The prevalence of adult obesity in Ogbomoso, southwest Nigeria.

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Original Article

ABSTRACT

Background: In many developing countries obesity and obesity-related morbidities are now becoming a major health challenges.

Objectives: To determine the prevalence of obesity among adults using the measure of body mass index (BMI) and waist circumference (WC).

Methods: A hospital based cross-sectional descriptive study of 400 adults was carried out. A standardized questionnaire was administered to the participants and had measurements of weight, height and waist circumference taken.

Results: Four hundred subjects were randomly selected (221 females and 179 males) and the mean age was 48.7 ± 16. 6 years. The overall prevalence of obesity using BMI was 14.8%, and based on WC was 33.8%. The prevalence of obesity using the BMI and WC among the males was the same (8.9%) while among the females the prevalence based on BMI was 19.5% and that of WC was 53.8%. The female subjects were more sedentary than the males (50.8% for males, 62.4% for females, $p<0.05$). Most of the obese subjects based on BMI (88.1%) and waist circumference (85.2%) preferred high calorie food.

Conclusion: Obesity in the study was high among females and is associated with physical inactivity and the consumption of high calorie diets.

Keywords: Obesity, body mass index, waist circumference, Nigeria.

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La prévalence de l'obésité chez l'adulte en Ogbomoso, sud-ouest du Nigéria.

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L'article d'origine

RÉSUMÉ

Antécédents: Dans de nombreux pays en développement l'obésité et l'obésité morbidité liée sont maintenant en train de devenir un des principaux défis à relever en matière de santé.

Objectifs: déterminer la prévalence de l'obésité chez les adultes en utilisant la mesure de l'index de masse corporelle (IMC) et circonférence de la taille (WC).

Méthodes: Un hôpital en fonction transversale étude descriptive de 400 adultes a été réalisée. Un questionnaire normalisé a été administré aux participants et a mesures de poids, de la hauteur et la circonférence prises.

Résultats: Quatre cents sujets ont été sélectionnés de façon aléatoire (221 femmes et 179 hommes) et la moyenne d'âge était 48,7 ± 16. 6 Ans. La prévalence globale de l'obésité utilisant L'IMC était de 14,8 %, et sur la base de WC était de 33,8 %. La prévalence de l'obésité en utilisant l'IMC et WC parmi les hommes était le même (de 8,9 %) tandis que chez les femmes, la prévalence en fonction de l'IMC était de 19,5 % et celui des toilettes était de 53,8 %. Les sujets de sexe féminin étaient plus sédentaires que celui des hommes (50,8 % pour les hommes, 62,4 % pour les femmes, $p<0.05$). La plupart des sujets obèses en fonction de l'IMC (88,1 %) et la circonférence (85,2 %) préféré haute calorie alimentaire.

Conclusion: L'obésité dans l'étude était élevé chez les femmes et est associé à la sédentarité et la consommation de calories alimentaires.

Mots-clés : l'obésité , l'indice de masse corporelle, la circonférence de la taille, du Nigéria.

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INTRODUCTION

In many developing countries overweight, obesity and obesity-related morbidities are becoming a major health challenges.(1)With urbanization and improved economic status has emerged a change in the nutritional pattern to a higher caloric content of diet and/or to the reduction of physical activity, and whose consequences are changes in the body composition of the individuals.(1) About 1.2 billion people (approximately 20% of the world population) in the world are overweight and at least 300 million of them are obese.(2)

World Health Organization (WHO) projects that approximately 2.3 billion adults will be overweight and more than 700 million will be obese by 2015 worldwide.(3) Obesity is defined as a condition of abnormal or excessive fat accumulation in the adipose tissue of the body.(4) Body mass index (BMI), is weight in kilograms divided by the square of height in metres (kg/ m2) and BMI is used to measure the "degree of fatness". Overweight is defined as BMI values between 25. 0 and 29.9kg/ m2 while obesity is BMI value ≥30kg/ m2.(4) Normal weight is characterized by a BMI of between 18 and 24.9kg/m2. Body mass index does not give us information about the distribution of fat in our body. That is a shortcoming because the distribution of the fat also determines types of health impairment. For example, it is known that fat accumulated in the abdomen (truncal obesity) which is metabolically active is far more dangerous than fat deposited in other parts of the body.

The 'gold standard' for assessing abdominal adiposity is the use of imaging techniques but the use imaging techniques are impractical in large epidemiological studies(5) hence, waist circumference (WC) is considered as the best anthropometric alternative for assessing abdominal adiposity. Waist circumference is an aggregate measurement of the actual amount of total and abdominal fat accumulation and is a crucial correlate of metabolic syndromes found among obese and overweight patients.(5) Abdominal overweight is defined as WC between 94cm and 101cm for men and between 80cm and 87cm for women, while abdominal obesity is defined as WC≥102cm and ≥88cm for men and women respectively.(4)

Study Area

Ogbomoso is located about 100km north of Ibadan, the Oyo State capital in Southwest Nigeria. The indigenous people are from the Yoruba ethnic group. Faming and trading are the major occupations of the inhabitant. The two degree- awarding institutions in Ogbomoso are Ladoke Akintola University of Technology and The Nigerian Baptist Theological Seminary. The people of the town access health care from a government-owned general hospital, a Baptist mission hospital, a few Primary Health Care centres and an increasing number of private hospitals.

METHODOLOGY

Ethics Committee of the Baptist Medical Centre, Ogbomoso gave approval for the study. The study was conducted at the medical out- patients' clinic between January and July, 2008. Written informed consent was also obtained from the subjects before their enrollment to participate in the study. The study was hospital based cross-sectional descriptive survey. Subjects aged 18 years and older who gave consent for the study were recruited.

Pregnant women, women in the puerperium (day of delivery to 6weeks post delivery), patients with ascites and intrabdominal masses determined through history and physical examination were excluded from the study. The subjects were selected through a systematic random sampling method. The list of patients who were registered each day to see the doctor at the medical out-patients' clinic was taken as a sample frame, and from a review of records, an average of 100 patients were estimated to attend the medical outpatient clinic per day during the period of the study. A sampling fraction (interval) of 10 was chosen and the first subject was determined by balloting

from the first ten patients as the starting number of the systematic sampling technique, subsequent selections were every 10th registered patient on the register. An identification sticker was attached to the record cards of the selected subjects from the records office, where the sampling was done and sent to a designated consulting office for the study. The selected subjects were screened and those who met the inclusion criteria were recruited for the study.

In order to prevent repeat selection an identification sticker was left on all selected subjects' cards until the study was over. A pre-tested questionnaire was administered by the researcher to obtain the following information: age, sex, marital status, ethnic group, religion, nationality, occupation, educational status, physical activity, and eating habits. The weight of all the subjects was determined using the Healthometer weighing scale made by Continental Scale Corporation, USA to the nearest single decimal and was measured in kilogrammes (kg). The height was determined in metres using the Stadiometer scale to the nearest single decimal. The weight and height were measured with the subjects wearing light clothing and without shoes. Body mass index (BMI) was calculated as weight (kg) divided by height squared (m2). Obesity was defined as body mass index (BMI) $\geq$30 kg/ m2 and overweight as 25.0–29.9 kg/m2.(4) A flexible non- stretchable tape measure was used to measure waist circumference (WC) in centimeters(cm). The measurement of waist circumference was taken at the midpoint between the lower rib border and iliac crest at the end of expiration with the subjects in standing position.(6) Abdominal overweight for male was defined as WC between 94cm and 101cm and for female between 80cm and 87cm, while abdominal obesity was defined as WC$\geq$102cm and $\geq$ 88cm for male and female respectively.(4)

The subjects were classified to be physically active if they engage in leisure time physical activity (walking, fitness training and sports) for three or more times per week of at least thirty minutes per occasion.(7) Registrar General's Scale of social classes.(8) was used to group the subjects into one of the five social classes

Class 1: Professional e.g. Lawyer, Doctor, Accountant.
Class 2: Intermediate e.g. Teacher, Nurse, Manager.
Class 3N: Skilled non-manual e.g. Typist, Shop assistant, telephone operators.
Class 3M: Skilled manual e.g. Miner, Bus-driver, Cook, artisans.
Class 4: Partly skilled (manual) e.g. Farm worker, Bus conductor.
Class 5: Unskilled e.g. Cleaner, Labourer.

Data analysis was done by computer using the statistical package for social sciences (SPSS 13).Pearson Chi-square was used to establish the relationship between the variables. P- value values < 0.05 were considered to be significant obtain the following information: age, sex, marital status, ethnic group, religion, nationality, occupation, educational status, physical activity, and eating habits. The weight of all the subjects was determined using the Healthometer weighing scale made by Continental Scale Corporation, USA to the nearest single decimal and was measured in kilogrammes (kg). The height was determined in metres using the Stadiometer scale to the nearest single decimal. The weight and height were measured with the subjects wearing light clothing and without shoes. Body mass index (BMI) was calculated as weight (kg) divided by height squared (m2). Obesity was defined as body mass index (BMI) $\geq$ 30 kg/ m2 and overweight as 25.0–29.9 kg/m2(4) A flexible non- stretchable tape measure was used to measure waist circumference (WC) in centimeters(cm). The measurement of waist circumference was taken at the midpoint between the lower rib border and iliac crest at the end of expiration with the subjects in standing position.(6) Abdominal overweight for male was defined as WC between 94cm

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Data analysis was done by computer using the statistical package for social sciences (SPSS 13).Pearson Chi-square was used to establish the relationship between the variables. P- value values < 0.05 were considered to be significant

RESULTS

A total of 400 adult subjects were recruited for the study. The mean age of the subjects was 48. 7 ±16. 6 years. The female subjects (55. 3%) were more than male subjects (44. 6%). The overall prevalence of obesity based on BMI was 14.8% and based on waist circumference, it was 33.8% (TABLE I). The prevalence of obesity based on BMI and waist circumference increased with age up to the age group 40-49 years after which they declined. The mean BMI among the subjects was 24. 6 ± 5. 4 Kg/m2 (23.2 ± 4.2 Kg/m2 for males and 25.9 ± 6. 0 Kg/m2 for females) while the mean waist circumference was 87.6 ± 14.1cm (84.1 ± 12.7cm for males and 90.4 ± 14.6cm for females) (TABLE II).

The prevalence of obesity based on BMI and waist circumference among the males were the same (8.9%) while among the females the prevalence based on BMI was 19.5% and that of waist circumference was 53.8% (Table I).

The prevalence of physical inactivity among the subjects was 57.3% (62.4% for females and 50.8% for males, $p<0.05$) (Table I). The majority (62.4%) of the physically inactive subjects were female. Among the subjects who were obese based on BMI, 66.1% of them were physically inactive (TABLE III) while 64.4% of those who were obese based on waist circumference were inactive (TABLE IV). The overwhelming majority of the subjects who were obese based on waist circumference (85.2%) (TABLE IV) and BMI (88.1%) (TABLE III) preferred to consume high calorie diet (TABLE I). More than one-half of the subjects who were obese based on BMI (59.3%) (TABLE III) and waist circumference (62.2%) (TABLE IV) were from social class 3N.

DISCUSSION

It was noticed from this research that obesity based on BMI and waist circumference increased with age up to age group 40-49 years after which they declined. This finding is similar to what Siminialayi et al found in Rivers State.(9) They found that abdominal obesity was more common among subjects older than 40 years. The prevalence of obesity based on BMI among our subjects was 14. 8% while the prevalence of obesity based on waist circumference was 33. 8 %.The prevalence of obesity based on BMI and waist circumference found in this study can be comparable with 16.3% for BMI and 31.7% for waist circumference found in Okrika, Rivers State, Nigeria by Siminialayi et al.(9) The findings is the same in Cotonou, Benin Republic where Sodjinou et al(10) found an overall prevalence of abdominal obesity of 32.0% but Rguibi and Belahsen(11) in Sahraoui, Morocco found a prevalence of abdominal obesity (76.0%) which was higher than that which was found in this study among the women. The prevalence of obesity based on BMI and waist circumference among the males were the same (8.9%) while among the females the prevalence based on BMI was19.5% and that

of waist circumference was 53.8%. The high prevalence of physical inactivity found among the female subjects is likely to be one of the major factors that may account for the high prevalence of obesity found among the female subjects in this study. This is in line with the findings of Kruger et al(12) in the North West Province, South Africa where they examined the association between measures and determinants of obesity in African women. They discovered that physical inactivity showed the strongest association with obesity. The findings of Afolabi et al(13) in Abeokuta, Nigeria also supported the strong association between obesity and physical activity. In addition, intake of high calorie diets is one of the major factors responsible for the development of obesity and this has been corroborated by this study where the majority of the of the subjects who were obese based on BMI (88.1%) and waist circumference (85.2%) preferred starchy food. However, contrary to the findings of many studies (14) where obesity was strongly associated with high socio-economic status, more than one half of the subjects who were obese based on BMI (59.3%) and waist circumference (62.2%) belonged to the social class 3N. These findings may be as a result of low representation of the subjects from social class 1 in this study where they constituted only 1. 0% of the total study population.

CONCLUSION

It was discovered from this study that obesity in this environment is particularly significant among females and is associated with physical inactivity and the consumption of high calorie diets. The use of only BMI in estimation of obesity in Ogbomoso will probably result in an underestimation of the prevalence of obesity especially
in women in which the prevalence based on BMI was lower than that of waist circumference. Studies have shown that people with a large waist are many times more at risk of developing ill health and these increased risks also apply in people with normal BMI but who have a large waist. (6,13) Since the measurement of waist circumference requires only the use of a tape measure, most clinics in developing countries will be able to afford a tape measure and it will be easier to make measurement of waist circumference a routine procedure than BMI which requires mathematical calculation to derive. This will help in the early detection of patients with large waists and the instituting of the measures that will lead to a reduction in waist sizes before patients develop complications associated with obesity. Since most patients should already be familiar with their waist sizes it will not be difficult to teach then how to measure their waist circumference and appreciate an abnormal waist size than abnormal BMI which requires mathematical calculation to derive. People who understand the dangers associated with large waists will be well motivated to institute measures with physical exercise and diets, designed to get their waists back to normal, and thus reduce their risks of disease conditions associated with obesity.

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TABLE I: THE ASSOCIATION BETWEEN GENDER, OBESITY AND PHYSICAL ACTIVITY

	MALE	FEMALE	TOTAL	X^2	P-VALUE
ABDOMINAL ADIPOSITY	**n (%)**	**n (%)**	**n (%)**		
NORMAL	139(77.7)	56(25.4)	195(48.7)		
OVERWEIGHT	24(13.4)	46(20.8)	70(17.5)	117.715	0.000
OBESE	16(8.9)	119(53.8)	135(33.8)		
TOTAL (N)	179(100.0)	221(100.0)	400(100.0)		
BMI OBESITY					
NORMAL	126(70.4)	115(52.0)	241(60.2)		
OVERWEIGHT	37(20.7)	63(28.5)	100(25.0)	15.378	0.000
OBESE	16(8.9)	43(19.5)	59(14.8)		
TOTAL(N)	179(100.0)	221(100.0)	400(100.0)		
PHYSICAL ACTIVITY					
ACTIVE	88(49.2)	83(37.6)	171(42.7)		
INACTIVE	91(50.8)	138(62.4)	229(57.3)	5.442	0.020
TOTAL(N)	179(100.0)	221(100.0)	400(100.0)		

X^2 = Chi Square

TABLE II: GENDER AND MEAN VALUES OF VARIABLES

VARIABLES (UNITS)	MEAN AND STANDARD DEVIATION		
	MALE	FEMALE	TOTAL
AGE (years)	49.3 ± 18.1	48.1 ± 15.3	48.7 ± 16.6
BMI (Kg/m2)	23.2 ± 4.2	25.9 ± 6.0	24.6 ± 5.4
WC (cm)	84.1 ± 12.7	90.4 ± 14.6	87.6 ± 14.1

TABLE III: THE ASSOCIATION BETWEEN BMI OBESITY, PHYSICAL ACTIVITY, DIET AND SOCIAL CLASS

	NORMAL	OVER WEIGHT	OBESE	TOTAL	X^2	P-VALUE
PHYSICAL ACTIVITY	n (%)	n (%)	n (%)	n (%)		
ACTIVE	107(44.4)	44(44.0)	20(33.9)	171(42.7)		
INACTIVE	134(55.6)	56(56.0)	39(66.1)	229(573)	2.220	0.330
TOTAL(N)	241(100.0)	100(100.0)	59(100.0)	400(100.0)		
DIET						
HIGH CALORIE	216(89.6)	86(86.0)	52(88.1)	354(88.5)		
LOW CALORIE	25(10.4)	14(14.6)	7(11.9)	46(11.5)	1.577	0.813
TOTAL(N)	241(100.0)	100(100.0)	59(100.0)	400(100.0)		
SOCIAL CLASS						
CLASS 1	3(1.2)	1(1.0)	0(0.0)	4(1.0)		
CLASS 2	48(19.9)	28(28.0)	11(18.6)	87(21.8)		
CLASS 3N	85(35.3)	51(51.0)	35(59.3)	171(42.8)		
CLASS 3M	13(5.4)	5(5.0)	4(6.8)	22(5.5)	31.321	0.001
CLASS 4	43(17.8)	5(5.0)	2(3.4)	50(12.5)		
CLASS 5	49(20.3)	10(10.0)	7(11.9)	66(16.5)		
TOTAL(N)	241(100.0)	100(1000)	59(100.0)	400(100.0)		

X^2 = Chi Square

TABLE IV: ASSOCIATION BETWEEN ABDOMINAL ADIPOSITY, DIET, SOCIAL CLASS AND PHYSICAL ACTIVITY.

VARIABLES	ABDOMINAL ADIPOSITY			X^2	P-VALUE
	NORMAL	OVERWEIGHT	OBESE		
DIET	n (%)	n (%)	n (%)		
HIGH CALORIE (354)	174(89.2)	65(92.9)	115(85.2)		
LOW CALORIE (46)	21(10.8)	5(7.1)	20(14.8)	5.874	0.209
TOTAL (N)	195(100.0)	70(100.0)	135(100.0)		
SOCIAL CLASS					
CLASS 1(4)	3(1.5)	1(1.4)	0(0.0)		
CLASS 2(87)	37(19.0)	18(25.7)	32(23.7)		
CLASS 3N(171)	53(27.2)	34(48.6)	84(62.2)	68.401	0.000
CLASS 3M(22)	15(7.7)	4(5.7)	3(2.2)		
CLASS 4(50)	43(22.1)	4(5.7)	3(2.2)		
CLASS 5(66)	44(22.6)	9(12.9)	13(9.6)		
TOTAL(N)	195(100.0)	70(100.0)	135(100.0)		
PHYSICAL ACTIVITY					
ACTIVE	93(47.9)	30(42.3)	48(35.6)		
INACTIVE	101(52.1)	41(57.7)	87(64.4)	4.996	0.082
TOTAL (N)	194(100.0)	71(100.0)	135(100.0)		

X^2 = Chi Square