Body size and abnormal lipids among adult patients at the Baptist Medical centre, Ogbomoso, Nigeria

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Abstract

Background: In many developing countries overweight, obesity and obesity-related morbidity are becoming a problem of increasing importance. Obese individuals are more likely to have elevated total cholesterol, triglycerides, low density lipoprotein (LDL) cholesterol and decreased high density lipoprotein (HDL) cholesterol.

Objective: To determine the prevalence of obesity using the measure of body mass index (BMI) and abnormal lipid level and the association between obesity and abnormal lipid level among adults in Ogbomoso, Nigeria.

Methods: A cross-sectional descriptive study of 400 adults aged 18 years and above was carried out at the Baptist Medical Centre, Ogbomoso, Nigeria. Participants were administered a standardized questionnaire and had measurements of weight, height and blood lipids taken.

Results: Four hundred subjects were randomly selected (221 females and 179 males) with a mean age of 48.65 ± 16.56 years. The overall prevalence of obesity was 14.75% (8.9% for males and 19.5% for females $p<0.05$). The female subjects were significantly more sedentary than the males (50.8% for males, 62.4% for females, $p<0.05$). Most of the subjects who were obese (88.1%) preferred high calorie food. The overall prevalence of abnormal lipid levels was 28.5% (26.8% for males and 29.9% for females). The prevalence of abnormal lipid levels among the subjects who were obese was 40.7%.

Conclusion: Obesity in this environment is particularly significant among females and is associated with abnormal lipid level.

Key words: Obesity, blood lipid level, body mass index.

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Introduction

In many developing countries overweight, obesity and obesity-related morbidity are becoming a problem of increasing importance.[1] Urbanization and economic development has led to a nutritional transition characterized by a shift 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] The World Health Organization (WHO) projects that by 2015, worldwide, approximately 2.3 billion adults will be overweight and more than 700 million will be obese.[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), defined as the weight in kilogrammes divided by the square of height in metres (kg/m2) is used to measure the "degree of fatness". Overweight is defined as BMI values between 25 and 29.9kg/m^2 while obesity is BMI value > 30kg/m^2.4Normal weight is characterized by a BMI of between 18 and 24.9 kg/m^2.

Obese individuals are more likely to have elevated total cholesterol, triglycerides, low density lipoprotein (LDL) cholesterol and decreased high density lipoprotein (HDL) cholesterol.[4,5] This metabolic profile is most often seen in obese people with a high accumulation of intra-abdominal fat and has consistently been related to an increased risk of coronary heart disease (CHD).[4] With weight loss, the levels of triglycerides can be expected to improve.

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A 10 kg weight loss can produce a 15% decrease in LDL cholesterol levels and an 8% increase in HDL cholesterol[4]. High Density Lipoprotein cholesterol reduces the risk of cardiovascular disease while LDL-cholesterol increases the risk of cardiovascular disease.[6] Serum lipid is measured as total cholesterol and its fractions; high density lipoprotein (HDL) cholesterol, low density lipoprotein (LDL) cholesterol, very low density lipoprotein (VLDL) cholesterol and triglycerides. Abnormal blood lipid levels, that is high total cholesterol (>5.0mmol/L), high levels of triglycerides (>1.7mmol/L), high levels of low-density lipoprotein (>3.0mmol/L) or low levels of high density lipoprotein cholesterol (<1.0mmol/L) men, (<1.2mmol/L) women all increase the risk of heart disease and stroke.[6]

The aim of this study was to determine the prevalence of obesity using the measure of body mass index (BMI) and abnormal lipid level and to determine if there is any association between obesity and abnormal lipid level among adults in Ogbomoso, Nigeria.

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. The majority of them engage in farming or trading. There are two degree- awarding institutions in Ogbomoso (Ladoke Akintola University of Technology and The Nigerian Baptist Theological Seminary) which attract people from other ethnic groups into the town. A government owned general hospital, a Baptist mission hospital, a few Primary Health Care centres and an increasing number of private hospitals meet the health needs of the people.

Methods

Approval was obtained from the Ethics Committee of the Baptist Medical Centre, Ogbomoso before the commencement of the study. The study was conducted at the medical out-patients' clinic between January, 2008 and July, 2008. Informed consent was also obtained from the subjects before their enrollment to participate in the study.

A cross sectional descriptive survey was used. 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. A systematic sampling method was used to select the subjects. 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 of 10 was chosen and a simple random sampling was done to pick the first subject 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 placed on all selected subjects' record cards 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 after an informed consent was sought and obtained. An identification sticker was left on all selected subjects' cards until the study was over to avoid a repeat selection.

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 family eating habits.

The weight of all the subjects was measured in kilogrammes using the Healthometer scale made by Continental Scale Corporation, USA to the nearest single decimal. The height was determined in metres using the Stadiometer scale to the nearest single decimal. The weight and height were measured with the subjects in 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) e" 30 kg/m^2 and overweight as 25 kg/m^2 d" BMI < 30 kg/m^2.

The subjects were requested to fast overnight. Blood sample was obtained in the morning after a 12-14hour fast. The blood sample was put in a lithium heparin bottle.

The blood was centrifuged (at 3000rpm, for 10min) about 30minutes after, and stored at 4^0c in plain plastic bottles overnight if analysis was not done the same day. The estimation of total cholesterol, HDL-cholesterol and triglycerides were done using the colorimetric method. All the analyses were done by a qualified Laboratory Scientist. The

LDL-cholesterol was calculated using the formula.[8]

LDL=Total cholesterol-(HDL + Triglycerides)/2.2

Abnormal lipid level was defined by the presence of one or more than one abnormal serum lipid concentration.[9]

The subjects who engaged in leisure time physical activity (walking, fitness training and sports) for greater than or equal to three times per week of thirty minutes per occasion were classified as physically active.[10]

Subjects' diets were classified as 'high calorie' or 'low calorie' diets according to their response to the question asked them to list 5 types of food they ate most in the order of preference and their consumption of fast foods/snacks. Those who had mainly refined carbohydrate and fatty foods including preference for fast foods were classified as having high calorie diet. While those who ate less of refined carbohydrate and fatty meals, and added vegetables and fruits as part of the food they ate most, were classified as having low calorie diets.

The subjects were placed into one of the five social classes based on their occupation using the Registrar General's Scale of social classes.[11]

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 were analyzed by computer using the statistical package for social sciences, version 13. (SPSS 13). Means and standard deviations were calculated. Pearson's Chi square test was performed to assess the relationship between obesity, abnormal lipid level, physical activity and diet. P-value of < 0.05 was set as level of statistical significance.

Results

A total of 400 subjects aged 18 years and older were recruited for the study. The mean age of the subjects was 48.65 ±16.57 years and there were more female subjects (55.25%) than male subjects (44.75%). The overall prevalence of obesity was 14.75%.

Obesity increased with age up to the age group 40-49 years after which it declined. The mean BMI among the subjects was 24.60 ± 5.43 Kg/m2 (23.15 ± 4.18 Kg/m2 for males and 25.93 ± 5.99Kg/m2 for females). The prevalence of obesity among the males was 8.9% while among the females it was19.5% $p<0.05$ (table 1).

Table 1: the association between sex, obesity, physical activity and abnormal lipid level

	Male	Female	Total	X2	P-value
	n (%)	n (%)	n (%)		
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)		
abnormal lipid					
normal	131(73.2)	155(70.1)	286(71.5)		
abnormal	48(26.8)	66(29.9)	114(28.5)	0.451	0.502
Total(n)	179(100.0)	221(100.0)	400(100.0)		

X^2 = Chi Square (%) = Percentage = n ÷ n X 100

The prevalence of physical inactivity among the subjects was 57.3% (62.4% for females and 50.8% for males, p<0.05) (table 1). Among the subjects who were obese, 66.1% (p>0.05) of them were physically inactive (table 2). The overwhelming majority of the subjects who were obese (88.1%) preferred to consume high calorie diet (p>0.05) (table 2). More than one-half of the subjects who were obese (59.3%) were from social class 3N (P<0.05) (table 2).

The overall prevalence of abnormal lipid levels was 28.5%. The prevalence of abnormal lipid levels among the male was 26.8% while it was 29.9% among the female. The prevalence of abnormal lipid levels among the subjects who were obese was40.7% (p< 0.05).

Table 2: The association between obesity, physical activity, diet, social class and abnormal lipid level

	Normal n (%)	Overweight n (%)	Obese n (%)	Total n (%)	x2	p-value
Physical activity						
Active	107(44.4)	44(44.0)	20(33.9)	171(42.7)		
Inactive	134(55.6)	56(56.0)	39(66.1)	229(57.3)	2.220	0.330
Total (n)	241(100.0)	100(100.0)	59(100.0)	400(100.0)		
Diets						
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(100.0)	59(100.0)	400(100.0)		
Abnormal lipid						
Normal	184(76.3)	67(67.0)	35(59.3)	286(71.5)		
Abnormal	139(57.7)	33(33.0)	24(40.7)	114(28.5)	8.068	0.018
Total (n)	241(100.0)	100(100.0)	59(100.0)	400(100.0)		

X^2 = chi square ( ) = percentage = n ÷ n x 100

Discussion

It was discovered from this study that obesity increased with age up to age group 40-49years after which it declined. This is similar to what was found in Rivers State, Nigeria by Siminialayi, Emem-Chioma and Dapper[12] where they found that obesity was more common among subjects older than 40 years. The prevalence of obesity among our subjects was 14.75%.The prevalence of obesity found in this study is comparable with 16.3% found in Okrika, Rivers State, Nigeria by Siminialayi, Emem-Chioma and Dapper.[12]

The prevalence of obesity among the males was 8.9% while it was19.5% among the female. The high prevalence of physical inactivity among the female subjects is one of the factors that may be responsible for the high prevalence of obesity found among the female subjects in this study. This is supported by the findings of Kruger, Venter, Vorster and Margetts[13] in the North West Province, South Africa where they investigated the association between measures and determinants of obesity in African women. They found that physical inactivity showed the strongest association with measures of obesity in their study. The fact that more than one-half (53.3%) of the subjects who were obese were traders (p<0.05) and that the female subjects constituted the

overwhelming majority (82.5%) of the subjects who were traders ($p<0.05$) is another reason for the high prevalence of obesity found among the female subjects. Most traders in Ogbomoso spend most of their time sitting down in their shops and engaging in predominantly sedentary activities. This strong association between obesity and trading was also supported by the findings of Afolabi, Addo and Sonibare[14] in their study in nearby Abeokuta, Ogun State, Nigeria and physical inactivity was the reason given for their findings.

In addition, consumption of high calorie diets is one of the major contributory factors to the development of obesity and this has been corroborated by this study where the majority of the subjects who were obese (88.1%) preferred high calorie diet. However, contrary to the findings of many studies[15,16] where obesity was strongly associated with high socio-economic status, more than one half of the subjects who were obese (59.3%) were from the social class 3N. This observation may be as a result of low representation of the subjects from social class 1 in Ogbomoso where they constituted only 1% of the total study population. Furthermore, it was discovered that the overall prevalence of abnormal lipid levels was 28.5%. This is at variance with the findings of Yao, Frommlet, Zhou, Zu, Wang, Yan et al[7] in Xinjiang, China where they found prevalence of 53.5% in the general population. The reference value used in this study is the one used in Europe,[6] so that may be one of the reasons responsible for this finding.

This is also supported by other studies that reported relatively lower levels of lipid profile in Africans than their Caucasian counterparts.[17,18,19] Among the subjects who were obese, 40.7% of them had abnormal lipid levels.

Conclusion

The findings from this study have suggested that obesity in this environment is particularly significant among females and is associated with abnormal lipid level. Therefore, there is need to promote lifestyle modification in Ogbomoso in order to retard the increasing prevalence of obesity and its associated complications.

The measurement of BMI should be made a routine procedure in the health care facilities. This will help in the early detection of patients who are overweight or obese before they develop complications associated with obesity.

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