Prevalence Of Metabolic Syndrome In Some Urban And Rural Communities In Enugu State, Nigeria.

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Citation

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Abstract

Objective - The aim of this study was to explore the prevalence of metabolic syndrome (MS) and the pattern of clustering of the risk factors in urban and rural communities in Enugu State.

Research Design And Methods – A total of 205 men and women aged ≥ 35 years, 103 urban dwellers and 102 rural dwellers were recruited for the study. The MS was diagnosed according to the definition developed by the Third Report of the National Cholesterol Education Programme Adult Treatment Panel (NCEP ATP) III.

Results – The prevalence of MS was 16.6% in the overall population. The UD recorded a higher prevalence of 20.4% and the RD a lower prevalence of 12.7% and while the women had a higher prevalence of 24.8%, men recorded a lower prevalence of 7.3%. Increase in the prevalence of low HDLC, high blood pressure and waist circumference accounted for much of the increase in the prevalence of MS.

Conclusion – The prevalence of MS is relatively high in Enugu State, urban dwellers and women are mostly affected with low HDLC being the most prevalent risk factor recorded among those with MS.

INTRODUCTION

MS is defined as a constellation of metabolic abnormalities that occur together in the same individual more often than might be expected by chance. The abnormalities include insulin resistance and/ or hyperinsulinaemia, dyslipideamia, hypertension, obesity and glucose intolerance (1). It sets a stage for health problems such as cardiovascular heart disease, type 2 diabetes etc (2).

Different prevalence rates were recorded among people of different ethnic origin living in the same locality; this suggests a genetic cause for the MS (3); the Hausas in Katsina, Nigeria recorded a prevalence of (22%), Yorubas in Ile-Ife, Nigeria (12.1%), the Caucasians (12.9%), Hispanics (31.9%) (4-7).

Epidemiological studies have shown that cardiovascular disease (CVD) now constitute major health problem in developing nations and over 80% of global morbidity and mortality (8). MS and its components is a risk factor for CVD and type 2 diabetes and if discovered early, can be treated or controlled. Several studies of different groups suggest different prevalence and pattern of clustering of the risk factors of MS. Thus, the present investigation sought to determine the prevalence of MS and the most common cluster of risk factors of MS in Enugu state.

RESEARCH DESIGN AND METHODS

The study was carried out in Enugu State, South East Nigeria from May to July 2009. A total of two hundred and five apparently healthy subjects were selected by random sampling for the study. One Hundred and three of them were recruited from Enugu urban municipality (GRA, Uwani, Abakpa and Trans-Ekulu,) while one hundred and two were recruited from rural areas (Ovoko, Owo, and Awhum), each representing one of the three geo-political zones in Enugu State. The subjects were all adults aged 35 to 85 years because MS affects mostly people above 35years of age (9).The subjects must have lived in their respective areas for up to ten years. Known diabetics, hypertensives and those on any form of medication that may affect the parameters under study were exempted. The study protocol was approved by Ethics Committee of Enugu state Ministry of Health and all subjects gave a written or oral informed consent prior to the study.

The body weight and height were measured in subjects wearing lightweight clothing and without shoes; BMI also calculated (kg/m^2). Waist and hip circumferences were measured to the nearest 0.1cm over single-thickness clothing with the subject standing in an erect position with feet together. The blood pressure was measured by a medically qualified personal and the reading taken in millimetre mercury (mmHg).

Fasting venous blood sample was collected from each subject after an overnight fast of 10-12 hours using a standard method (10). Two millilitres was transferred into fluoride oxalate bottle and was used to estimate fasting plasma glucose (FPG) the same day using glucose oxidase method (11). The remaining was emptied into a clean dry plain tube, allowed to clot under room temperature and the serum harvested and stored in the freezer. The analysis of HDLC and TG were done within three days. HDLC was assayed by phosphotungstic acid precipitation and cholesterol oxidase method (13), TG was measured using enzymatic method (14).

The MS was defined according to the National Cholesterol Education Programme Adult Treatment Panel III (NCEP ATP III) as the presence of three of the following clinical criteria: blood pressure (Bp) ≥130/85 mmHg, waist circumference (WC) >102 cm in men and >88 cm in women, HDL cholesterol <1.0 mmol/l (40mg/dl) in men and <1.3 mmol/l (50mg/dl) in women, TG ≥1.7mmol/l (150mg/dl) and FPG ≥5.6mmol/l (101mg/dl) (3).

Statistical analyses were performed using SPSS version 15 software. Descriptive statistics were performed for the study population; continuous variables were presented as mean ± standard deviation. Categorical variables were expressed as absolute numbers and percentages and the differences in categorical variables were assessed by student's t-test. A two tailed P-value less than 0.05 was considered significant.

RESULTS

In the study sample (n= 205) 16.6% (34 subjects) fulfilled the criteria for MS. The UD had a higher prevalence of 20.4% (21 subjects) as against 12.7% (13 subjects) recorded for the RD. Moreover, the prevalence of MS was higher in women {24.8% (27 subjects)} than in men {7.3% (7subjects)} (Table 1).

Table 1

The Prevalence of MS in all the Groups.

Groups	N	MS	Prevalence (%)
Total	205	34	16.6
Urban	103	21	20.4
Rural	102	13	12.7
MEN	96	7	7.3
WOMEN	109	27	24.8

The urban subjects had less favourable levels of BMI (28.42±5.18kg/m²), WC (90.82±10.63cm) and TG (1.20±0.6mmol/L) than the rural subjects (23.13±3.94kg/m²), (83.35±10.16cm) and (0.9±0.34mmol/L) respectively ($p<0.05$) (Table 2).

Table 2

The Comparison of the Mean Values of Anthropometric and Biochemical Parameters of Urban and Rural Subjects.

	URBAN	RURAL	P VAL
N	103	102	
WHR	0.88±0.07	0.89±0.55	P>0.05
BMI (kg/m²)	28.42±5.18	23.13±3.94	P<0.05
WC (cm)	90.82±10.63	83.35±10.16	P<0.05
FPG (mmol/l)	4.45±0.63	4.26±0.80	P>0.05
TG (mmol/l)	1.20±0.60	0.90±0.34	P<0.05
HDLC (mmol/l)	1.19±0.30	1.25±0.35	P>0.05
Diast (mmHg)	82.37±11.58	78.81±17.65	P>0.05

The result in Table 3 shows that by ATP criteria, only 5.4% of the subjects had hyperglycaemia. The prevalence of low HDLC was 48.3%, hypertension was 47.3% excess WC was 28.8% and high TG was 8.3%. Although raised WHR is not among the ATP criteria, it recorded the highest prevalence of 52.7%. However, among the subjects with MS, the most prevalent risk factors recorded were low HDLC (94.1%), excess WC (85.3%), hypertension (82.4%) and raised WHR (67.4%).

Table 3

The prevalence of abnormal parameters among all the subjects. Prevalence of MS=34 (16.6%)

	WHR	BMI	WC	FPG	TG	HDLC	DIA	SYS
N	205	205	205	205	205	205	205	205
Abnormal (N)	108	45	59	11	17	99	74	97
Abnormal (%)	52.7	22.0	28.8	5.4	8.3	48.3	36.1	47.3
Abnormal (In MS)	23	15	29	4	10	32	23	28
Abnormal (% In MS)	67.4	44.1	85.3	11.8	29.4	94.1	67.6	82.4

The most prevalent abnormalities recorded for the UD were high systolic blood pressure (HSBP) (53.4%), low HDLC (48.5%), raised WHR (48.5%), High diastolic blood pressure (HDBP) (43.7%), high BMI (37.9%) and excess WC (34%) while the most prevalent risk factors seen among those with MS in the group were low HDLC (90.5%), excess WC (90.5%), HBP (81%) and high BMI (61.9%). However, the most prevalent abnormalities found among the RD were raised WHR (56.9%), low HDLC (48%), HSBP (41.2%), HDBP (28.4%) and excess WC (23.5%). The most common risk factors seen among those with MS were low HDLC (100%), HBP (84.6%), raised WHR (84.6%) and excess WC (76.9%). Other abnormalities were rarely seen among the subjects with MS in these groups (Tables 4 and 5).

Table 4

The prevalence of abnormal parameters among the urban subjects. Prevalence MS=21(20.4%)

	WHR	BMI	WC	FPG	TG	HDLC	DIA	SYS
N	103	103	103	103	103	103	103	103
Abnormal (N)	50	39	35	4	12	50	45	55
Abnormal (%)	48.5	37.9	34.0	3.9	11.7	48.5	43.7	53.4
Abnormal (In MS)	12	13	19	2	5	19	17	17
Abnormal (% In MS)	57.1	61.9	90.5	9.5	23.8	90.5	81.0	81.0

Table 5

The Prevalence Of Abnormal Parameters Among The Rural Subjects.Prevalence Of MS=13(12.7%)

	WHR	BMI	WC	FPG	TG	HDLC	DIA	SYS
N	102	102	102	102	102	102	102	102
Abnormal (N)	58	6	24	7	5	49	29	42
Abnormal (%)	56.9	5.9	23.5	6.9	4.9	48.0	28.4	41.2
Abnormal (In MS)	11	2	10	2	5	13	6	11
Abnormal (% In MS)	84.6	15.4	76.9	15.4	38.5	100.0	46.2	84.6

Finally, WC correlated positively with TG (R=0.244) among UD and negatively with HDLC (R= -0.241) among RD ($P<0.05$). Also, WHR correlated positively with SBP (R=0.241) and DBP (R=0.201) among the RD ($P<0.05$).

DISCUSSIONS AND CONCLUSION

The overall prevalence of 16.6% obtained in this study is comparable to 16% recorded among the Non- Hispanic Americans (15) but lower than 22% reported in Katsina town Nigeria (4) and 30% reported among the South African corporate executives (16). Probably, this is because the study in Katsina involved only the urban dwellers (UD) who enjoy

the luxury of urban life and the South African corporate executives whose job are sedentary in nature. These two groups of subjects are likely to have an increased risk of developing MS. However, it is higher than 12.1% reported among rural communities in Ife (5) and 11% recorded for the Canada Europeans (17). The variation in the prevalence of MS in various ethnic groups, suggests genetic cause for the MS. This was observed in the San Antonio Heart study, in which a higher prevalence of 21.1% was obtained among the Mexican Americans as against 16% obtained among the Non-Hispanic Americans (15) all were Americans but different ethnicity.

In addition to genetic predisposition, changing lifestyle associated with industrialization and diets may have contributed reasonably to the relatively high prevalence of abdominal obesity obtained among the urban dwellers UD. Obesity can lead to high blood pressure (HBP), high TG and low HDLC and thus high prevalence of MS recorded among the UD. The high prevalence of MS recorded among the UD in this study, is comparable to what was observed in the work done among the UD in Katsina which recorded higher prevalence when compared to the work done on the rural dwellers (RD) in Ile-Ife. These two works were reported differently as a representation of the prevalence of MS in apparently healthy adult Nigerians (4-5). Also the work done among the Indians, gave the same result (18). On the contrary, lower prevalence of MS was recorded among the urban Finnishians compared to the rural Finnishians and this was attributed to higher level of education and income unlike the RD who were less educated and poor (19).

Moreover, higher prevalence of excess WC (abdominal obesity), low HDLC and significant higher value of BMI were recorded among the women than men, thus resulting to a higher prevalence of MS among the women than the men. This higher prevalence of abdominal obesity among women was obtained in Katsina, Ile-Ife and among the African American women in USA (4,5,7) but disagrees with the work of Sam et al, which recorded higher prevalence of abdominal obesity in men (20).

Obesity (measured as raised WHR and excess WC) was the most prevalent abnormality recorded among the subjects studied followed by low HDLC and HBP. This is comparable with the result obtained by Wahab and colleagues which recorded low HDLC and obesity as the most prevalent abnormalities observed in their work (4). However, low HDLC was the most prevalent risk factor recorded among the subjects with MS, followed by obesity and HBP. This disagrees with the result obtained among the Japanese, which recorded HBP as the most common risk factor (21).

In conclusion, relatively high prevalence of MS was recorded in this study and UD and women were mostly affected. The increase in high calorie diet and reduced physical inactivity caused by the luxury of modern life are the probable cause of the high prevalence of MS among UD.Low HDLC, obesity and HBP were the most prevalent criteria observed while hyperglycaemia and high TG were the least observed.

References

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