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Generalized And Abdominal Obesity; The Association With Hypertension Among Men In Ikeja, Lagos State

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Abstract

Background

Obesity is an increasing problem in the developing world, with more than 115 million people suffering from obesity-related problems. Abdominal obesity and increased body mass index are known to be associated with hypertension[5], an important public health problem worldwide and the most widely recognized modifiable risk factor for cardiovascular disease, cerebrovascular disease (stroke) and end-stage renal disease.

Methods

A descriptive, cross-sectional community-based study involving three hundred apparently healthy men aged 20 years and above to determine the prevalence of generalized and abdominal obesity and their association with hypertension

Results

The prevalence of abdominal and generalised obesity was 16.7% and 12.7% respectively. The prevalence of hypertension was 46.7%. Abdominal obesity (measured as waist circumference ≥ 120) had a stronger association with hypertension than generalized obesity(measured as BMI ≥30 kg/m^2).

Conclusion

The prevalence of generalized and abdominal obesity among urban men is high.

Abdominal obesity is strongly associated with hypertension. The need for public health actions to reverse this trend cannot be over emphasized.

Keywords: Abodominal obesity,

Generalized Obesity, Hypertension, Men, Urban

Introduction

The problem of obesity is increasing in the developing world, with more than 115 million people suffering from obesity-related problems.[1] The World Health Organization estimated that about 1.6 billion adults worldwide were overweight (body mass index [BMI] ≥25 kg/m^2) and at least 400 million were obese (BMI ≥30 kg/m^2) in 2005; numbers that are expected to reach 2.3 billion and 700 million, respectively, by 2015.[2]

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Nutritional and lifestyle transitions in developing countries have led to significant shifts in dietary and physical activity patterns. These changes have significant effects on body composition and metabolism, including increased Body Mass Index (BMI), excess generalized and abdominal adiposity, deposition of ectopic fat, and increased dyslipidemia and diabetes.[1]

Obesity and overweight in adulthood are associated with low life expectancy and increased mortality.[3]

Persistent obesity deregulates metabolic processes controlling blood glucose, blood pressure, and lipids.[4]

Abdominal obesity, defined as waist circumference (WC) ≥ 102 cm for men and 88 cm for women; and BMI (kg/m□) are known to be associated with hypertension,[5] an important public health problem worldwide and the most widely recognized modifiable risk factor for cardiovascular disease (CVD), cerebrovascular disease (stroke) and end-stage renal disease.[6]

The risk of complications attributable to hypertension tends to be greater in developing economies. This is because the low rates of detection and treatment in such countries result in a proportionately higher rate of complications. A large number of hypertensive patients present for the first time with fatal and non-fatal cardiovascular events such as heart failure, coronary artery disease (CAD) and stroke.[7]

The purpose of this study was to determine the prevalence of generalized and abdominal obesity among men in Ikeja, the capital city of Lagos State, Nigeria, and to explore their association with hypertension.

Materials And Methods

This descriptive cross-sectional community-based study was conducted in Ikeja, an urban city, as well as the capital of Lagos State, with an area of about 46.20 km^2 and a population of 313,196.[8] Apparently healthy subjects (aged 20 years and above)who volunteered to participate in the study were consecutively recruited from local residents. Subjects were considered apparently healthy if they were asymptomatic for any disease, had no physical disability and believed they were in a good state of health.

Socio-demographic data was obtained using a structured pre-tested questionnaire and blood pressure and anthropometric measurements were taken. Blood pressure (BP) was measured on the left arm, by a trained nurse using an Accusson mercury sphygmomanometer. An appropriate-sized cuff was placed about 2.5cm above the antecubital fossa with the participants sitting, after resting for at least ten minutes. Three BP measurements were taken with at least three-minute intervals between consecutive measurements. The mean systolic and diastolic BP from the second and third measurements was calculated.[9]

Height and weight were measured with participants wearing light clothing and without shoes or caps. The waist circumference was taken at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest (hip bone). Hip circumference was taken around the maximum circumference of the buttocks.[9]The body mass index (BMI) was calculated using weight in kilograms divided by the square of the height in metres.

The diagnosis of hypertension was based on systolic blood pressure (BP) ≥ 140 mmHg or a diastolic blood pressure of ≥90 mmHg or both, and/or concomitant use of antihypertensive medications according to the WHO/ISH guidelines.[10] The classification of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure *(JNC-7)* was used to classify blood pressure into the following categories:

- Normal: systolic BP <120 and diastolic BP <80
- Prehypertension: SBP 120-139 or DBP 80-89
- Stage 1 hypertension: SBP 140-159 or DBP 90-99
- Stage 2 hypertension: SBP ≥160 or DBP ≥100 [11]

The BMI was classified using the WHO classification, with BMI <18.5 kg/m^2 regarded as underweight, BMI18.5–24.5 kg/m^2 as normal, BMI 25–29.5 kg/m^2 as overweight and BMI >30 $kg/m^2$was classified as obesity.[12]

Waist circumference between 94cm and 101cm was regarded as abdominal overweight, while it was considered as abdominal obesity if waist circumference exceeds 101cm.[13]

Ethical approval was obtained from the Health Research and Ethical Committee of the Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos State. Informed consent was also obtained from the respondents before recruitment into the study.

Statistical Analysis

Data was entered and analyzed using the IBM SPSS version 19. Age specific means and standard deviation of the anthropometric variables and the systolic and diastolic blood pressure were computed and compared. Pearson's correlation analysis was used to quantify the association of waist circumference and BMI with age, systolic and diastolic blood pressure. Chi square test was used to evaluate differences in categorical variables. Student's t-test was used to compare continuous variables. Binary logistic regression analysis was used to estimate the independent effect of each factor in treatment outcome. All variables with P value ≤ 0.05 were entered in the logistic regression model (stepwise). Differences between data were considered significant where $P < 0.05$.

Results

A total of 300 apparently healthy men were recruited for this study. The mean age was 48.4±14.5 years. Majority of the respondents were between 40-49 years, married, and with secondary school education.10%, 36% and 43% were current smokers, took alcohol and were engaged in some form of physical exercise respectively as shown in Table 1.

Table 2 shows that 18.3% and 16.7% of the respondents had abdominal overweight and abdominal obesity respectively, while 32.3% and 12.7% had generalized overweight and obesity respectively. The prevalence of hypertension was 46.7%. The prevalence of overweight and obesity (either abdominal or generalized) and hypertension tended to increase with age. The mean waist circumference, BMI, systolic and diastolic blood pressure also increased with age as shown in Table 3.

Table 4 shows that majority of the respondents who were overweight or obese (either generalized or abdominal) had high blood pressure. Among those who had abdominal or generalized obesity the prevalence of hypertension tended to increase with age (Table 5).

Table 6 showed the factors associated with hypertension among the respondents. Age, marital status, BMI and waist circumference were significantly associated with hypertension ($p < 0.05$).

However, binary logistic regression showed that waist circumference (1.100; CI 1.039 – 1.166) and age (1.101; CI 1.070 – 1.133) were significantly associated with hypertension as shown in Table 7.

Table 8 showed the correlation between BMI, blood pressure, waist circumference and age. There were significant positive correlations of BMI and waist circumference with both systolic and diastolic blood pressure. The correlation coefficient showed that the relationship of waist circumference with both systolic blood pressure (0.501) and diastolic blood pressure (0.499) was stronger than the relationship of BMI with both systolic blood pressure (0.465) and diastolic blood pressure (0.450). There was also significant positive correlation of BMI and waist circumference with age but the magnitude of correlation of waist circumference with age (0.360) was more than that of BMI with age (0.317).

Table 1 : Socio Demographic characteristics

Variable	Frequency	%
Age group		
20- 29	39	13.0
30 – 39	47	15.7
40 – 49	71	23.7
50 – 59	65	21.7
60 – 69	51	17.0
≥70	27	9.0
Ethnic Group		
Yoruba	184	61.3
Igbo	43	14.3
Hausa	2	0.7
Others	71	23.7
Marital status		
Single	54	18.0
Married	244	81.3
Divorced	2	0.7
Educational Status		
Primary	43	14.3
Secondary	160	53.3
Graduate	69	23.0
Post Graduate	28	9.3
Cigarette Smoking		
Yes	31	10.3
No	269	89.7
Alcohol intake		
Yes	107	35.7
No	193	64.3
Engage in Physical Exercise		
Yes	129	43.0
No	171	57.0

Table 2: Age Specific prevalence of BMI, Waist circumference and Grade of Hypertension

Variable	N	20-29(%)	30-39(%)	40-49(%)	50-59(%)	60-69(%)	≥70(%)
Waist Circumference							
Normal	195	19.0	23.6	21.0	16.4	13.8	6.2
Overweight	55	3.6	1.8	30.9	40.0	16.4	7.3
Obese	50	0	0	26.0	22.0	30.0	22.0
BMI							
Underweight	15	13.3	13.3	33.3	26.7	0	13.3
Normal	150	20.7	22.0	20.7	18.0	12.0	6.7
Overweight	97	4.1	12.4	25.8	26.8	23.7	7.2
Obese	38	5.3	0	26.3	21.1	26.3	21.1
Hypertension							
Normal	160	23.1	26.9	25.0	18.1	3.8	3.1
Hypertension	140	1.4	2.9	22.1	25.7	31.1	15.7
Hypertension Grading							
Normal	106	27.4	29.2	22.6	17.0	1.9	1.9
Pre HTN	56	14.3	23.2	30.4	19.6	7.1	5.4
Stage I	72	2.8	4.2	27.8	15.3	33.3	16.7
Stage II	66	0	0	15.2	37.9	31.8	15.2

Table 3: Age specific mean distribution of Age, blood pressure, WC and BMI

Variable	20-29	30-39	40-49	50-59	60-69	≥70	Total
Age	25.33	34.94	44.21	54.48	63.90	72.30	48.4±14.5
Systolic BP	112.03	114.15	128.11	141.17	151.67	149.63	132.0±23.5
Diastolic BP	70.64	75.34	83.80	90.43	96.08	94.11	83.22±15.1
WC	83.47	84.28	91.94	92.44	94.88	93.82	90.42±10.4
BMI	22.63	23.11	25.17	25.64	26.34	28.40	25.11±4.8
Total	39	47	71	65	51	27	300

Table 4: Distribution of BMI and WC by Grades of Hypertension

Parameter	Total	Normal(%)	Pre Hypertension(%)	Stage I(%)	Stage II(%)
Waist Circumference					
Normal	195	47.7	25.1	16.4	10.8
Overweight	55	23.6	7.3	40.0	29.1
Obese	50	0	0	36.0	58.0
BMI					
Underweight	15	46.7	26.7	26.7	0
Normal	150	46.7	23.3	18.0	12.0
Overweight	97	25.8	17.5	29.9	26.8
Obese	38	10.5	0	31.6	57.9

Table 5: Age Specific prevalence of hypertension in respondents with Abdominal and General Obesity

Type	N	20-29(%)	30-39(%)	40-49(%)	50-59(%)	60-69(%)	70-79(%)
General Obesity (BMI)							
Normal	4	50.0	0	50.0	0	0	0
Stage I	12	0	0	33.3	0	50.0	16.7
Stage II	22	0	0	18.2	36.4	18.2	27.3
Hypertension	34	0	0	23.5	23.5	29.4	23.5
Abdominal Obesity (WC)							
Pre Hypertension	3	0	0	0	100	0	0
Stage I	18	0	0	38.9	0	33.3	27.8
Stage II	29	0	0	20.7	27.6	31.0	20.7
Hypertension	47	0	0	27.7	17.0	31.9	23.4

Table 6 : Factors associated with hypertension among respondents

Factors	Non Hypertensive (n=160)	Hypertensive (n = 140)	t/X^2	p
Age Group				
< 40 years	80 (50.0)	6 (4.3)	12.153[x]	0.000
≥ 40 years	80 (50.0)	134 (95.7)		
Marital Status				
Single	50 (31.3)	4 (2.9)	40.78	0.000
Others	110 (68.7)	136 (97.1)		
Educational Status				
Primary	24 (15.0)	19 (13.6)	1.87	0.600
Secondary	89 (55.6)	71 (50.7)		
Graduate	35 (21.9)	34 (24.3)		
Post graduate	12 (7.5)	16 (11.4)		
Cigarette Smoking				
Yes	16 (10.0)	15 (10.7)	0.04	0.839
No	144 (90.0)	125 (89.3)		
Alcohol Intake				
Yes	58 (36.3)	49 (35.0)	0.05	0.8216
No	102 (63.8)	91 (65.0)		
Engage in Physical exercise				
Yes	75 (46.9)	54 (38.6)	2.10	0.1473
No	85 (53.1)	86 (61.4)		
BMI				
Underweight	10 (6.3)	5 (3.6)	8.049 [x]	0.000
Normal	105 (65.6)	45 (32.1)		
Overweight	41 (25.6)	56 (40.0)		
Obese	4 (2.5)	34 (24.3)		
Waist Circumference				
Normal	140 (87.5)	55 (39.3)	9.738 [x]	0.000
Overweight	17 (10.6)	38 (27.1)		
Obese	3 (1.9)	47 (35.6)		

Table 7:Logistic Regression analysis of Hypertension and some variables

Variables	B	Wald Statistic	p	odds Ratio	95% CI Lower	Upper
Age	0.096	43.813	0.000	1.101	1.070	1.133
WC	0.096	10.570	0.001	1.100	1.039	1.166
BMI	0.036	0.325	0.569	1.036	0.917	1.172
Single status	0.608	0.677	0.411	0.545	0.128	2.315

WC = Waist Circumference

Table 8: Correlation matrix between BMI, Blood pressure, Waist circumference and Age

Variables	BMI	Systolic BP	Diastolic BP	Age	WC
BMI	1.000	0.465^{XX}	0.450^{XX}	0.317^{XX}	0.806^{xx}
Systolic BP	0.465^{XX}	1.000	0.906^{XX}	0.617^{XX}	0.501^{xx}
Diastolic BP	0.450^{XX}	0.906^{XX}	1.000	0.574^{XX}	0.499^{xx}
Age	0.317^{XX}	0.617^{XX}	0.574^{XX}	1.000	0.366^{xx}
WC	0.806^{xx}	0.501^{xx}	0.499^{xx}	0.366^{xx}	1.000

^{XX} Correlation is significant at the 0.01 level (2 tailed)

Discussion

This study showed that the prevalence of generalised and abdominal obesity among men was 12.7% and 16.7% respectively. Similar finding was reported in studies conducted in Enugu and Port Harcourt Nigeria.[14,15] However, while some Nigerian studies reported a lower prevalence of abdominal and generalised obesity,[16,17] others have documented a higher prevalence in general obesity among men compared with the result obtained in this study.[7,16,18-20] There was age-specific increase in the means of the BMI and waist circumference and the prevalence of abdominal and generalised obesity also increased with age. In agreement with earlier studies, this study showed that generalised and abdominal obesity tends to increase with age.[17,21] The waist circumference is a measure of abdominal obesity and is important in the aetiology of metabolic disorders.[22] However, some studies have shown that increasing abdominal obesity is associated with urbanization in Nigeria.[23]

Obesity is culturally and socially acceptable among Nigerians and therefore is not usually recognized as a medical problem.[24] Thus, in an African society like Nigeria, where a plump appearance is still favoured in many tribes and fatness is still seen as a measure of affluence, there is need to educate the populace on the health benefits of an ideal weight. The higher prevalence of abdominal obesity among the study population shows that the need for health education cannot be overemphasized. With this , obesity and its adverse implications may be reduced to its barest minimum.[14]

The prevalence of hypertension among men obtained in this study was 46.7%; similar findings were reported in studies done both in Nigeria and other countries.[14,19,25,26] Studies done in other communities have reported a lower prevalence among men.[7,16,19,27] However a hospital based study conducted in Ogbomosho, South-West Nigeria reported a higher prevalence of 50.8%.[17] Unlike the findings from the study from Ogbomosho the prevalence of stage I (24%) and stage II (22%) is higher than prehypertension (18%).[17]

Increase in the prevalence of hypertension in Nigeria has been reported which has been attributed to rapid westernization of lifestyle, change in dietary habits and lack of physical activities in Nigerians living in both the rural and urban areas.[14] In agreement with all other previous studies, the prevalence of hypertension increased with age and the mean systolic and diastolic blood pressure increased with age.[28-30]

Abdominal and generalised obesity are associated with hypertension ($P < 0.05$). About 88.5% and 94.5% of those who had generalised and abdominal obesity respectively had hypertension. However, logistic regression showed that waist circumference (not BMI) and age were significantly associated with hypertension ($P < 0.05$).

In addition, waist circumference had a stronger correlation with both systolic and diastolic blood pressure than BMI. This is consistent with studies that have shown that abdominal obesity is associated with the risk of hypertension, which is also independent of the overall adiposity in some sites. [31,32].

A study documented that reduction of hypertension burden could occur if the waist circumference is reduced to less than 94 cm in men and 88 cm in women.[31] Obesity is associated with an increased risk of cardiovascular diseases, and this is enhanced by the presence of hypertension in overweight and obese individuals. The cardiovascular risk is significantly increased only in the presence of hypertension.[33] A world health report has shown that cardiovascular disease accounted for 9.2% of the total deaths in Africa[34] and by 2025 three-quarter of the world's hypertensive population will be in developing countries.[35] There is need for early intervention for this trend to be averted especially in a populous city like Lagos.

Conclusion

The prevalence of obesity among men in Ikeja Local Government Area of Lagos State was high. Abdominal obesity was associated with the development of hypertension. There is need to educate the populace about the health significance of abdominal obesity; continuous self assessment of their waist circumference using a simple tape measurement, and adoption of healthy lifestyle.

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