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Original Research Article

Socio-Demographic, Clinical and Biochemical Characteristics of Patients Living With Type 2 Diabetes and Hypertension Co-Morbidity Seen in the Medical Outpatient Clinic of the University of Portharcourt Teaching Hospital

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Abstract

Background: The population of persons living with diabetes and hypertension is increasing worldwide. Despite this increment, data on this subgroup of patients is scarce. ***Objective:*** To study the socio-demographic, clinical and biochemical characteristics of patients living with type 2 diabetes and hypertension co-morbidity. ***Subject and methods:*** This is a cross-sectional study carried out at the cardiology unit of the department of Internal Medicine University of Portharcourt Teaching Hospital. One hundred and sixty adults18years and above living with hypertension and diabetes were recruited. 80 adults living with hypertension matched for age and sex served as control. Data on patient's age, sex, duration of hypertension, DM, family history of diabetes , hypertension, history of sedentary life style, alcohol consumption, peripheral neuropathy, smoking and ischemic heart disease, body mass index, waist circumference, blood pressure ,pulse pressure, fasting blood sugar, fasting lipid profile and serum electrolyte ,urea and creatinine were obtained. ***Results:*** The mean age of the cases was 57.51±9.1 years. There were 60% females and 40% males among the cases. Family history of DM and hypertension were found in 81(50.6%) and 107 (66.9%) respectively. History of ischemic heart disease was positive in 63(39.4%) of the cases and positive in 40(50%) of the controls. The mean body mass index was statistically higher in the cases compared to the controls (29.46±4.4kg/m^2 vs 26.66±4.40kg/m^2 p=0.022). The prevalence of sedentary life style was significantly higher in the cases than the controls 58(36.2%) vs 19(23.8%)p=0.001). The systolic BP and triglyceride of the cases and control were comparable. Mean e-EGFR was significantly lower in the cases than the controls 68.98±25.14mls/min vs 88.33±28.94ml/min. ***Conclusion:*** Sedentary lifestyle, obesity and renal impairment were common in people living with hypertension diabetes co-morbidity. Ischemic heart disease based on history was less common.

Keywords: Socio-Demographic Clinical Biochemical Diabetes Portharcourt.

INTRODUCTION

Hypertension is a common problem in people living with type 1 or type 2diabetes. Its time course in relation to the duration of diabetes is different for both types of diabetes [1]. Among those with type 1 DM, the incidence of hypertension rises from 5% at 10years to 33% at 20years [1]. The findings are different for people with type2 DM. In a series of 3500 newly diagnosed type 2 diabetic patients, 39% were already hypertensive [2]. Hypertension and DM are strongly associated with obesity and not surprisingly people living with hypertension and diabetes are at increased risk for cardiovascular disease and morbidity. This is due to coexistence of hypertension myocardial ischemia and specific diabetic cardiomyopathy termed "cardiotoxic triad". Early detection and treatment of hypertension and diabetes co-morbid features is particularly important to prevent cardiovascular disease and to minimize progression of renal disease and diabetic retinopathy [3]. It is therefore imperative that people living with hypertension and diabetes mellitus morbidity are studied systematically. The aim of this study is to study the clinical and biochemical characteristics of people living with hypertension and diabetes attending medical outpatient clinic of the University of Portharcourt teaching hospital.

SUBJECTS AND METHODS

Study population consisted of hypertensive type 2 diabetic subjects greater than 18years of age seen at the medical out- patient clinic or admitted into the medical ward of the hospital randomly selected. Data

was obtained from subjects who were considered hypertensive diabetic on the basis of blood pressure ≥140/90mmHg and existing diagnosis or fasting blood sugar greater than 7.0mmol/l. An arm of control comprising 80 hypertensive patients attending medical outpatient clinic or admitted to the medical ward selected randomly and matched for age and sex were recruited.

Data obtained include age, sex, family history of DM and hypertension, history of ischemic heart disease and history of neuropathy using a structured questionnaire. The study subjects underwent clinical examination to determine weight, height, waist circumference, body mass index and waist-hip ratio. Pulse was counted for one minute assessing rate, rhythm, volume, character and synchrony.

Blood pressure was measured using accoson mecury sphygmomanometer to determine the brachial arterial systolic and diastolic blood pressure using the first and fifth korotkoff sounds respectively[4]. Two blood pressure measurements were taken measured 3minutes apart and after 5minutes of rest with the arm at the heart level and the average recorded. Exercise, smoking, and caffeine were avoided at least 30 minutes prior to the blood pressure measurement. Hypertension was deemed present if BP is ≥ 140/90mmHg on at least 3 occasions or current use of antihypertensive agents [4]. The subjects were weighed without shoes and in light clothing on standard beam balance while height was measured to the nearest centimeter using a standiometer, subjects standing with feet together without shoes or head gear.

Body mass index was calculated and classified according to WHO as class normal weight (18.5-24.9kg/m^2), overweight (25- 29.9kg/m^2) class 1 obesity (30- 34.9kg/m^2) class 2 obesity (35-39.9kg/m^2) and morbid obesity (≥40kg/m^2)[5]. A venous blood sample was drawn and analyzed in the hematology chemical pathology laboratories of UPTH for plasma hemoglobin, fasting lipid profile, fasting plasma glucose.

Venopuncture was carried out and 10mls of fasting blood sample was drawn from each subject and hypertensive control between 7:30am and 8:30am, 2mls was put into fluoride oxalate bottle for FBG estimation, 5mls of which was put into lithium heparin bottle for assessment of lipid profile and serum electrolyte, urea, creatinine and uric acid, 3mls was put into EDTA bottle for haemoglobin estimation. Urinalysis was done to assay for protein using dipstick .Fasting lipid profile including triglyceride, total cholesterol, HDL, TG were measured using enzymatic method with a reagent from Atlas medical laboratories. Fasting HDL was measured with the precipitation method. LDL was calculated using the Fried-wald equation when the triglyceride level was less than 4.0mmol/dl (LDL=TC-(HDL+TG/2.2)[6].HbA1c was assessed using a bioRad laboratories Ln2it^{R}which is diabetic control and Complication Trial Calibrated. A pipette was used to obtain a drop of the participant's blood. This was then inserted into the cartridge and placed into the machine. The assay time was 10 mins and the result displayed in % on the machine screen. Diabetes was diagnosed on the basis of presence of symptoms of DM- Polyuria, polydypsia with random blood glucose >11.1mmol/L[7]or previously diagnosed patients.

RESULTS

A total 240 subjects participated in the study of which 160 were 160 constituted participants with both hypertension and diabetes mellitus (cases) and 80 participants with hypertension only (control). There were more female than male in the ratio of 1.5:1 as 96(60%) were females and 64% (40) were males. Among hypertensive controls there was slight female preponderance 42(52.5%) and 38(47.5%) were males giving a ratio of 1.6:1.The ages of the cases ranged between39-87 with a mean age of 57.51±9.18 years. The ages of the hypertensive control controls ranged between35-79years with a mean age of 55.90±12.15years. BMI was significantly higher in the cases than in the controls 29.46±5.64kg/m2 vs 27.83±4.42kg/m^2. The mean diastolic BP was significantly higher in the controls than in the cases 87.29±11.0mmHg vs 83.41±9.44mmHg. The mean pulse pressure of the cases was significantly higher in the cases than in the controls 53.9±13.85mmHg vs 68.98±25.14mmHg. Family history of hypertension was comparable in both the cases and the controls. The clinical characteristics of the cases and controls are shown in table 1a and 1b below. Hb concentration of the cases ranged from7-15g/dl with a mean of 11-65 ±1.65g/dl while that of the control ranged from 10-16g/dl with a mean of 13.03±1.33g/dl. There was statistically significant difference between the mean hemoglobin concentration of the cases and the controls. Comparing the mean e-GFR of the cases and controls showed statistically significant higher mean e-GFR in the controls than in the cases 88.33±28.94 mls/min vs68.98±25.14mls/min. The mean total cholesterol was significantly lower in the cases than in the controls 4.57±1.25mmol/l vs 5.41±1.24mmol/l. The mean triglyceride of both the cases and controls were comparable 1.8±0.47mmol/l vs 1.23±0.55mmol/l. The mean HDL was statistically higher in the controls than in the cases 0.90±0.19mmol/l vs 1.41±0.69mmol/l. The laboratory characteristics of the cases and controls are compared in table 2 below.

Table-1: Socio-demographic characteristics of the study population

VARIABLES	Cases N =160 (%)	Hypertensive control N =80(%)	P
Age(years)			
30-39	2(1.2)	8(10.0)	0.323
40-49	22(13.8)	20(25.0)	
50-59	74(46.2)	20(25.2)	
60-69	48(30.0)	20(25.0)	
70-79	8(5.0)	12(15.0)	
80-89	6(3.8)	0(0.0)	
Sex			
Male	64(40)	38(37.5)	0.453
female	96(60)	42(52.5)	
Smoking	6 (3.8)	5 (6.2)	0.513
Family History of DM	81(50.6)	58(72.5)	0.001*
Family History of HTN	107(66.9)	56(70.0)	0.625
Alcohol intake	21(13.1)	12(15.0%)	0.691
Sedentary Lifestyle	58(36.2)	19(23.8)	0.051

KEY:
Cases=Patients with hypertension and diabetes
Controls=Patients with hypertension
P= P value for cases versus hypertensive controls.

Table-2: Clinical characteristics of the study population

VARIABLE	Cases(n=160)	Hypertensive controls (n=80)	P
	Mean ± SD	Mean ± SD	
BMI (kg/m2)	29.46 ± 5.64	26.66± 4.40	0.022*
WC (cm)	100.23±10.54	97.78± 12.10	0.108
WHR	1.0 ± 0.09	0.95± 0.07	0.001*
SBP (mmHg)	137.54±17.14	136.26 ±20.21	0.599
DBP (mmHg)	83.41± 9.44	87.29 11.00	0.001*
PR b/min	83.78 ±11.55	76.90 9.57	0.001*
Pulse pressure (mmHg)	53.59± 13.85	49.00 13.08	0.014*
History of Neuropathy	118(73.8%)	24(30.0%)	0.001*
History of ischaemic heart disease	63(39.4%)	40(50%)	0.117*

Key:
Cases=Patients with hypertension and diabetes
Controls=Patients with hypertension
P= P value for Cases versus Hypertensive controls

Table-2: Laboratory characteristics of the study population

	Cases(n=160)	Hypertensive controls(n=80)	P
VARIABLES	MEAN ±SD	MEAN ±SD	
FBS (mmol/L)	8.24± 2.85	5.03± 1.07	0.001*
Hb (g/dl)	11.65± 1.59	13.03± 1.33	0.001*
EGFR (mls/min)	68.98±25.14	88.33± 28.94	0.001*
SUA (micromo/l)	358.01±91.25	323.74±88.79	0.020*
TCH (mmol/L)	4.57± 1.25	5.41± 1.24	0.001*
TG (mmol/L)	1.18± 0.47	1.23± 0.55	0.733
HDL mmol/L	0.90±0.19	1.41± 0.69	0.036*
LDL mmol/L	3.26± 0.69	3.15 ±1.48	0.001*
HbAlc(%)	7.54± 0.40	5.02±0.66	0.001*

LEGEND: Data expressed as mean ± standard deviation, FBS =fasting blood sugar, Hb=Hemoglobin concentration, TCH=Total cholesterol, TG=Triglyceride, HDL= High density lipoprotein, LDL=low density lipoprotein, HbAlc=Glycated Hemoglobin, eGFR=Estimated Glomerular filtration Rate, DM=Diabetes,
Cases= patients with hypertension and diabetes
Controls=Patients with hypertension
P1=Cases versus Hypertensive controls.

DISCUSSION

This study was a cross –sectional study of 160 patients living with hypertension and diabetes mellitus (cases) and 80 patients with hypertension (controls) matched for age and sex.

Significant smoking was comparable across the cases and controls 3.8%vs 6.2%. This was far lower than that reported in the LIFEstudy [8].This is not surprising considering the fact that high prevalence of smoking has been reported in the Western word [9]. Alcohol intake was slightly higher among the hypertensive controls than in the cases 15%vs13.8%. This was similar to that documented by Giovani de Simone *et al*.[10]This can be explained by more consciousness of people living with both hypertension and diabetes co-morbidity to healthy lifestyle. The proportion of cases with family of DM was lower than in the controls. The reason for this is not readily apparent in this study. It is an established fact that both hypertension and DM run in families [11]. More of the cases had a sedentary lifestyle than the controls 36.2% vs 23.8%.Another study documented similar finding [11]. The proportion of cases with history of ischemic heart disease was lower than the cases 39.4%vs 50%.This can be explained by the concept of silent ischemia common in diabetic patients [12]. The BMI was significantly higher in the cases than in the controls with a mean of 29.46±5.64kg/m^2. Anderson *et al*. [13] Hilderbrand *et al*. [8] documented significantly higher BMI in hypertensive diabetic cases than hypertensive controls similar to this study. Obesity is a common co-morbidity in hypertension and type 2 DM [14]. This study showed that systolic blood pressure was comparable across cases and control137.26±17.40mmHg vs 136.26±20.21mmHg. On the contrary mean diastolic blood pressure was lower in the cases compared to the hypertensive controls83.41±9.44mmHg vs .29±11mmHg. This implies wider pulse pressure which can be explained by increased arterial stiffness induced by DM and accelerated steady loss of aortic compliance induced by hypertension. Other investigators found similar trend [15, 16]. The mean systolic blood pressure documented by Danbauchi *et al*. [17] and Hindabrandt *et al*. [8] were higher than that found in this study. The reason for the difference in the mean of the BP as documented by Danbauchi was probably exclusion of overt heart failure in their study.

The cases had a lower e-GFR compared to the controls 68.98±25.14mls/min vs 88.33±28.94mls/min. This corroborates the fact that diabetes mellitus act additively impairing renal function. Similar differential pattern was found by other investigators [8]. The mean total cholesterol was higher in the hypertensive control compared with the cases. The reason for higher mean total cholesterol in the cases may be due to the fact that people living with hypertension and diabetes are more likely to be more dietary and drug adherent than hypertensive patients [18]. This finding is in agreement with that found by Hindabrandt *et al*. [8]. Triglyceride was comparable across the cases and controls. This is consistent with that reported in Sokoto, North-West Nigeria by Isiezuo *et al*.[19]. The cases had lower hemoglobin concentration compared to the cases 11.65±1.59g/dl vs 13.03±1.59g/dl. This supports the fact that hypertension diabetes comorbidity accelerates renal impairment accounting for anemia in this sub-set of patients.

In conclusion, our study showed that, obesity, renal impairment and sedentary lifestyle were common in people living with type 2 diabetes mellitus and hypertension co-morbidity. Ischemic heart disease based on history of typical chest pain in this study is less common. These multiple morbidities place this subset of patients at higher cardiovascular risk. Therefore appropriate measures should be put in place to address these risk factors beyond hypertension and diabetes control.

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