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Lipid Profile Patterns of Overweight and Obese Primary Care Patients in Niger Delta Region, South-South Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author IAU conceived, designed the study, did the data collection and literature search. Author AF also took part in data collection, statistical analysis and general review of the study. Both authors read the work and approved the manuscript.

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ABSTRACT

Introduction: Overweight, obesity and their complications are major public health problems because of their effects on individuals, families and communities.
The objective of this study was to describe the lipid profile patterns of overweight and obese adult primary care patients attending the family medicine clinic of university of Uyo teaching hospital in the Niger Delta region of Nigeria.
Methods: This was a cross –sectional descriptive study done between October 2011 and March 2012. Using a systematic sampling technique, 584 subjects aged 18-65 years were recruited, data were collected with an interview-administered structured questionnaire. Subjects were measured for height, weight, waist and hip circumference. Body mass index (BMI) and waist –hip- ratio (WHR)

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were calculated. Using standard procedures, a complete lipid profile was done for all overweight and obese respondents. The lipid profile patterns of respondents were classified based on adult treatment plan III (ATP III).

Results: Of the 584 respondents, 196 (36.6%) were men and 388(66.4%) were women. The mean age for men was 43.3±17.8 years while that for women was 50.2±13.6 years. The prevalence of overweight amongst men was 39.8% versus 31.7% for women; 28.0% of men were obese compared to 52.0% for women. A total of 19.9% of overweight respondents had elevated levels of total cholesterol compared to 36.2% of obese (p=0.001).There was no significant difference in the levels of serum triglycerides between the overweight and obese respondents (p=0.12). A total of 11.9% of overweight respondents had elevated levels of low density lipoprotein cholesterol (LDL-C) compared to 27.6% obese (p=0.001); 16.9% of overweight compared to 45.1% of obese respondents had reduced levels of high density lipoprotein cholesterol (HDL-C) (p=0.001). There was no significant difference in the levels of serum lipids between male and female overweight and obese respondents in this study.

Conclusion: Overweight and obesity are now common in our environment. Abnormal lipid patterns are also common among the overweight and obese in our communities. Primary care physicians should now better appreciate the scope of care required by the overweight and obese patients in their care.

Keywords: Overweight; obesity; lipid profile; Niger Delta Region.

1. INTRODUCTION

Overweight and obesity were at one time associated with high income countries, but in recent time, low and middle income countries are also experiencing this epidemic [1,2].

Obesity is considered a public health problem because it is associated with multiple risk factors that place individuals in a significantly high risk group for cardiovascular diseases, hypertension, type-2 diabetes mellitus (T2Dm), Osteoarthritis and certain cancers [3].

Because of their protracted nature, these conditions lead to reduced quality of life as well as premature death.

Causes of overweight and obesity in Nigeria, a low-to-medium income country are multifactorial. These include increasing urbanization, sedentary lifestyles, nutritional transition resulting in consumption of foods high in calorie content thereby leading to changes in body composition of individuals and increased body lipid levels [4].

The dyslipidaemias associated with obesity have been attributed to various causes which include Insulin resistance, excessive intake of fat calories, increased production of free fatty acids and disturbances in the counter regulatory hormones [5].

When adjustments are made for some of these parameters such as insulin resistance, however, obesity still remains closely associated with many of the abnormal lipid disorders seen in obese individuals [5].

Several studies have reported plasma and/or serum lipid profile patterns among different population groups in Nigeria [6-9].

In spite of the above, published work on lipid profile patterns among overweight and obese primary care patients in Uyo, South-South Nigeria is scarce in the scientific literature.

Therefore, this study was designed to investigate the prevalence of overweight, obesity as well as lipid profile patterns among family medicine outpatient clinic attendees in Uyo, South-South Nigeria, an area also referred to as the Niger Delta region of Nigeria.

Findings from this study will assist primary care physicians to fully appreciate the scope of care that would be appropriate for the overweight and obese patients in their care.

2. RESEARCH METHODS AND DESIGN

2.1 Location of the Study

This study was carried out at the family Medicine Outpatient Clinic of the University of Uyo Teaching Hospital (UUTH).

University of Uyo Teaching Hospital is located on the outskirts of Uyo, the Capital of Akwa Ibom

State in Nigeria. Nigeria is divided into six geopolitical zones as follows: North-East, North-West, North-central, South-East, South-West and South-South. Uyo is located in the South-South geopolitical zone. The zone is otherwise referred to as the Niger Delta region.

University of Uyo Teaching Hospital is one of the Tertiary and referral health institutions in the State and its environs and serves a population of approximately 3.9 million people [10].

2.2 Subjects

This study was carried out among adult outpatients attending the family medicine clinic for various reasons.

They were recruited using a systematic random-sampling method with a sampling interval of six.

Each recruited subject was given information about the objectives of the research, and the reason for their recruitment, the fact that blood will be taken for analysis, and a written informed consent was obtained to show their willingness to participate in the study. Thereafter numbers ranging from one to six were assigned to the first six subjects who met the inclusion criteria.

The first respondent was chosen by simply balloting one of the numbers from a basket containing the assigned numbers. Thereafter, every sixth subject was recruited into the study.

Where, however, a subject was assessed to be too ill at the point of recruitment or below 18 years of age or above 65 years of age, such a subject was dropped and the next subject who met the inclusion criteria was recruited.

2.3 Methods

This study took place between October 2011 and March 2012. A total of 584 consenting male and female subjects took part in the study.

Weight was measured in Kilograms to the nearest 0.5 kg using a Hanna-calibrated bathroom scale, model BR9011. Each subject was weighed wearing light clothing with no shoes or stockings.

The height of the subjects was measured using an improvised wooden stadiometer mounted on a vertical wall with the respondent standing erect against the wall on a horizontal floor without shoes.

The head was placed so as to ensure that the external auditory meatus and the angle of the eye were on a horizontal line.

The height was measured in metres to the nearest 0.1 cm. Body mass index (BM1) was calculated as the weight (kg)/ (Height $[m]^2$ (i.e. kg/m^2) [11].

A non-stretch tape was used to measure the body circumferences. The waist circumference was taken at the midpoint between the lower rib border and iliac crest at the end of expiration with the subject in standing position [12]. Hip circumference was measured to the nearest 0.1 cm at the maximum posterior protuberance of the buttocks while the subject was standing upright with feet together.

A complete lipid profile was done on all subjects. The parameters measured were total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), high density lipoprotein (HDL-C) and triglyceride TG).

The method of Levin and Zak was used for the estimation of TC and HDL-C [12].

Triglyceride values were estimated by the method of Levy and LDL-C by the Friedewald formula respectively [13,14].

According to the World Health Organization (WHO), overweight is defined as a BM1 of 25.0 – 29.9 kg/m^2 and obesity as BMI of >30.0 $kg/m.^2$ The normal waist circumference for men is 102 cm or less while the normal waist circumference for women is 88 cm or less. Average waist-hip-ratio values for men are 0.93 and 0.83 for women. The lipid profile of the subjects was classified based on Adult treatment panel III (ATP III) model [15].

Moreover, each of the subjects was assessed using an interview – administered questionnaire containing such information as age, marital status, highest level of education attained, income (in Nigerian Naira denomination) using the approved wage structure in the Nigerian Public Service [16].

Other information obtained from the respondents included their occupational status which was classified as professionals (These include Lawyers, Teachers with University degrees and

soldiers), skilled workers (which include Tailors and Teachers without a University degree and non-skilled workers (which include labourers, pensioners and students).

2.4 Data Analysis

Statistical analysis was done using the statistical package for social sciences (SPSS) Version 18.0. Distribution and cross tabulation was generated; chi-square was used to compare proportions.

The P-value of 0.05 was used to determine the level of statistical significance.

2.5 Ethical Considerations

Ethical approval for the study was obtained from the University of Uyo Teaching Hospital ethical committee. A pretest of the research questionnaire was performed in order to determine its applicability, experience and logistic problems.

3. RESULTS

Of the 584 subjects recruited into the study, 66.4% (n = 388) were females, while 36.6% (n = 190) were males.

Table 1 shows the socio-demographic and clinical characteristics of the respondents.

There was a statistically significant difference between the mean age of females (50.2 [SD =13.6]) and males (43.3 [SD 17.8]) (p = 0.000).

Respondents who were between 25 and 54 years of age were more obese (p = 0.000). Overweight and obesity was more prevalent among married respondents in this study (p = 0.992).

Women had a mean BM1 of 30.7 kg/m^2 (SD = 5.7) versus 27.6 kg/m^2 (SD = 4.5) for Men (p = 0.000).

Women had a mean waist circumference of 95.3 cm (SD = 12.4) versus 91.2 cm (SD – 11.2) for men (p = 0.000).

The mean hip circumference for women was 109.4 cm (SD = 14.2), while the mean hip circumference for men was 103.3 cm (SD = 10.4). Approximately 65.0% of the female respondents had an abnormal waist-hip-ratio (WHR) compared with 37.8% of the male.

Table 2 shows the cholesterol profile of overweight and obese respondents based on NCEP/ATP III classification.

The mean total cholesterol level of overweight and obese respondents was 5.78 mmol/l (SD=1.81) and 6.91 mmol/l (SD = 1.60) respectively. A total of 19.9% (n = 40) overweight and 36.2% (n = 93) obese respondent had elevated levels of total cholesterol (p = 0.001).

The mean Serum Triglyceride levels of overweight and obese respondents was 2.44 mmol/l (SD = 0.91) and 3.51 mmol/l (SD = 0.84) respectively. There was no significant difference in the levels of elevated serum triglycerides between the overweight and obese respondents (p = 0.012).

The mean serum low density lipoprotein cholesterol of overweight respondents was 4.16 mmol/l (SD = 0.92) while that of obese respondents was 5.94 mmol/l (SD = 0.76).

A total of 11.9% (n = 24) overweight compared to 27.6% (n = 71) obese respondents had very high levels of low-density lipoprotein cholesterol (LDL.C) (p = 0.001).

The mean serum high density lipoprotein cholesterol (HDL-C) levels of overweight and obese respondents was 1.10 mmol/l (SD = 0.16) and 1.20 mmol/L (SD = 0.12) respectively.

A total of 16.9% (n = 34) overweight and 45.1% (n = 116) obese respondents had reduced levels of HDL-C respectively (p = 0.001).

Table 3 shows the comparison of cholesterol profile between overweight and obese male and female respondents in this study.

The mean total cholesterol level of overweight male respondents in this study was 5.57 mmol/l (SD = 1.73) compared to 5.31 mmol/1 (SD = 1.26) females (p = 1.000).

The mean total cholesterol level of obese male subjects was 5.96 mmol/l (SD = 0.93) compared to 5.93 mmol/l (SD = 0.78) of females (p = 1.000). This was not statistically significant.

Table 1. Characteristics of the study population

Variables	Respondents	
Socio-demographic characteristics	**Female(F) (n=388[%])**	**Male(M) (n=196[%])**
Age in years		
18 – 24	9[2.3]	12[6.1]
25 – 34	120[30.9]	38[19.4]
35 – 44	118[30.4]	58[29.6]
45 – 54	94[24.2]	56[28.6]
55 – 64	42[10.8]	20[10.2]
65	5[1.3]	12[6.1]
Marital status		
Single	64[16.5]	45[23.0]
Married	281[72.4]	145[74.0]
Divorced and/or separated	8[2.1]	2[1.0]
Widow	35[9.0]	4[2.0]
Educational level		
No formal Education	8[2.1]	1[0.5]
Primary School	54[13.9]	25[12.8]
Secondary School	92[23.7]	51[26.0]
Post Secondary School	234[60.3]	119[60.7]
Income		
Low	217[56.0]	96[49.0]
Middle	108[27.8]	65[33.2]
High	65[16.2]	35[17.8]
Occupation		
Non-skiled	75[19.3]	28[14.3]
Skilled	115[29.7]	69[35.2]
Professional	198[51.0]	99[50.5]
Place of residence		
Urban	244[62.9]	123[62.8]
Rural	144[37.1]	73[37.2]
Body mass index (kg/m^2)		
<18.5	-	-
18.5 – 24.9	63[16.2]	63[32.1]
25.0 – 29.9	123[31.7]	78[39.8]
30.0 – 34-9	108[27.8]	44[22.4]
35.0 – 39.9	69[17.8]	9[4.6]
>40	25[6.4]	2[1.0]
Waist circumsference		
>88cm (F)	84[21.6]	-
<102cm (M)	-	171[87.2]
>88cm (F)	304[78.4]	-
>102cm (M)	-	25[12.8]
Qualities of waist-hip-ratio		
<0.84	136[35.0]	57[29.1]
0.85 – 0.89	141[36.6]	65[33.1]
>0.93	110[28.4]	74[37.8]

The mean triglycerides level of overweight male subject was 1.62 mmol/l (SD = 0.68) compared to 1.57 mmol/l (SD = 0.45) for females (p = 1.000). This was not statistically significant. The mean triglycerides level of obese male respondents in this study was 1.56 mmol/l (SD=0.80) compared to 1.98 mmol/l (SD=0.17) for females (p=1.000). This was not statistically significant.

The mean low density lipoprotein cholesterol (LDL-C) level of overweight male respondents in this study was 3.88 mmol/l (SD = 1.58) compared to 3.34 mmol/l (SD = 1.19) for females

(p = 1.000). This was not statistically significant.

Among the obese respondents, men had a mean LDL-C level of 4.23 mmol/l (SD = 1.05) compared to 4.48 mmol/l (SD = 0.73) for women (p = 1.000).

The mean high density lipoprotein cholesterol (HDL-C) level for overweight male respondents was 1.05 mmol/l (SD = 0.30) compared to 1.31 mmol/l (SD = 0.29) for female (p = 1.000). Among the obese respondents, the mean HDL-C level for men was 1.05 mmol/l (SD = 0.31) compared to 1.39 mmol/l (SD = 0.51) for females (p = 1.000). This was not statistically significant.

4. DISCUSSION

The prevalence of overweight among respondents in this study was 31.7% for female and 39.8% for male while the prevalence of obesity among respondents was 52.0% for female and 28.0% for male.

A population based study in Katsina State of North-Western Nigeria reported prevalence of obesity of 29.8% for female and 9.3 for male [17].

Among urban dwellers of Jos in North-Central Nigeria, the prevalence of overweight was 17.2% while that of obesity was 4.2% [18].

Table 2. Cholesterol profile of overweight and obese respondents according to ATP III classification

Variables	Respondents			
	Overweight (n=201[%])	Obese (n=257[%])	X^2	P-value
Total cholesterol (mmol/l)				
Desirable (<5.18)	72 [35.8]	74 [28.8]	1.49	0.135
Borderline (5.18 – 6.19)	89 [44.3]	90 [35.0]	1.93	0.054
High (>6.19)	40 [19.9]	93 [36.2]	3.71	0.001*
Triglyceride (mmol/l)				
Normal (<1.70)	66 [32.8]	102 [39.7]	1.42	0.155
Borderline (1.70 – 2.25)	48 [23.9]	74 [28.8]	1.07	0.284
High (2.26 – 5.63)	87 [43.3]	81 [31.5]	3.50	0.012
Low density lipoprotein cholesterol (LDL-C)(mmol/l)				
Optimal (<2.59)	45 [22.4]	41 [16.0]	1.62	0.105
Near optimal (2.59-3.34)	39 [19.4]	30 [11.7]	2.15	0.031
Borderline High (3.37-4.12)	52 [25.9]	46[17.9]	1.96	0.050
High (4.15 – 4.90)	41 [20.4]	69 [26.8]	1.48	0.138
Very High (>4.90)	24 [11.9]	71 [27.6]	4.00	0.001*
High Density Lipoprotein cholesterol (HDL-C) (mmol/l)				
Low (<1.0)	34 [16.9]	116 [45.1]	6.28	0.001*
Borderline (1.0-1.50)	105 [52.2]	63 [24.5]	6.01	0.001*
High (>1.50)	62 [30.8]	62 [30.8]	0.011	1.000

**Statistically significant*

Table 3. Comparison of the cholesterol profile of overweight and obese male and female respondents

Variables	Respondents							
	Overweight		X^2	p-value	Obese		X^2	p-value
	Male	Female			Male	Female		
TC (mmol/l)	5.57±1.73	5.31±1.26	0.001	1.000	5.96±0.93	5.93±0.78	0.001	1.000
TG (mmol/l)	1.62±0.68	1.57±0.45	0.001	1.000	1.56±0.80	1.98±0.17	0.001	1.000
LDL-C (mmol/l)	3.88±1.58	3.34±1.19	0.001	1.000	4.23±1.05	4.48±0.73	0.001	1.000
HDL-C (mmol/l)	1.05±0.30	1.31±0.29	0.001	1.000	1.05±0.31	1.39±0.51	0.001	1.000

TC = Total Cholesterol, TG = Triglyceride LDL-C = Low Density Lipoprotein Cholesterol HDL-C = High Density Lipoprotein Cholesterol

Another population based study involving indigenous residents of a Nigerian ethnic group in Rivers State, South-South Nigeria reported the prevalence of overweight and obesity as 22.0% and 49.3% respectively [19].

The differences in the prevalence of overweight and obesity among different workers in Nigeria might be due to differences in the subjects studied as well as the study design, in spite of the above, it is important to note that overweight and obesity is fast becoming a major public health problem that must not be overlooked.

The high prevalence of overweight men (39.8%) and women (31.7%) in this study shows that in the nearest future, obesity will assume an epidemic dimension in Uyo, South-South Nigeria unless the population is sufficiently sensitized to adopt healthy living habits [20].

Among respondents in this study, women were more obese than men. This finding is consistent with reports from other workers in Nigeria and other African Countries [21-23].

Large body size is perceived as affluence in most African Societies, some cultural practices such as fattening done for women as symbols of initiation into adulthood and increased presence of more sedentary activities occasioned by security challenges and technology are some of the factors responsible for this trend [24-26].

Abnormal lipid profile patterns observed among respondents in this study included significantly high total cholesterol level, very high low density lipoprotein cholesterol and low levels of high density lipoprotein cholesterol among obese respondents.

There was, however, no significant difference in the level of serum triglycerides among overweight and obese respondents in this study. This was different from a report involving civil servants in Abakaliki, South-Eastern Nigeria in which subjects with raised body mass index (BMI) were reported to have higher levels of total cholesterol and low levels of low density lipoprotein cholesterol and triglycerides but with no differences in the level of high density lipoprotein cholesterol (HDL-C) [27].

The disparities in these findings can only be explained by differences in the subjects studied. However, in another study involving overweight and obese diabetic subjects in Abuja North-Central Nigeria and Saudi Arabia in the middle East, respondents with higher BMI had higher triglyceride levels whereas total cholesterol, low density lipoprotein and high density lipoprotein were significantly lower [9,28].

Obesity and type-2 diabetes mellitus are associated with increased deposition of triglycerides in non-adipose tissue, such as the heart, liver, pancreas and skeletal muscle thus increasing the risk of metabolic and cardiovascular complications seen in diabetes.

Findings from this study also show that the prevalence of dyslipidaemia was not significantly different between male and female overweight and obese respondents. This however, contrasts with findings from another report which showed that the prevalence of dyslipidaemia increased with increasing BMI Levels in both sexes [28].

This finding has an important health implication. It may be speculated that male and female overweight and obese respondents in this study may be at risk of cardiovascular diseases.

5. LIMITATIONS

One limitation of this study is that since the respondents were hospital outpatient attendees, the result may not be generalized to the entire population.

6. CONCLUSION

The findings from this study have shown that dyslipidaemia is common among overweight and obese outpatients seen in our hospital.

In view of the health risks associated with overweight, obesity and dyslipidaemia, an epidemiological study of the general population is hereby advocated to properly stratify them with respect to risks of developing non-communicable diseases. There is need for large scale education on healthier lifestyle choices such as good nutrition, weight reduction, greater physical activity and regular medical check-up.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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