, and medication adherence and glycaemic control are shown in pie chart. The chi-square test was used to analyse the association between medication adherence and glycaemic control.

➢ *Ethical Approval*

Committee on Research and Ethics of FMC Gusau gave approval for this research, and all participants gave informed consent.

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- Confidentiality: Strict confidentiality was kept during the conduct of this reserch.

III. RESULTS

Two of the 120 patients recruited had incomplete HbA1c data and were excluded, so 118 patients were analysed.

➢ *Sociodemographic Profile*

The average age of the study participants was 51.68 ± 8.88 years. About two-thirds, 79 (66.9%), were aged 45–64 years, 29 (24.6%) were 44 or younger and 10 (8.5%) were 65 or older. The sample included 80 women (67.8%) and 38 men (32.2%). Most participants were married (96; 81.4%), Hausa (102; 86.4%) and Muslim (107; 90.7%). Table 1 below shows the other details.

Table 1 Demographic Profile of the Participants (n = 118)

Age (years)	Frequency	Percentage
≤ 44	29	24.6
45-64	79	66.9
≥ 65	10	8.5
Sex		
Female	80	67.8
Male	38	32.2
Marital status		
Married	96	81.4
Divorced	5	4.2
Widowed	16	13.6
Separated	1	0.8
Ethnicity		
Hausa	102	86.4
Yoruba	1	0.8
Igbo	10	8.5
Others	5	4.2
Religion		
Islam	107	90.7
Christianity	11	9.3

➢ *Clinical Characteristics*

Table 2 summarises the participants' clinical profile. Most of T2DM patients were living with the disease for > 1 year (107; 90.7%); six (5.1%) were diagnosed a year earlier and five (4.2%) less than a year earlier. Nearly all, 115 (97.5%), took oral hypoglycaemic agents only, while the remaining 3 (2.5%) took insulin as well. A family history of the respondents was reported by 85 participants (72.0%), and family history of hypertension the respondents was 101 (85.6%). Hypertension was present in 99 (83.9%) of the respondents.

Table 2 Clinical Profile

Variables	Frequency (n = 118)	Percent (%)
Period Since Diagnosis of Diabetes Mellitus		
< 1 year	5	4.2
1 year	6	5.1
More than 1 year	107	90.7
Family history of diabetes		
Yes	85	72.0
No	33	28.0
Family history of hypertension		
Yes	101	85.6
No	17	14.4
Diabetics with HTN comorbidity		
Yes	99	83.9
No	19	16.1
Treatment Modalities		
Oral anti-diabetic medications only	115	97.5
Oral anti-diabetic medications and Insulin	3	2.5

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➢ *Body Mass Index*

Figure 1 shows the distribution of BMI categories. Obesity was the most frequent, in 45 participants (38.1%), followed by overweight in 40 (33.9%) and normal weight in 31 (26.3%). Only two participants (1.7%) were underweight. Overweight and obesity together affected 85 participants (72.0%), as seen in the figure below.

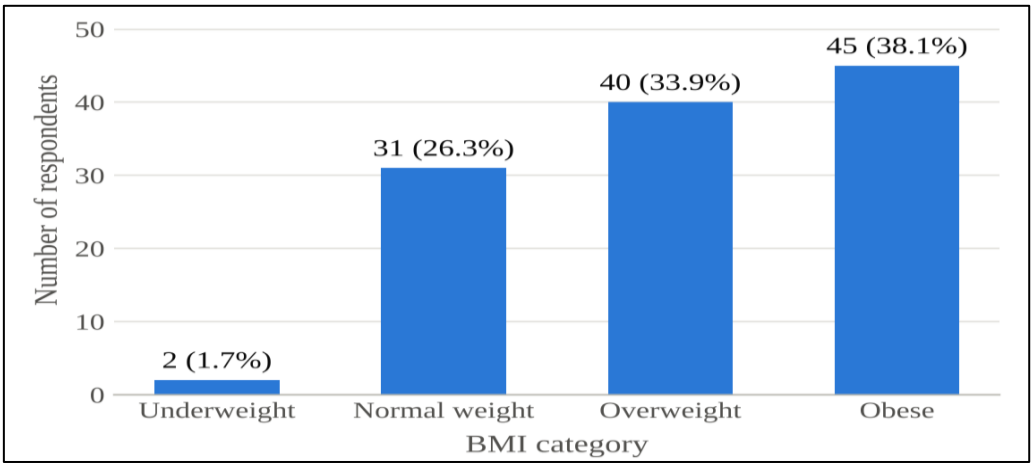

Fig 1 Distribution of Participants by BMI Category (n = 118).

➢ *The Medication Adherence Level*

The medication adherence of the respondents was assessed using the MMAS-8.High adherence was recorded in 48 participants (40.7%), moderate adherence in 46 (39.0%) and poor adherence in 24 (20.3%) (Figure 2).

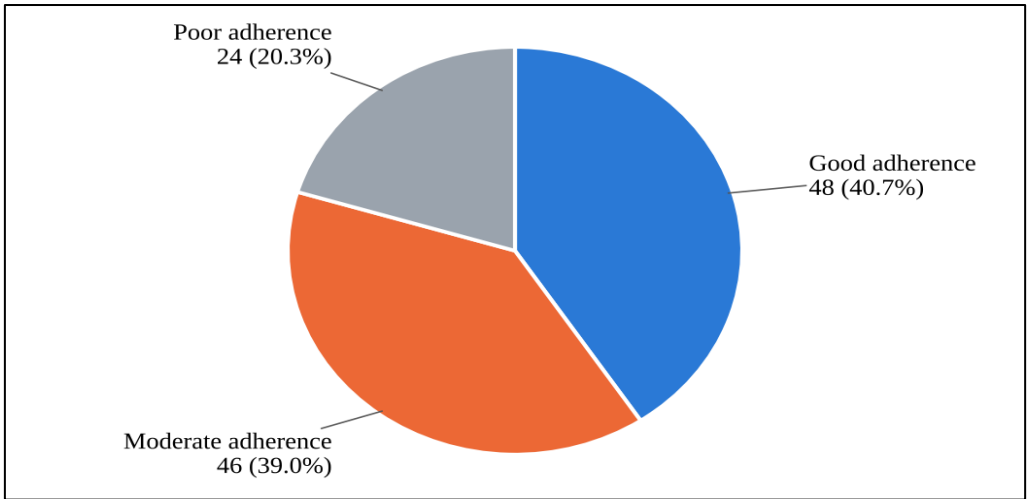

Fig 2 Anti-Diabetic Medication Adherence Level of the Participants (n = 118).

➢ *Glycaemic Control*

The glycaemic control was good in 67 participants (56.8%) and poor in 51 (43.2%;) (Figure 3).

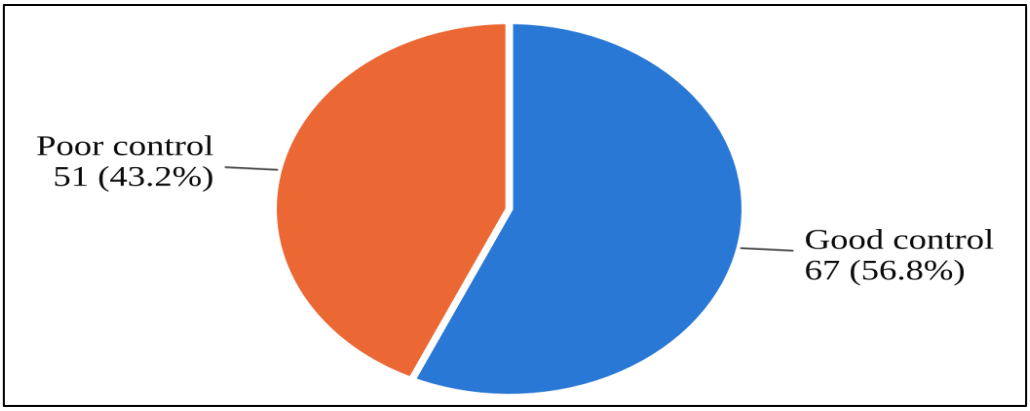

Fig 3 Level of Glycaemic Control Among the Respondents (n = 118).

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➢ *Association Between Adherence to Medication and Glycaemic Control*

Most of the respondents with good medication adherence had good glycaemic control, and more than half of those with suboptimal medication adherence had poor glucose control. Other details are seen in the table 3 below.

Table 3 Association Between Adherence to Medication and Glycaemic Control

Medication adherence	Good control n (%)	Poor control n (%)	Total n (%)
Good	35 (72.9)	13 (27.1)	48 (100.0)
Moderate	21 (45.7)	25 (54.3)	46 (100.0)
Poor	11 (45.8)	13 (54.2)	24 (100.0)
Total	67 (56.8)	51 (43.2)	118 (100.0)

Pearson $\chi^2 = 8.586$, df = 2, p = 0.014.

IV. DISCUSSION

This study described 118 T2DM participants who attended the GOPC of FMC Gusau. Their mean age was 51.68 ± 8.88 years, and two-thirds 80; (67.8%) were women. Hypertension was present in 83.9% of the respondents, 33.9% of them overweight, 38.1% were obese and 43.2% of them had poor glycaemic control. Only 40.7% of the respondents had optimal adherence to medications, and good glycaemic control was seen in those with optimal medication adherence. Almost all the patients (97.5%) were taking tablets of antidiabetic medication.

Most of the respondents were middle-aged. The mean age of 51.68 ± 8.88 years is close to the 53.5 years reported by Sada et al in North west Nigeria, the 49.0 years in a hospital diabetes clinic in Lahore, Pakistan, and the 55 years in a hospital-based study in Kumasi, Ghana.[10,13,14] Patients were older in the primary care diabetes clinics of Bahrain (58.4 years), in six hospitals in Bangladesh (55.1 years) and in a large outpatient study in China (62.6 years).[6,8,15] Younger age at diagnosis of T2DM is associated with a higher risk of micro- and macrovascular complications and death,[16]

Women made up 67.8% of our participants. A diabetes clinic in Lahore, Pakistan (65.1%), and a study in tertiary clinic in Lagos revealed that men were found to be fewer than women, and the excess was larger in Kumasi (75%).[10,11,14] In Kano, by contrast, women were 55.9% of clinic patients.[17] Sex ratios in T2DM vary widely between countries, and obesity, a major risk factor, is more common in women.[18]

About 72.0% reported having inherited the disease from their parents. Inheritance of diabetes mellitus carried a hazard ratio of 2.72 for incident diabetes, and adjusting for body size, lifestyle and a genetic risk score lowered it only to 2.44.[19] A clinic study in Tabuk, Saudi Arabia, linked family history of the disease to poor glycaemic control.[20]

Overweight and obesity affected 33.9% and 38.1% of the respondents, respectively. Previous research on hypertension and obesity in T2DM, obesity exceeded 30% in 38 of 44 studies.[1] BMI-defined obesity was found in 27.4% of patients at a clinic of T2DM in Kano, and 53% of patients in Kumasi had a BMI above 25.[10,17] In Lahore, 37.2% were obese,[14] close to the result obtained in this study 38.1%. [14] The Kano study also shows why BMI alone can understate the problem: half of its patients (50.5%) had central obesity,[17] In a meta-analysis of prospective cohorts, adults with obesity had about 4.6 times the risk of having T2DM than adults with normal weight.[22]

Hypertension was the most frequent comorbidity, recorded in 83.9% of patients. This is close to the 83.4% found in two hospitals in Abu Dhabi and higher than the 78.6% in Lagos, 67.2% in Bangladesh, 63.4% in Bahrain, 63% in Kumasi, 58.1% in Lahore and 46.8% in Kano.[6,7,10,11,14,15,17] Previous research shows that that hypertension is very common in more than fifty percents of patients with T2DM, and many in greater than three-quarters.[1] Hypertension is about twice more predominant in T2DM as in those without the disease, partly because the two conditions share a common predisposing factors such as obesity and dyslipidaemia.[23]

Hypertension adds to cardiovascular risk in people living with T2DM,[23] and our findings support measuring and reviewing blood pressure at every clinic visit of T2DM patients. Good glycaemic control, defined as an HbA1c below 7%, was found in 56.8% of patients, and 43.2% were above target. The ADA guideline recommended an HbA1c target below 7% for many non-pregnant adults, but these targets should be tailored to age, comorbidities, treatment burden and tendency to develop hypoglycaemia.[24] In General Outpatient Clinic care clinics in Makurdi, 65.8% of T2DM patients had suboptimal blood glucose control, compared to the level of suboptimal blood glucose control obtained in the index study 43.2%.[24,25,26]

Tablet antidiabetic agents were used by 97.5% of respondents, and only 2.5% were on insulin.

Only 40.7% of our study participants had optimal antidiabetic medication adherence measured on the MMAS-8, scale while 39.0% had moderate and 20.3% had poor medication adherence. Suboptimal adherence to medication has been found in many countries across sub-Saharan Africa. According to study conducted in Tanzania self-reported adherence to antidiabetic drugs was 60.2% over one week and 71.2% over three months, and the high price of antidiabetic medication was statistically related with non-adherence.[27] In northwestern Nigeria, Sada et al. found that the predominant of their T2DM patients attending MOPD FMC Gusau adhered better to their medication than to dietary management and exercise, yet only 20% had good glycaemic control.[13] Differences in measurement probably

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explain part of the gap between studies. The exact differences between the two studies were due to variance in the tools used to measure both glycaemic control and antidiabetic medication adherence.

Antidiabetic medication adherence was statistically related with glycaemic control. Good control was achieved by 72.9% of the respondents with good adherence, compared with 45.7% of those with moderate adherence and 45.8% of those with poor adherence ($\chi^2 = 8.586$, $p = 0.014$). Previous studies in Ethiopia found that suboptimal adherence to antidiabetic medication was related with poor glycaemic control (AOR 3.67; 95% CI 2.41–4.92).[28] At Kenyatta National Hospital in Kenya, where adherence was graded with the MMAS-8 and control was judged by HbA1c, good control was found in 56.1% of high-adherence patients, compared with 24.3% of low-adherence and 19.6% of medium-adherence patients ($p = 0.019$).[29] A multicentre study in north-west Ethiopia found that good antidiabetic medication adherence was independently related to a lower tendency toward suboptimal glycaemic control in T2DM patients.[30] Sada et al. also reported significantly better control among their participants with good antidiabetic medication adherence in north-west Nigeria.[13]

➢ *Strengths of the Study*

One strength of this research is its focus on a first-contact outpatient service in north-western Nigeria. BMI, blood pressure and HbA1c were measured and combined with clinical history, and adherence was assessed with the MMAS-8, a widely used scale. The findings of this research provided an important information on the integrated management of T2DM in Family Practice.

- *The Limitation of the Research*

This study has several constraints. Its cross-sectional design means that it cannot establish causality. These findings cannot be generalised to all people with T2DM in Zamfara State or Nigeria.

V. RECOMMENDATIONS

For the General Outpatient Clinic, it is suggested that BP of the respondents should be measured and reviewed at every diabetes visit, because most respondents were hypertensive.

Also, family physician should discuss the weight of people living with T2DM in a supportive, non-stigmatising way, with realistic plans for nutrition and physical activity. Medication adherence should be assessed routinely, and counselling on diabetic self-care practices. Routine screening of individuals with a history of DM can help them benefit from risk assessment and prevention counselling. These suggestions are in keeping with the ADA's emphasis on individualised glycaemic goals and the IDF's call for better prevention, diagnosis and ongoing disease management.[2,24]

VI. CONCLUSION

The study participants who T2DM attending the GOPC of FMC Gusau were mostly middle-aged, and 72.0% had family history of DM. Nearly three-quarters were either overweight or obese, hypertension was present in 83.9%, and 43.2% had poor glycaemic control. Only 40.7% had good medication adherence. The result obtained in this research shows an integrated approach in which glycaemia, medication adherence, blood pressure, overweight and obesity were reviewed together at each visit.

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- *Competing Interest*

The research has no competing interest in this research.

- *Funding Information*

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