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Outcomes of type 2 diabetes care in a tertiary hospital in the Federal Capital Territory, Nigeria

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Abstract

Diabetes mellitus (DM) is a metabolic disease and monitoring of biochemical parameters like Low Density Lipoproteins (LDL), High Density Lipoproteins (HDL), total cholesterol, triglyceride, HbAIc and anthropometric indices, blood pressure, may reduce complications associated with it. The objective of the study is to assess the clinical outcome of diabetes care in a tertiary healthcare facility, determine the extent of glycaemic control and to access the incidence of complication. A prospective cross sectional study was conducted on outpatients who met the inclusion criteria. Data were gathered on demographic, biochemical and anthropometric parameters. Descriptive statistics were computed and sampled characteristics were compared using student's t-test. There were fifty-four (54) eligible respondents; mean age was 52.50 $\pm$ 10.577 years. There was a statistically significant decrease in follow up fasting blood glucose 8.25 $\pm$ 3.12 mmol/L of the respondents as compared to the baseline fasting blood glucose 11.1 $\pm$ 4.68 mmol/L, $P < 0.01$. Similarly there was also a decrease in follow up systolic blood pressure 127.59 $\pm$ 17.29 mmHg compared to baseline blood pressure 140.63 $\pm$ 29.63 mmHg, $P<0.01$ and follow up diastolic blood pressure 80.26 $\pm$ 10.23 mmHg as compared to baseline 87.24 + 13.66 mmHg, $P <0.01$. There was also a decrease in follow up total cholesterol, and follow up triglyceride compared to their baseline values. However, the decrease was not statistically significant $P>0.05$. There is need for improved monitoring by healthcare providers to improve positive outcomes of diabetic care.

Keywords: Diabetes Mellitus, Anthropometric parameters, fasting blood sugar, Insulin.

INTRODUCTION

Diabetes mellitus is a metabolic disease associated with high morbidity and mortality all over the world. Diabetes care requires intensive metabolic control of glycosylated haemoglobin, treatment of hypertension and patient education in order to reduce complications associated with diabetes mellitus and thus improve the quality of life of diabetic patient [1]. HbA1c can be used to diagnose diabetes and the diagnosis can be made if the HbA1c level is $\geq$ 6.5% [2]. The diagnosis should be confirmed with a repeat HbA1c test, unless clinical symptoms and plasma glucose levels > 11.1mmol/L equivalent to 200mg/dl [3].

Diabetes patients with type 2 diabetes who may be overweight require nutritional management, exercise, pharmacotherapy using antidiabetics and educational support are often required for optimal blood glucose

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control [4,5]. Antidiabetics such as acarbose, miglitol, metfomin and troglitazone are safe and do not cause hypoglycemia when used as monotherapy. Monitoring of the glycosylated hemoglobin (HbA1c), fasting blood glucose, postprandial blood glucose, blood pressure, lipid profile, body mass index (BMI), waist and hip circumference ratio may be found to reduce complications associated with diabetes mellitus thus improving the quality of life (QoL) of diabetes patient on therapy [6]. However, patient needs to be properly counselled and educated to adhere to management as studies have shown that poor control is either as a result of misinterpretation of urine test or due to medications that have not been properly taken. As such, the clinical pharmacist is required to provide efficacious anti diabetic drugs with comprehensive pharmaceutical care (PC) to both hospitalized and ambulatory diabetic patients. Patient education is seen as the cornerstone of diabetes care in type 2 diabetes mellitus where patients need to carry out self care which includes; exercise, diet, weight control, blood glucose monitoring, use of medications, foot and eye care, and control of macrovascular risk factors. Previous study showed less satisfactory knowledge of diabetes among nurses who constitute the highest number of the healthcare team and they undertake a semi formal diabetes education of patient in the healthcare system [7].

The management strategies for diabetic care in this study will focus on the outcome of diabetes care on type 2 diabetes mellitus, which solely depends on drug therapy while monitoring their Anthropometric and biochemical measurement in order to assess the level of glycemic control in patients.

The aim of this study is to access the clinical outcome of diabetes care in a tertiary hospital, and the specific objectives are to determine the extent of glycemic control and the incidence of complications.

METHODS

Study design. The study was a four-month prospective cross sectional study involving patients with type 2 diabetes diagnosed by the consultant endocrinologist in the Medical Outpatient Department of a tertiary hospital. This study was carried out between August and December 2014.

Study site. This study was conducted among the previously diagnosed patients with diabetes attending the Medical Outpatient Department (MOPD) of the University of Abuja Teaching Hospital (UATH) Gwagwalada FCT Abuja in Nigeria. The UATH provides healthcare services to the North-Central zone of Nigeria: Kogi, Niger, Benue, Kwara, Nasarawa and Plateau States including Federal Capital Territory. The hospital is a tertiary hospital and a reference healthcare facility that provides healthcare services to both residents and across the country.

Study population and sample size. There were about 240 diabetic patients registered at the MOPD of the study site and an average of 30 diabetes patients attends the clinic weekly. Inclusion criteria. Patients who were 18 years and above diagnosed with type 2 DM and had made 2 or more visits to the MOPD 2 to 3 months apart between January and June, 2014 whom follow-up data were available over this period of time, were eligible for this study.

Exclusion criteria. Pregnant patients and those who had no diagnosis for type 2 diabetes were excluded from the study.

Sampling. Each respondent was recruited consecutively as they came for their routine clinic. The hospital numbers and contact of patients included in this study were recorded and used to track them at their clinic visit after three months.

Study instruments/ Data collection. A data collection form was designed. Section A comprised questions to obtain the respondents' sociodemographic data such as age, sex, educational level, occupation, marital status, ethnicity, diet, smoking, exercise and alcohol use. Section B contained questions to obtain their clinical variables such as; diagnosis, drug therapy, patients' blood pressure, section C; biochemical indices i.e., glycosylated haemoglobin (HbA1c), fasting blood glucose (FGB), and. Lipid profile (LDL, HDL, TG, T. Cholesterol) at baseline and 3 months after, within the study period. Section D; anthropometric measures such as height, weight, body mass index (BMI), hip and waist circumference was measured using standard protocol (flexible stretch resistant tape) with the participant wearing light clothing, without shoes in an upright position within the consultation area. Hip circumference was measured at the point of maximal circumference around the buttocks, which is the widest point making sure its horizontal and flat against the skin. While the waist circumference was measured locating the upper hip bone and placing tape around the stomach just above the upper hip bone ensuring that it is not too tight that it compresses the skin. The resulting measurement is the hip and waist circumference respectively. Then the waist circumference was divided by the hip circumference to produce an individual waist-to-hip ratio. The height (meters) and weight (kg) of the patient was measured using the stadiometer. BMI was calculated as weight (kg) divided by the square of height (m^2).

Data analysis. The data obtained from the respondents and those gathered from patients medical records were entered into a Microsoft excel sheet, double-checked and then loaded into statistical package for social sciences (SPSS version 14, IL Chicago). Categorical data were reported as frequencies and percentages; Student's t-test was used to compare differences in means of patients' clinical and anthropometric data.

Ethical consideration. Ethical approval was obtained from the Hospital authorities to carry out this study (FCT/ UATH/ HREC/PR/ 384). An informed consent form was filled by every type 2 diabetic patient who volunteered to participate in the study.

RESULTS

Sociodemographic characteristics of respondents. A total of 54 respondents were surveyed with a mean age of 52.50 years $\pm$ 10.58 years, range 18 – 72 years. Twenty-nine (53.7%) of the respondents were female and majority 35(64.8%) were Christians, 43(79.6%) were married, 19(35.3%) had primary education and 11(20.4%) were housewives. Details of the sociodemographic characteristics are shown in Table 1.

Clinical variables. The mean duration of the disease was 7.12 $\pm$ 5.94 years (range 0.25 – 30 years). Majority have been monitoring their blood glucose regularly using laboratory test (92.6%), while 38 (70.4%) of the respondents claimed they were on a special diet and did not smoke 52(96.3%). Some exercise regularly 28(51.9%) and do not own a glucometer 30(55.6%). With regards to alcohol intake 42(77.8%) of the respondents claimed they do not take alcohol while others take alcohol occasionally. Most of these patients reported to check their blood pressure only when they go for their clinic appointment 21(39.2%), 16(29.8%) claimed they check their blood pressure every day while others do not check their B.P regularly. More respondents had a diagnosis for only DM 20(37.0%) and hypertension 3(5.6%) at first presentation at the clinic compared to 9(16.7%) and none respectively as at follow up diagnosis while there was an increase in diagnosis of DM and DM Hypertension co-morbidity 45(83.4%) compared to the

baseline diagnosis. Twenty-two (40.7%) of respondents claimed they have a problem with their vision and only 5(9.3%) had albumin in urine.

Drug therapy of respondents. Insulin, biguanide and sulfonylureas were the most frequently prescribed antidiabetic medication for the baseline and follow up therapy of the DM patients. However, a thiazolidinedione (pioglitazone) 4(7.4%) was also initiated for follow up therapy. Table 4 shows the medications used for baseline and follow up therapy of DM subjects. There was a significant decrease in follow up fasting blood glucose 8.25 $\pm$ 3.12 mmol/L of the respondents as compared to the baseline fasting blood glucose 11.1 $\pm$ 4.68 mmol/L, $P < 0.01$. Similarly there was also a decrease in follow up systolic blood pressure 127.59 $\pm$ 17.29 mmHg compared to baseline blood pressure 140.63 $\pm$ 29.63mmHg, $P<0.01$ and follow up diastolic blood pressure 80.26 $\pm$ 10.23 mmHg as compared to baseline 87.24 + 13.66 mmHg, $P <0.01$. There were also a decrease in follow up total cholesterol, and follow up triglyceride compared to their baseline values. However, the decrease were not significant $P>0.05$. The respondents follow up LDL 3.16 $\pm$ 1.38 mg/dl was higher than baseline LDL 2.98 $\pm$ 1.59 mg/dl but this also was not significant $P>0.05$ (Table 3). Only three respondents had glycosylated haemoglobin (HbA1c) tests done at their baseline and follow up attendance at the clinic hence the values could not be reported because of the small sample size.

The average height of the respondents was 1.63 $\pm$ 0.1m, (range 1.13 – 1.80m), mean weight was 77.28 $\pm$ 16.18kg, (range 44.2 – 122kg). The respondents were on the average obese, their mean BM1 was 29.05 $\pm$ 7.15kg/m^2, (range 16.04 – 54.03 kg/m^2). The mean waist circumference for male respondents was 99.80 $\pm$ 14.39 cm, which was within the normal range of $\leq$ 102 cm, while that of females was 102.06 $\pm$ 17.07cm; higher than the normal value of $\leq$ 88 cm indicating central obesity. The mean hip circumference was 93.60 $\pm$ 14.74cm for male and that of female was 106.51 $\pm$ 22.47 cm.

Table 1: Sociodemographic characteristics of respondents

Variables	Categories	Frequency (%)
Sex	Female	29 (53.7)
	Male	25(46.3)
Religion	Christian	35(64.8)
	Islam	18(33.3)
	Others	1(1.9)
Marital Status	Married	43(79.6)
	Single	2(3.7)
	Separated	4(7.4)
	Widow	5(9.3)
Education	None	2(3.7)
	Primary	19(35.2)
	Secondary	9(16.7)
	Tertiary	24(44.4)
Occupation	Civil servant	21(39.1)
	Self employed	5(9.3)
	Artisans	13(24.3)
	House wife	11(20.4)
	Student	1(1.9)
	Retired	3(5.7)

Table 2: Drugs prescribed for the respondents at FMC Gwagwalada, Abuja, Nigeria

Drugs	Baseline frequency (%)	Follow up Frequency (%)
S.C Insulin	13(24.1)	12(22.2)
Metformin	37(68.5)	45(83.4)
Glibenclamide	24(44.5)	23(42.6)
Lipid lowering drugs	7(13.1)	21(39.0)
Antihypertensive	34(64.2)	48(90.3)
Antiplatelets	19(35.2)	38(70.5)
Antioxidants	2(3.8)	-
Pioglitazone	-	4(7.4)
Antibiotics	-	5(9.3)
Antifungal	-	1(1.9)
Multivitamin	-	5(9.3)

Table 3: Comparing baseline and follow up biochemical indices

Variables	N	Baseline (mean ± SD)	Follow up (mean ± SD)	P-value
Fasting blood glucose (M mol/L)	52	11.1 ± 4.68	8.25 ± 3.12	<0.01
Systolic blood pressure (mmHg)	54	140.63 ± 29.63	127.59 ± 17.29	<0.01
Diastolic blood pressure (mmHg)	54	87.24 ± 13.66	80.26 ± 10.23	<0.01
LDL (mg/dl)	15	2.98 ± 1.59	3.16 ± 1.38	0.75
Triglyceride (mg/dl)	15	2.08 ± 1.35	1.68 ± 0.67	0.23
Total cholesterol (mg/dl)	15	5.02 ± 1.47	4.48 ± 1.18	0.34

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Table 4: Comparison of anthropometric data based on gender

Variables	N	Male (mean ± SD)	N	Female (mean ± SD)	P-Value
Height	25	1.66 ± 0.12	29	1.62 ± 0.06	0.288
Weight	25	75.99 ± 16.05	29	78.40 ± 16.49	0.570
BM1	25	27.76 ± 7.28	29	30.16 ± 6.98	0.492
Waist circumference	25	99.80 ± 14.39	29	102.06 ± 17.06	0.244
Hip circumference	25	93.60 ± 14.74	29	106.52 ± 22.48	0.109
Waist to hip ratio	25	1.08 ± 0.16	29	0.98 ± 0.16	0.582
Fasting blood glucose (baseline) mmol/L	25	11.36 ± 3.92	29	10.72 ± 5.19	0.052
Fasting blood glucose (follow up) mmol/L	25	8.48 ± 3.66	29	8.07 ± 2.67	0.476
Blood pressure systolic (baseline) mmHg	25	133.36 ± 23.85	29	146.89 ± 32.96	0.211
Blood pressure diastolic (baseline) mmHg	25	84.00 ± 12.24	29	90.03 ± 14.39	0.230
Blood pressure systolic (follow up) mmHg	25	129.84 ± 17.48	29	125.66 ± 17.20	0.605
Blood pressure diastolic (follow up)	25	80.72 ± 12.24	29	79.86 ± 8.31	0.031
LDL (baseline)	19	2.74 ± 1.15	19	3.18 ± 1.48	0.397
LDL (follow up)	12	3.08 ± 1.62	8	3.23 ± 0.77	0.122
HDL (baseline)	19	1.20 ± 0.54	19	1.46 ± 0.34	0.342
HDL (follow up)	12	1.12 ± 0.28	8	1.14 ± 0.21	0.257
Triglyceride (baseline)	19	1.69 ± 1.26	19	1.40 ± 0.62	0.239
Triglyceride (follow up)	12	1.91 ± 1.53	8	1.62 ± 0.64	0.248
Total cholesterol (baseline)	19	4.44 ± 1.15	19	5.28 ± 1.50	0.403
Total cholesterol (follow up)	12	4.34 ± 1.33	8	5.08 ± 0.63	0.009

The waist to hip ratio for males and females was 1.07 ± 0.15 and 0.97 ± 0.16 respectively, signifying central obesity in both gender. There was however, no association between BMI, WHR, and WC of the subjects with FBG (p>0.05). There was also no significant differences in the diabetes control indices with respect to gender p>0.05 (Table 4).

DISCUSSION

Type 2 DM is a major cause of morbidity and mortality resulting from both

microvascular and macrovascular complications [8] .The respondents in this study had a wide range of duration of the disease, this underscores the fact that diabetes is a chronic illness and that new cases are diagnosed regularly. This study showed that patients that were initially diagnosed of only diabetes progressed to have other co-morbid conditions particularly hypertension. More than two-third of the subjects were currently diagnosed of having both diabetes and hypertension than at first presentation, this is similar to the study carried out by Hadi and Suwaidi, [9] where seventy percent of patients with diabetes also had hypertension. It is well known that genetic and similar lifestyle factors contribute to the development of diabetes and hypertension.

Majority of the subjects claim that they monitor their blood glucose regularly, however about half of them do not own a glucometer. The importance of Self Monitoring of Blood Glucose (SMBG), which requires owning a glucometer, is generally appreciated and recommended particularly in type 1 diabetes. There is however, a debate as to the effectiveness of SMBG in type 2 diabetes [10]. Similarly, majority of our subjects despite also being hypertensive only check their BP when they have clinic appointments. A randomized controlled trial to intensify blood pressure control among patients with type 2 DM and hypertension did not show better BP control in patients that monitored their BP at home as compared to those who check only at the clinic during hospital appointment [11].

There was a significant decrease in the respondents' mean FBG during the follow up (8.25 $\pm$ 3.12 mmol/L) compared to baseline FBG (glucose 11.1 $\pm$ 4.68 mmol/L). However, despite this appreciable decrease, they still did not meet targets for tight control of blood glucose control. This is finding is similar to a study carried out by Odili *et al.*, [12]. There was also a significant decrease in the mean BP of the respondents when compared to the baseline BP; this is commendable as blood pressure control is an important parameter in diabetes care. A landmark study has shown that adequate control of blood pressure in patients with diabetes and hypertension achieves clinical reduction in risk of death and complication related to diabetes [13].

The decrease in total cholesterol and triglyceride and an increased LDL at follow up. This may be because great emphasis is not placed on monitoring and controlling subjects' lipids. There is strong evidence of the benefits of lowering cholesterol levels in diabetes patients [14,15].

Majority of the subjects had higher than normal BMI and WHR indices. WC and WHR are indices that describe central obesity and are associated with an increase risk for type 2 diabetes and other health related cardiovascular diseases [16,17].

It is noteworthy to state that only three subjects had HbA1c test results .This might be due to the high cost of procuring this in a developing country where majority of patients have to pay for health services out of pocket.

Conclusion. Glycaemic control was relatively poor in our study as compared to the normal FBG value of 5.4 – 6.5mmol/L. Although, the mean blood pressure for both male and female subjects were at goal (130/80 mmHg) compared to the baseline B.P. There was only a small decrease in total cholesterol levels. However, increased FBG levels were not associated with increased WHR, BM1, and WC. There is a gap in drug monitoring parameters, which is necessary in ensuring expected outcomes of DM management are achieved and complications are prevented. Therefore, proper pharmaceutical care practice is required in DM management and health facilities should improve their equipments and facilities to conform to required standards of practice.

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