IBOM MEDICAL JOURNAL
Vol.19 No.2 | April - June 2026 | Pages 300-305
www.ibommedicaljournal.org

Comorbidities among overweight and obese adult patients seen at the General Outpatient Clinic of a Tertiary Hospital, South-South Nigeria

Kalu, Nnenna Okore Ama[1], Udoh, Sunday Bassey[1], Morgan, Uduak-obong Morgan[1], Dianabasi Eduwem[2]

[1]Department of Family Medicine, University of Uyo Teaching Hospital, Uyo, Akwa Ibom State, Nigeria
[2]Department of Radiology, University of Uyo/University of Uyo Teaching Hospital, Uyo. Nigeria

Abstract

Background: Overweight and obesity are major global health concerns, associated with significant morbidity and mortality. They are key risk factors for numerous non-communicable diseases (NCDs), including hypertension, diabetes mellitus, dyslipidemia, osteoarthritis, coronary heart disease, stroke, and certain cancers. This study aimed to identify the common comorbidities associated with overweight and obesity among adult patients attending the General Outpatient Clinic of the University of Uyo Teaching Hospital, Uyo, Nigeria.
Methods: A cross-sectional study was conducted involving 385 overweight and obese adults aged 18–60 years. Data were collected using semi-structured questionnaires. Anthropometric measurements and laboratory investigations (fasting blood glucose and lipid profile) were obtained. Data analysis was performed using SPSS version 17.0.
Results: Of the 385 questionnaires distributed, 380 were fully completed and analyzed (response rate: 98.7%). The identified comorbidities associated with overweight and obesity, in descending order, were: abnormal LDL (66.3%), hypertension (58.2%), hypercholesterolemia (52.6%), joint arthropathies (46.8%), erectile dysfunction (32.4%), fertility problems (30.3%), raised triglycerides (26.6%), diabetes mellitus (12.4%), and abnormal HDL (3.9%). Only osteoarthritis/arthropathies showed a statistically significant association with overweight/obesity ($\chi^2 = 4.901$, $p = 0.03$).
Conclusion: Osteoarthritis/arthropathy was the identified comorbidity significantly associated with overweight and obesity in this population. Public health efforts should promote healthier diets and active lifestyles to prevent obesity-related comorbidities.

Keywords: Overweight, Obesity, Comorbidity, Uyo, Nigeria

Introduction

Overweight is defined as having excess body fat relative to optimal health, a condition prevalent in settings with abundant food and sedentary lifestyles.[1,2] Obesity, a more severe form of excess adiposity, is recognized as a disease that adversely affects health, reducing life expectancy and increasing the risk of various health problems.[1-3] It typically results from a chronic energy imbalance-where caloric intake exceeds expenditure.[3] While traditionally attributed to behavioral factors, evidence now underscores a significant genetic predisposition, with obesity emerging from complex interactions between multiple genes and environmental influences.[1]

Overweight and obesity are major public health challenges, contributing substantially to global morbidity and mortality.[1-4] They are established risk factors for numerous NCDs, including hypertension, type 2 diabetes mellitus, dyslipidemia, osteoarthritis, coronary heart disease,

Corresponding Author:

Dr. Morgan, Uduak-obong Morgan
Department of Family Medicine, University of Uyo Teaching Hospital, Uyo, Akwa Ibom State, Nigeria.

uduakobongmorgan@uniuyo.edu.ng

DOI: 10.61386/imj.v19i2.1055

stroke, depression, respiratory disorders, cancers, and metabolic syndrome.[3] Key drivers of this epidemic include dietary shifts, tobacco use, excessive alcohol consumption, physical inactivity, rural-to-urban migration, and fetal malnutrition.[2-5]

The World Health Organization (WHO) and the U.S. National Institutes of Health (NIH) classify overweight and obesity primarily using body mass index (BMI). For most ethnic groups, a BMI of ≥25 kg/m^2 defines overweight, and ≥30 kg/m^2 defines obesity.[2,6] Other assessment tools include waist circumference, waist-hip ratio, skinfold thickness, bioelectrical impedance, and dual-energy X-ray absorptiometry.[2,6-8]

BMI remains the most widely used anthropometric index due to its strong correlation with body fat and validated association with obesity-related morbidities such as hypertension, dysglycemia, and dyslipidemia.[9] Obesity is further stratified into classes reflecting escalating health risks: Class I (30.0–34.9 kg/m²), Class II (35.0–39.9 kg/m²), and Class III (≥40 kg/m²).[10]

Healthcare encounters provide critical opportunities for clinicians to offer anticipatory guidance, patient education, and lifestyle counseling to individuals with obesity. This study aimed to assess the common comorbidities associated with overweight and obesity among adults attending a general outpatient clinic in Uyo, Nigeria. The findings are intended to inform clinical guidelines and public health policy.

Materials and methods

Study Design and Setting

This hospital-based, descriptive cross-sectional study was conducted at the General Outpatient Clinic (GOPC) of the University of Uyo Teaching Hospital (UUTH), Uyo, Akwa Ibom State, Nigeria. The clinic operates weekdays year-round, managed by consultant family physicians, their resident doctors and medical officers.

Study Population, Sample Size determination and Sampling Technique

The study population consisted of adults (aged 18–60 years) presenting to the GOPC between July and December 2017. Using the Leslie Kish formula for cross-sectional studies and assuming a 35.1% prevalence of overweight (from a prior Nigerian study), a minimum sample size of 350 was calculated.[11,12] With a 10% allowance for non-response and incomplete data, the final calculated sample size was 385.

Participants were consecutively recruited into the study after BMI screening. Those with a BMI ≥25 kg/m^2 were enrolled daily until the calculated sample size was reached. Exclusions included individuals with skeletal deformities affecting height measurement, critical illness, pregnancy, or conditions causing edema (e.g., ascites).

Data Collection

Data were collected using a semi-structured questionnaire using self and interviewer administered techniques. It covered socio-demographics, lifestyle factors, and comorbidities. Anthropometric measurements (weight, height, blood pressure) and biochemical assays (fasting blood glucose, lipid profile) were performed. A pre-test of the questionnaire was carried out using 40 randomly selected respondents from the GOPD clinic of St. Luke's Hospital Anua before commencement of the study.

Weight was measured to the nearest 0.1 kg using a calibrated bathroom scale. Height was measured to the nearest 0.1 m using a standardized wooden stadiometer. Blood pressure was measured with a mercury sphygmomanometer and appropriate cuff size. Fasting blood glucose was assessed using an Accu-chek glucometer, standardized against a laboratory glucose oxidase method. Venous blood samples were analyzed for lipid profile at the hospital's chemical pathology laboratory.

Definitions

· Overweight: BMI 25.0–29.9 kg/m², Obesity: BMI ≥30.0 kg/m² (Class I: 30.0–34.9; Class II: 35.0–39.9; Class III: ≥40)[10].

· Hypertension: BP≥140/90 mmHg[7].

· Diabetes mellitus: Fasting blood glucose ≥126 mg/dL (7.0 mmol/L)[7].

· Dyslipidemia: Total cholesterol ≥200 mg/dL (5.17 mmol/L); triglycerides ≥150 mg/dL (1.7 mmol/L); LDL-C ≥100 mg/dL (2.58 mmol/L); HDL-C <40 mg/dL (1.03 mmol/L)[7].

Data Analysis

Data were analyzed using SPSS version 17.0.

Descriptive statistics (means, standard deviations, frequencies, percentages) summarized continuous and categorical variables. Associations were tested using the chi-square test. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the UUTH Research and Ethics Committee. Written informed consent was obtained from all participants and participation was voluntary.

Results

A total of 385 questionnaires were distributed, of which 380 were returned with complete information and laboratory results, yielding a response rate of 98.2%. The age of respondents ranged from 18 to 60 years, with a mean (±SD) of 40.93 ± 9.75 years.

Socio-demographic Characteristics of Respondents

The socio-demographic profile of the respondents is presented in Table 1. Slightly more than half (51.3%) were aged 40 years or older. The majority were females (73.2%), had attained tertiary education (70.0%), were married (62.4%), identified as Christian (99.2%), resided in urban areas (84.5%), and were of the Ibibio tribe (65.0%). Regarding monthly income, 48.7% earned less than ₦50,000, while 26.3% earned above ₦100,000. For occupational class, the largest proportion (46.1%) belonged to Class 2 (intermediates), and the smallest to Class 3M (skilled manual; 1.0%).

Table 1: Socio-demographic Characteristics of Respondents

Socio-demographic characteristics	Frequency	Percentage(%)
Age Group (years)		
Less than 40	185	48.7
40 and above	195	51.3
Gender		
Males	102	26.8
Females	278	73.2
Level of education		
No formal education	7	1.8
Primary	44	11.6
Secondary	63	16.6
Tertiary	266	70.0
Marital Status		
Single	101	26.6
Married	237	62.4
Divorced	2	0.5
Widowed	33	8.7
Separated	7	1.8
Religion		
Christianity	377	99.2
Muslim	3	0.8
Tribe		
Igbos	80	21.1
Hausa	3	0.8
Yoruba	8	2.1
Ibibio	247	65.0
Others	42	11.0
Residence		
Urban	321	84.5
Rural	59	15.5
Income Group		
Less than ₦50,000	185	48.7
₦50,000 - ₦100,000	95	25.0
Above ₦100,000	100	26.3
Occupation		
Class1	26	6.8
Class2	175	46.1
Class3N	9	2.4
Class3M	4	1.0
Class 4	161	42.4
Class 5	5	1.3

Common Comorbidities Among Respondents

The frequencies of the assessed comorbidities are shown in Table 2. The most prevalent comorbidity was elevated LDL-cholesterol (66.3%), followed by hypertension (58.2%) and hypercholesterolemia (52.6%). The least prevalent was low HDL-cholesterol (3.9%).

Association Between Overweight/Obesity and Comorbidities

The relationship between BMI category (overweight versus obese) and each comorbidity is detailed in Table 3. Of all conditions assessed, only joint arthropathies/osteoarthritis showed a statistically significant association with obesity/overweight ($\chi^2 = 4.901$, $p = 0.03$).

Table 2: Frequency of Common Comorbidities Among Respondents

Co-morbidities	Frequency(n=380)	Percentage(%)
Hypertension		
Yes	221	58.2
No	159	41.8
Diabetes Mellitus		
Yes	47	12.4
No	333	87.6
Total cholesterol		
Normal	180	47.4
Abnormal (increased)	200	52.6
Triglycerides		
Normal	279	73.4
Deranged(increased)	101	26.6
HDL		
Normal	365	96.1
Abnormal(decreased)	15	3.9
LDL		
Normal	128	33.7
Abnormal(increased)	252	66.3
Erectile Dysfunction (n=102)		
Yes	33	32.4
No	69	67.6
Joint Deformities		
Yes	178	46.8
No	202	53.2
Infertility		
Yes	115	30.3
No	265	69.7

Table 3: Association Between Overweight/Obesity and Co-Morbidities

Co-Morbidities	BMI Pattern		Total N=380	Statistical tests and values
	Overweight (%) n=100	Obese n (%) n=280		
Blood pressure				
Normal	49 (49.0)	110 (39.3)	159 (41.8)	$\chi2$= 2.85
Raised	51 (51.0)	170 (60.7)	221 (58.2)	P=0.09
Blood Glucose				
Normal	82 (82.0)	251 (89.6)	333 (87.6)	$\chi2$= 3.971
Raised	18 (18.0)	29 (10.4)	47 (12.4)	P=0.05
Total Cholesterol				
Normal	50 (50.0)	130 (46.4)	180 (47.4)	$\chi2$= 0.3770
Deranged (raised)	50 (50.0)	150 (53.6)	200 (52.6)	P=0.54
Triglycerides				
Normal	73 (73.0)	206 (73.6)	279 (73.4)	$\chi2$= 0.0123
Deranged(raised)	27 (27.0)	74 (26.4)	101 (26.6)	P=0.91
HDL				
Normal	97 (97.0)	268 (95.7)	365 (96.1)	$\chi2$= 0.321
Deranged(reduced)	3 (3.0)	12 (4.3)	15 (3.9)	P=0.77
LDL				
Normal	40 (40.0)	88 (31.4)	128 (33.7)	$\chi2$= 2.423
deranged (raised	60 (60.0)	192 (68.6)	252 (66.3)	P=0.12
Erectile Problems				
Yes	12 (25.0)	21 (38.9)	33 (32.4)	$\chi2$= 2.44
No	36 (75.0)	32 (61.1)	69 (67.6)	P=0.12
Joint Deformities				
Yes	38 (38.0)	140 (50.0)	178 (46.8)	$\chi2$= 4.901
No	62 (62.0)	135 (50.0)	202(53.2)	P=0.03
Infertility				
No	74 (74.0)	191 (68.2)	265 (69.7)	$\chi2$= 1.168
Yes	26 (26.0)	89 (31.8)	115 (30.3)	P=0.28

*Percentages for erectile dysfunction are calculated from the male subgroup (n=102; Overweight males=48, Obese males=54).

Discussion

This study assessed the common comorbidities associated with overweight and obesity among adults attending a general outpatient clinic in Uyo, Nigeria. The most common comorbidities were dyslipidemic abnormalities (elevated LDL: 66.3%; hypercholesterolemia: 52.6%) and hypertension (58.2%). This compares favourably with results of other studies. A study by Schmiegelow and colleagues in Denmark reported that increase in BMI increases the prevalence of dyslipidaemia, hypertension, diabetes mellitus and metabolic disorder in fertile women.[13] Guh et al in a systematic review of articles reported in their study that overweight and obesity were associated with development of metabolic syndrome which comprises of hypertension, dyslipidemia, diabetes mellitus and abdominal obesity.[14] A review article by Singh and colleagues showed that dyslipidaemia was one of the co-morbidities associated with overweight and obesity.[15] Osuji et al conducted a study on women who came for "August meeting", a yearly women meeting in south-eastern Nigeria, and reported an association between overweight/obesity and dyslipidemia.[16] While the rates of dyslipidaemic abnormalities were high in this study, and consistent with the known metabolic sequelae of obesity, they did not show a statistically significant association with BMI category in this sample. This lack of significance may be due to the use of antihypertensive and lipid-lowering medications by participants, a hospital-based sampling bias, or the relatively modest sample size.

Notably, osteoarthritis/joint arthropathies were significantly associated with overweight/obesity (p=0.03). This finding agrees with results of other studies. A study by Adebimpe and his colleagues in a study done in South Western Nigeria reported that overweight and obesity were strongly associated with an increased risk of arthritis, and the knee joint was mostly affected.[17] A study by Bliddal and his two colleagues reported the significance of weight loss in improving the signs and symptom of osteoarthritis, disability and function in obese patients.[18] Idung et al in their study in South-South Nigeria also confirmed that osteoarthritis in addition to hypertension were the most prevalent co-morbidities associated with overweight and obesity.[19] These findings are biomechanically plausible, as excess body weight increases mechanical stress on weight-bearing joints, accelerating cartilage degeneration.[10,11] It is also clinically significant in this population, given the high proportion of older adults and individuals in occupational classes involving physical work (Classes 2 & 4), which may exacerbate joint symptoms.

Contrary to several literatures,[14,20-24] neither diabetes mellitus nor erectile dysfunction showed a significant statistical association with overweight and obesity. The lower-than-expected proportion of diabetes mellitus may be influenced by ongoing management in this clinical population. The non-significant finding for erectile dysfunction may stem from underreporting due to social stigma or the smaller male subsample.

A key strength of this study is its integration of clinical measurements with laboratory data. However, limitations include its hospital-based, cross-sectional design, which precludes causal inference, and the use of consecutive sampling, which may affect generalizability. The potential for

underreporting of sensitive conditions (e.g., erectile dysfunction, infertility) and the influence of existing treatments on blood pressure and lipids must also be considered.

Conclusion and Recommendation

This study identified osteoarthritis as the most significant comorbidity associated with overweight and obesity in this clinical population. While dyslipidemia and hypertension were highly prevalent, their lack of statistical association highlights the complex interplay of treatment and measurement in clinical studies. The findings underscore the need for integrated clinic-based interventions that combine weight management with musculoskeletal health. Public health strategies should promote lifestyle modifications targeting dietary patterns and physical activity to mitigate the burden of obesity-related comorbidities.

Source of funding: This study was funded by the lead author

Conflict of interest: None

Author Contributions: The lead author conceived the work and all authors were involved in critically reviewing, writing and reading through the final manuscript.

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