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The prevalence and Predictors of generalised obesity in a rural farming community in the Niger Delta Region of Nigeria

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Abstract

Background: Obesity, an independent risk factor for cardiovascular diseases has become a global epidemic even in the developing nations of the world. Epidemiologic transition with rapid urbanisation is important variable implicated in the rising prevalence of obesity. The prevalence of this major risk factor for cardiovascular disorders like hypertension, heart failure, coronary artery disease etc has not been richly studied in the rural setting of the Nigerian Niger Delta region despite the increasing urbanisation taking place in same region.

The aim of this research therefore is to determine the prevalence and predictors of obesity in a rural farming community of the Niger Delta region of Nigeria

Methods: A cross sectional study involving 388 subjects aged 15 years and above. Demographic social and relevant medical information and social information were obtained using a questionnaire administered by face-to-face interview. Anthropometric (height, weight, waist circumference, Waist-Hip-Ratio) and blood pressure measurements were done. Blood samples were taken for fasting blood sugar.

Results: The overall mean age of the study subjects was 40.88 ± 16.52 . The mean age for males was 40.66 ± 17.23 and that for females was 40.98 ± 16.17 . The male to female ratio was 1:2.1. The prevalence of generalised obesity in this study was 3.4%. The females had a higher prevalence than the males ($p = 0.02$). The prevalence of obesity found to be highest in the 50 to 59 years age group. Pearson and Spearman' rho correlation analysis of BMI with other parameters revealed that educational status, waist circumference, and hypertension had significant association while logistic regression confirmed these variables as well as physical inactivity as predictors of obesity.

Conclusion: The prevalence of obesity in this rural community is 3.4% and educational status, waist circumference and hypertension are important predictors.

Key words: Prevalence, Predictors, generalised obesity, rural, Niger Delta



INTRODUCTION

Obesity, an independent risk factor for cardiovascular diseases is fast becoming a global epidemic with increasing prevalence in sub-Saharan Africa.¹⁻³ This is associated with high consumption of calorie and fat laden diet along with sedentary life styles. Obesity in the developing countries is found to be commoner among the wealthy probably due to nutritional transition, transitions in energy expenditure due to urbanization and other unknown factors bearing in mind that urbanization is associated with a drastic decrease in physical activity and changes in dietary habits.⁴⁻⁵

In the Northern sub-region of Africa, Belahsen and Rguibi provided an overview of obesity and its determinants in six North African countries (Morocco, Mauritania, Algeria, Libya, Tunisia, and Egypt).⁶ The figures reported ranges from 13.5 to 46% in women, 4% to 22% in men while data from the West African sub-region, indicate high prevalence of obesity and even overweight.⁶⁻⁷ The World Health Organisation (WHO) in its 2010 publication, showed prevalence rate of obesity in Nigeria to be 3% and 8.1% in men and women respectively.⁸ It also reported a rising pattern of overweight and obesity in Nigeria between 2002 and 2010 having reported an increase of 23% in men and 18% in women of a combined prevalence of overweight and obesity, while the prevalence of obesity alone increased by 47% in men and 39% in women over same period.⁸ Additionally, Akarolo-Anthony et al in 2014 reported a high obesity prevalence of 26% amongst adult Nigerian.⁹ Hence, it has become a significant health problem as well in this region.

While a number of published works are urban-based studies, there are some publications from the rural African community that have shown increasing rural prevalence of obesity.⁷⁻¹⁰ Report from a rural fishing community in the Niger Delta region of Nigeria gave the prevalence of obesity as 16.3% to 31.7%.¹¹

Obesity is associated with increasing mortality from all causes including cardiovascular diseases.¹⁰ As depicted in the study of Bibbins-Domingo et al,¹² adolescent overweight increases rates of coronary heart disease among future young adult and several studies have established a relationship between obesity and hypertension.¹³⁻¹⁴ These serious complications of obesity can be curtailed if not completely prevented by appropriate education and health campaign on lifestyle modification. Prevention programmes start with screening to identify the population at



risk. Hence, the need to determine the crude prevalence and predictors of obesity in a rural farming community in the Niger Delta Region of Nigeria.

MATERIALS AND METHODS

This was a cross-sectional survey involving subjects 15 years and above in a rural, farming community in the Niger Delta region of Nigeria. Consent was obtained from individual participant, community leadership and ethical approval was obtained from the Ethical committee of the University of Port Harcourt Teaching Hospital.

Demographic data and other relevant social and medical information were obtained by the researcher and field assistants by means of a face-to-face questionnaire administration. Physical activity was assessed with World Health Organization (WHO) Step questionnaire which was modified to fit into the activities peculiar to the rural community where this study was done. Anthropometric and blood pressure measurements were done in a standardized manner. Participants were weighed barefooted using Hanson's weighing scale with readings taken to the nearest 0.1 kg and their heights measured without foot wear and headdress to the nearest 0.1cm. The uppermost border of the iliac crest and the lower border of the costal margin (rib cage) were located and the midway between these points was identified and served as the position for measuring waist circumference. Hip circumference was measured in a horizontal plane at the maximum width over the greater trochanter. Blood pressure was measured using a mercury sphygmomanometer. Fasting blood sample was taken for blood glucose analyses.

WHO classification of body mass index (BMI) was used in this study to grade BMI.¹⁵ BMI was calculated as weight in kilogram divided by the square of height in meters. Under weight- < 18.5 Kg/m²; Normal Weight- 18.5 to 24.9 Kg/m²; Overweight- 25 to 29.9 Kg/m²; Obesity- > 30 Kg/m². Waist circumference ≥ 102 cm for males and ≥ 88 cm for females was regarded as abdominal obesity.¹⁶ Hypertension was defined using the JNC 7 (Joint National Committee on Prevention, Evaluation, and Treatment report) criteria as blood pressure $\geq 140/90$ mmHg or self-reported anti hypertensive medication use¹⁷ while a fasting plasma glucose (FPG) of ≥ 7.0 mmol/l (126 mg/dl) and individuals who were previously known to have diabetes based on history of drug medication were classified to have diabetes in this study.

Statistical Package for Social Sciences (SPSS Inc, Chicago,IL) version 17 was used for data analyses and obtained results reported as either mean values (standard deviation) or



proportions. Comparison for statistical significance was by student's t test for continuous variables and chi-square analysis for categorical variables. Pearson and Spearman' rho correlation test were used to determine the relationship between obesity and its possible risk factors. Logistic regression was also done. A p-value of <0.05 was considered statistically significant.

RESULT

Three hundred and eighty eight participants had data analyzed with male to female ratio of 1:2.1. The overall mean age was 40.88 ± 16.52 years. The mean age for males was 40.66 ± 17.23 years and that for females was 40.98 ± 16.17 years. The overall prevalence of generalised obesity found in this study was 3.4% of which the female gender had a 100 percent prevalence and males 0% ($p=0.02$). The prevalence of obesity found to be highest in the 50 to 59 years age group of females as depicted in Table 1. The means and standard deviation of the study variables by gender are reported in Table 2. According to Table 3, a comparison of the means of the study parameters between the obese versus the normal weight subjects showed the means for weight, BMI, Systolic and diastolic blood pressure were statistically significant.

A comparison of percentage of occurrence of parameters between subjects with normal weight, over weight and obesity showed that the prevalence of physical inactivity, high hip circumference, hypertension and diabetes were highest in the obese category. Table 4 depicts this and other pertinent findings.

Pearson correlation and Spearman' rho correlation analyses (Table 5) showed that education status, hypertension and waist circumference correlated with obesity. Linear regression analysis, (Table 6), showed that all these variables as well as physical inactivity predicted presence of obesity.



Table 1. Age and Sex prevalence of obesity in the study population

Age groups	percentage
	Females
15-29 years	1.7
30-39 years	4.5
40-49 years	1.2
50-59 years	10.9
60-69 years	2.5
≥70 years	3.6

Table 2. Means and standard deviation of the study variables by sex

Variables	Total subjects(N=388)	Females(N=262)	Males(N=126)	p value
Age (years)	40.88±16.52	40.98±16.17	40.66±17.23	0.86
BMI(kg/m ²)	22.22±37	22.26±4.0	22.16±3.1	0.80
WC(cm)	71.64±10.31	71.31±10.88	72.34±9.01	0.36
WHR	0.94±0.1	0.94±0.1	0.94±0.1	0.78
SBP(mmHg)	120.06±21.82	118.88±22.39	122.53±20.45	0.12
DBP(mmHg)	74.22±13.23	73.67±13.1	75.38±13.52	0.23
FBS(mmol/L)	4.5±1.29	4.5±1.33	4.5±1.24	0.98
TCHOL(mmol/L)	4.0±0.81	4.04±0.82	3.93±0.79	0.24



Table 3. Comparison of Means and standard deviation of the subjects with obesity and normal weight

variables	Total subjects	Obese subjects	Normal weight	P value
Age (Years)	40.88±16.52	46.02±16.09	39.64±16.42	0.07
Weight(Kg)	55.61±10.86	80.62±10.94	80.62±10.94	<0.001*
BMI(kg/m ²)	22.22±37	32.35±3.06	21.45±2.02	<0.001*
WC(cm)	71.64±10.31	74.85±11.91	71.81±8.81	0.21
WHR	0.94±0.1	0.95±0.66	0.94±0.06	0.11
SBP(mmHg)	120.06±21.82	131.08±20.94	118.34±20.64	0.004*
DBP(mmHg)	74.22±13.23	83.38±14.98	72.89±12.40	0.003*
FBS(mmol/L)	4.5±1.29	4.8±1.58	4.42±0.99	0.233
TCHOL(mmol/L)	4.0±0.81	4.40±0.97	3.91±0.77	0.1

*statistically significant

Table 4. Comparison of percentage of occurrence of parameters between subjects with normal weight, over weight and obesity

Parameter	Obese subjects (%)	Overweight subjects (%)	Normal weight subjects (%)	P value
Physical inactivity	18.2	12.7	7.1	0.3
High WC	46.2	9.5	0	0.001
Hypertension	46.2	34.9	16.04	0.001
FBS ≥7mmol/l	7.7	3.4	1.5	0.6



Table 5. Relationship of generalised obesity with risk factors for obesity

variables	Coefficient of correlation (r)	p-value
Education	161	<0.001
Physical inactivity	-0.086	0.09
Hypertension	-0.161	<0.001
Waist circumference	0.392	<0.001

Table 6. Regression analysis of generalised obesity and correlates

	Unstandardised coefficient		t	P-value
	B	Std Error		
Education	0.640	0.25	2.57	0.01
Physical inactivity	-1.924	0.57	-3.36	<0.001
Hypertension	-1.249	0.432	-2.89	0.004
Waist circumference	-3.952	1.050	3.76	<0.001

DISCUSSION

The low prevalence of generalised obesity in this study is similar to what has been reported by several other authors in rural communities in different regions of Nigeria and in Africa.¹⁸⁻¹⁹ This low rate of generalised obesity could be due to high level of physical activity of the rural dwellers arising from their farming and household chores such as pounding, chopping of fire woods and other activities. Much higher prevalence rates were however reported in a rural study in the Niger Delta region of Nigeria (16.3%-31.7%)¹¹ and in a work by Sani et.al in Kastina, North-western, Nigeria (21.3%).²⁰ These high rates reported in the Niger Delta region of Nigeria may be related to the high level of sedentary lifestyle in that community as reported by the authors unlike the present study with low level of sedentary lifestyle. The work by Sani et.al was an urban study that involved local residents, hospital staff and relations of in-patients



of a tertiary hospital in Kastina state. This may account for the higher prevalence as generalised obesity is commoner in the urban than rural areas.^{4-5,21}

In this study, generalised obesity was remarkably commoner in females than males. This is in agreement with reports by Siminialayi et al in Okirika, Rivers State,¹¹ Okesina et al in rural Maiduguri¹⁸ and Ezenwaka et al in South-Western Nigeria.¹⁹ This pattern was also depicted in studies done in West African sub-region and Northern African sub-region as reported by Belahsen et al.⁶ Reports from Asia²² and the United States of America in²³ gave similar pattern. In females, the high prevalence of obesity in the middle aged may be part of the constellation of metabolic syndrome common in middle aged females.

Age is an important risk factor implicated in obesity. In this study, obesity was found in all age groups of the female gender while none was found in all male age groups. Females in the middle age group had the highest prevalence of obesity in this study. This is similar to the findings in other studies where the prevalence of obesity was highest in the middle aged females.^{7, 14, 24} These could be part of the constellations of metabolic syndrome commoner in the middle age. In a comparison of the means and standard deviation of the subjects with obesity and normal weight in this study, a higher value was found amongst the obese group buttressing the link between obesity and lipid abnormalities.

The correlation analyses for obesity showed that education status, hypertension and waist circumference correlated with obesity while the logistic regression confirmed these variables as significant predictors of obesity. Hypertension is about 6 times more frequent in obese subjects than in lean men and women.¹⁴ Not only is hypertension more frequent in obese subjects than in normal-weight subjects, but also weight gain in young people is a potent risk factor for subsequent development of hypertension.¹⁴

REFERENCES

1. Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999–2000. *JAMA*. 2002; 288: 1723–1727.
2. Agyemang C, Owusu-Dabo E, de Jonge A, Martins D, Ogedegbe G, Stronk K: Overweight and obesity among Ghanaian residents in The Netherlands: how do they weigh against their urban and rural counterparts in Ghana? *Public Health Nutr* 2008:1-8.
3. Rotimi CN, Cooper RS, Ataman SL, Osoimehin B, Kadiri S, Muna W,



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- Kingue S, Fraser H, McGee D: Distribution of anthropometric variables and the prevalence of obesity in populations of Prevalence of the metabolic syndrome in Benin, West Africa. *Nutr Res*. 2009, 29(3):180-189.
4. Ntandou G, Delisle H, Agueh V, Fayomi B: Abdominal obesity explains the positive rural-urban gradient in the prevalence of the metabolic syndrome in Benin, West Africa. *Nutr Res* 2009, 29(3):180-189
 5. Kaufman JS, Rotimi CN, Brieger WR, Oladokum MA, Kadiri S, Osotimehin BO, Cooper RS: Determinants of Hypertension in West Africa: Contribution of anthropometric and dietary risk factors to urban-rural and socioeconomic gradients. *American Journal of Epidemiology* 1996, 143:1203-1218.
 6. WHO (2006)| WHO Global InfoBase www.who.int/ncd_surveillance/infobase/en/.
 7. Amoah A. Sociodemographic variations in obesity among Ghanaian adults. *Public Health Nutrition* 2003;6:751-757.
 8. Ono T, Guthold R, Strong K: WHO Global Comparable Estimates: Global Infobase data for saving lives 2005; 2012. <https://apps.who.int/infobase/Index.aspx>.
 9. Sally N Akarolo-Anthony, Walter C Willett, Donna Spiegelman and Clement A Adebamowo Obesity epidemic has emerged among Nigerians *BMC Public Health* 2014, **14**:455 DOI: 10.1186/1471-2458-14-455
 10. Agyemang C, Owusu-Dabo E, de Jonge A, Martins D, Ogedegbe G, Stronk K: Overweight and obesity among Ghanaian residents in The Netherlands: how do they weigh against their urban and rural counterparts in Ghana? *Public Health Nutr* 2008:1-8.
 11. Siminialayi I, Emem-Chioma P, Dapper D: The prevalence of obesity as indicated by BMI and waist circumference among Nigerian adults attending family medicine clinics as outpatients in Rivers State. *Niger, J Med* 2008, 17(3):340-345.
 12. Bibbins-Domingo, K., Coxson, P., Pletcher, M.J., Lightwood, J. and Goldman, L. 2007. Adolescent Overweight and Future Adult Coronary Heart Disease. *Engl J Med* (357):2371-9.
 13. Ulasi II, Ijoma CK, Onwubere BJC, Arodiwe E, Onodugo O, Okafor C. High Prevalence and Low Awareness of Hypertension in a Market Population in Enugu, Nigeria. *International Journal of Hypertension* 2011; 2011:869675

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14. Stamler R, Stamler J, Riedlinger WF, Algera G, Roberts RH. Weight and blood pressure: findings in hypertension screening of 1 million Americans. JAMA. 1978; 240: 1607–1610.
15. World Health Organization, “Obesity Preventing and Managing the Global Epidemic,” Report of a WHO Consultation on Obesity WHO/NUT/NCD/98.1, Geneva, Switzerland, 1997.
16. Waist Circumference and Waist–Hip Ratio: Report of a WHO Expert Consultation Geneva, 8–11 December 2008
17. Chobanian, AV, Bakris, GL, Black, HR, Cushman, WC. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The JNC 7 Report. JAMA 2003; 289:2560.
18. Okesina AB, Oparinde DP, Akindoyin KA, Erasmus RT. Prevalence of some risk factors of coronary heart disease in a rural Nigerian population. *East Afr Med J* 1999; 76:212-6.
19. Ezenwaka EC, Akanji AO, Akanji BO, Unwin NC, Adejuwon CA. The prevalence of insulin resistance and other cardiovascular disease risk factors in healthy elderly south-western Nigerians *Atherosclerosis* 1997; 128(2): 201-211.
20. Sani MU, Wahab KW, Yusuf BO, Gbadamosi M, Johnson OV, Gbadamosi A. Modifiable cardiovascular risk factors among apparently healthy adult Nigerian population – a cross sectional study. *BMC Res Notes*. 2010; 3:11.
21. Yusuf S, Reddy S, Stephanie. O, Sonia. A: Global Burden of Cardiovascular Diseases Part I: General Considerations, The Epidemiologic Transition, Risk Factors, and the Impact of Urbanization. *Circulation* 2001, 104:2746-22753.
22. Akter SF, Fauzi ARM, Nordin MS, Satwi S, Mohamed A, Aznan MA and Samsu D. Prevalence of cardiovascular risk factors in a selected community at Kuantan, Pahang, Malaysia *International Journal of Medicine and Medical Sciences* 2010; 2(10): 322-328.
23. Mokdad AH, Serdula MK, Dietz WH, Bowman BA, Marks JS, Koplan JP. The spread of the obesity epidemic in the United States, 1991–1998. *JAMA*. 1999; 282: 1519–1522.
24. Jackson M, Walker S, Cruickshank J, Sharma S, Cade J, Mbanya J. et al. Diet and overweight and obesity in populations of African origin: Cameroon, Jamaica and the UK. *Public Health Nutr*. 2007; 10:122–130.