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PREVALENCE OF METABOLIC SYNDROME AMONG HYPERTENSIVE PATIENTS IN ABUJA, NIGERIA

Background: It is well known that factors like high blood pressure, hyperglycemia, dyslipidemia, obesity and hyperuricemia tend to cluster together giving rise to what is called metabolic syndrome. In spite of the high prevalence of hypertension in Nigeria, there is a dearth of data describing the prevalence of metabolic syndrome in Nigerian hypertensive patients. We therefore set out to look at the prevalence of metabolic syndrome in hypertensive patients presenting to the cardiology clinic of a tertiary institution in Abuja, Nigeria.

Methods: Metabolic syndrome was defined in patients according to the World Health Organisation's definition.

Results: Of the 362 patients studied, 56.9% were male and 43.1% were female. The mean age was 51.80 ± 11.63 years, mean duration of hypertension was 8.90 ± 3.95 years, mean body mass index was 29.36 ± 6.12 kg/m² and mean arterial blood pressure was 110.28 ± 18.17 mm Hg. Overall, 13.0% of the study population had metabolic syndrome; 16.7% of females and 10.2% of males.

Conclusion: The prevalence of metabolic syndrome among hypertensive patients in Abuja, Nigeria is comparable to rates observed in some general populations in Europe. This might imply the epidemiological transition in disease pattern already being experienced in many parts of sub-Saharan Africa. (*Ethn Dis.* 2012;22(1):1–4)

Key Words: Prevalence, Metabolic Syndrome, Hypertension

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INTRODUCTION

Metabolic syndrome is a condition that enhances atherosclerosis and increases the risk of cardiovascular events through the aggregation of independent metabolic disorders.¹ The hallmark features of this syndrome include atherogenic dyslipidemia, insulin resistance, hypertension, abdominal obesity and prothrombotic state.²

In addition to increasing a patient's risk of cardiovascular disease, metabolic syndrome may hasten the development of type 2 diabetes mellitus, diabetic nephropathy, diabetic retinopathy, diabetic neuropathy and stroke.³

A large proportion of individuals living in Western countries are afflicted with this abnormality. Using obesity, insulin resistance, dyslipidemia, impaired glucose tolerance and hypertension as central features of metabolic syndrome, one estimate suggests that as many as 50 to 75 million people in the United States may have had significant manifestations of the syndrome in 2010.⁴

In a study involving patients from Sweden and Finland, and using the World Health Organisation (WHO) criteria, metabolic syndrome was observed in 10% of women and 15% of men with normal glucose tolerance, 42% of women and 64% of men with impaired fasting glucose or impaired glucose tolerance and 78% of women and 84% of men with type 2 diabetes mellitus.⁵

Furthermore, WHO guidelines suggest that patients with elevated blood pressure (>140 mm Hg systolic and >90 mm Hg diastolic) and/or receiving antihypertensive treatment are at risk for metabolic syndrome.⁶ In keeping with this, the prevalence of metabolic syndrome in the general population of Germany, Spain and Italy was 36%, 11% and 10% respectively, but rose up to 61%, 22% and 21% respectively in hypertensive individuals.⁷ And among hypertensive patients, the prevalence of metabolic syndrome was found to be 47.9% in China,⁸ 35.3% in Finland⁹ and 41.9% in Kuwait.¹⁰

In spite of this and the high prevalence of hypertension in Nigerian Africans,¹¹ there is a dearth of data on the prevalence of metabolic syndrome in hypertensive Nigerian Africans. We therefore decided to determine the prevalence of metabolic syndrome (using WHO criteria) in hypertensive patients referred to the cardiology clinic of the University of Abuja Teaching Hospital from April 2006 to November 2008.

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METHODS

Inclusion Criteria

Patients with high blood pressure presenting for the first time at cardiology clinic of University of Abuja Teaching Hospital from April 2006 to April 2008 were studied. Patients were referred from both primary and secondary health centers from neighboring towns. Reasons for referral ranged from poor blood pressure control to suspected target organ damage, especially left atrial enlargement and left ventricular hypertrophy on electrocardiography.

Exclusion Criteria

Patients with concomitant retroviral infection and who were on protease inhibitors, and patients with nephrotic syndrome, chronic liver disease and patients on lipid lowering medications were excluded from the study.

Measurements

Baseline clinical and demographic characteristics were obtained from the patients using a structured questionnaire. Information obtained were age, sex, history of smoking, history of hypertension and history of diabetes mellitus. Patients were weighed without shoes and in light clothing on a standard beam scale while heights were measured to the nearest centimeter using an anthropometric plane with patients not wearing shoes or headwear. Body mass index (BMI) was calculated using the formula weight in kg/height in meters². Blood pressure measurements were obtained according to standard guidelines with a mercury sphygmomanometer (Accoson, London). Systolic and diastolic blood pressures were measured at Korotkoff sounds I and V respectively. Blood pressure was measured at the right arm three times after a 5-minute rest with patient in a seated position, and the average of the three measurements was calculated. Patients were asked to fast for 8–12 hours before blood sample collection. Blood chemi-

cal analysis was performed at a central certified laboratory. Blood fasting glucose and lipids were analysed enzymatically by auto analyzer (Erber Spectrophotometer).

The diagnosis of metabolic syndrome was based on the modified WHO definition. The WHO criteria for diagnosis of metabolic syndrome was chosen as it has been earlier described to be more sensitive in diagnosing metabolic syndrome in Black Africans compared to the National Cholesterol Education Program and International Diabetes Federation definitions.¹²

A diagnosis of obesity was made if the BMI >30kg/m². Hypercholesterolemia was determined if fasting total cholesterol levels >5.2mmol/L while hypertriglyceridemia was said to be present if triglyceride levels >1.7 mmol/L, and low HDL-cholesterol level was defined as ≤.9 mmol/L (male) or ≤1.0 mmol/L (female). Diabetes mellitus and impaired fasting blood glucose were defined according to American Diabetes Association criteria of 1997 as fasting plasma glucose ≥126mg/dL and 110–126mg/dL respectively.¹³

All patients gave written informed consent before they were enrolled into the study. Ethical clearance was obtained from the Medical Research Ethical Committee of the University of Abuja Teaching Hospital.

Statistical Analysis

Data was analysed using SPSS version 10.0(SPSS Inc., Chicago, IL). Baseline variables were expressed as mean ± SD. A *P*<.05 was considered statistically significant.

RESULTS

A total of 362 patients participated in the study. Using WHO's criteria for metabolic syndrome, 47 patients representing 13.0% of the study population had metabolic syndrome. Metabolic

Table 1. Demographic characteristics of all participants (N=362)

Variables	Mean ± standard deviation
Age, years	51.80 ± 11.63
BMI, kg/m ²	29.36 ± 6.12
SBP, mm Hg	146.07 ± 24.00
DBP, mm Hg	92.90 ± 15.73
MAP, mm Hg	110.28 ± 18.17
PP, mm Hg	53.01 ± 17.10
TC, mmol/L	4.77 ± 1.27
TG, mmol/L	1.30 ± 0.58
LDLc, mmol/L	3.17 ± 1.20
HDLc, mmol/L	1.22 ± 0.61

BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; MAP, mean arterial pressure; TC, total cholesterol; TG, triglyceride; LDLc, low density lipoprotein cholesterol; HDLc, high density lipoprotein cholesterol.

syndrome was found in 26 females representing 16.7% of the study population and in 21 males representing 10.2% of the study population.

Table 1 shows the demographic characteristics of all the patients studied. Patients, on average, were overweight with a mean BMI of 29.36 ± 6.12kg/m². The mean systolic, diastolic and arterial blood pressures were also elevated. The mean total, low density lipoprotein and high density lipoprotein cholesterol, and triglyceride levels were within normal limits.

Table 2 shows the demographic characteristics of the patients with metabolic syndrome. Females had significantly higher systolic blood pressure, pulse pressure and serum triglyceride levels.

Table 3 shows the prevalence of each of the components of metabolic syndrome with high serum triglyceride occurring most frequently in 80.9% of cases followed by obesity in 48.9% of cases.

DISCUSSION

This study has shown a prevalence rate of 13.0% of metabolic syndrome (16.7% female vs 10.2% male) among

Table 2. Demographic characteristics of participants with metabolic syndrome by sex

Variables	Male (n=21) mean ± standard deviation	Female(n=26) mean ± standard deviation	P
Age, years	52.19 ± 11.89	53.05 ± 12.18	.79
BMI, kg/m ²	29.18 ± 6.16	32.50 ± 6.50	.09
SBP, mm Hg	139.62 ± 21.44	156.19 ± 21.79	.012 ^a
DBP, mm Hg	91.00 ± 18.21	94.76 ± 14.36	.44
PP, mm Hg	48.62 ± 15.08	61.43 ± 15.58	.007 ^a
MAP, mm Hg	107.21 ± 18.00	115.24 ± 15.55	.11
TC, mmol/L	4.87 ± 1.16	5.08 ± 1.12	.53
TG, mmol/L	1.59 ± .11	2.34 ± .40	.000 ^a
LDLc, mmol/L	3.15 ± 1.21	2.72 ± 1.07	.43
HDLc, mmol/L	1.17 ± .44	1.22 ± .39	.66

^a Statistically significant.

BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; MAP, mean arterial pressure; TC, total cholesterol; TG, triglyceride; LDLc, low density lipoprotein cholesterol; HDLc, high density lipoprotein cholesterol.

hypertensive patients in Abuja, Nigeria. A higher prevalence of metabolic syndrome in females has been previously reported in African Americans.⁴

Previously, Isezuo and Ebunu¹⁴ found a prevalence of 20.5% among hypertensive diabetic patients in northern Nigeria, while Alebiosu and Odu-san¹⁵ found a prevalence of 25.2% among hypertensive diabetic patients in southwest Nigeria. The higher prevalence of metabolic syndrome in these two studies compared to our own study is not surprising as diabetic patients have been previously reported in the Western population to have very high prevalence of metabolic syndrome.⁵

The prevalence rate of 13.0% seen in our study is much lower than what is observed in Europe and Asia and compares with what is observed in normoglycemic normotensive patients in the United States⁴ and Europe.⁵

Our hypertensive patients were overweight with an average body mass index (BMI) of 29.36 ± 6.12kg/m². This supports the theory of transition in the epidemiology of disease pattern being experienced in sub-Saharan Africa; with our society becoming more sedentary and Westernised, obesity is steadily on the increase.

Females with metabolic syndrome were noted to have significantly higher serum triglyceride levels, along with higher systolic, diastolic and pulse pressures as compared to males. This may be, in part, due to the effect of weight as females had a higher BMI than males, although the difference was not statistically significant. It is well established that blood pressure increases with weight.¹⁶ Hypertriglyceridemia was found to be the most common abnormality occurring in 30 (80.9%) of the 47 patients with metabolic syndrome.

Table 3. Frequency of each component of metabolic syndrome based on the WHO Criteria among the participants diagnosed with metabolic syndrome (N=47)

Variable	n	%
Fasting plasma glucose, 110–126 mg/dL	9	18.9
Serum triglyceride ≥1.7 mmol/L	36	80.9
Serum HDL<.9 mmol/L(male); <1.0 mmol/L(female)	18	38.3
Body mass index >30 kg/m ²	23	48.9

The prevalence rate of 13% seen in our study is much lower than what is observed in Europe and Asia and compares with what is observed in normoglycemic normotensive patients in the United States⁴ and Europe.⁵

CONCLUSION

Although the prevalence of metabolic syndrome in our hypertensive patients was less than that seen in Europe and Asia, a prevalence of 13% should not be ignored, especially in a large population of about 150 million with a prevalence of hypertension at 25%.

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