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Relationship Between Metabolic Syndrome and Health-Related Quality of Life Among Obese Adults in a Nigerian Tertiary Hospital

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Abstract

Introduction: Obesity is a global public health concern and a major risk factor for chronic non-communicable diseases such as diabetes mellitus, hypertension, and cardiovascular disorders. Its increasing prevalence in Nigeria, together with its metabolic and psychosocial consequences, highlights the need to understand its impact on Health-Related Quality of Life (HRQOL). This study assessed the relationship between Metabolic Syndrome (MetS) and HRQOL among obese adults attending a tertiary hospital in Edo State, Nigeria.

Methods: A hospital-based cross-sectional study was conducted among 300 obese adults (≥18 years) attending the General Outpatient Department of Irrua Specialist Teaching Hospital. Participants were selected using systematic random sampling. Data were collected using a semi-structured interviewer-administered questionnaire, the World Health Organization Quality of Life-BREF (WHOQOL-BREF) instrument, and laboratory measurements including fasting blood glucose and lipid profile. Metabolic syndrome was defined using the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria. Data were analyzed using SPSS version 25. Associations between variables were tested using Chi-square analysis at a significance level of $p < 0.05$.

Results: Of the 300 participants, 215 (71.7%) were female and the mean age was 51.6 ± 8.9 years. The prevalence of metabolic syndrome was 26.3%. Overall, 72.3% of respondents reported good HRQOL, while 27.7% reported poor HRQOL. The physical and psychological domains were the most affected. Participants without metabolic syndrome had significantly better overall HRQOL ($p = 0.001$) and physical health scores ($p = 0.022$).

Conclusion: Metabolic syndrome is common among obese adults and is associated with poorer physical health and overall quality of life. Integrated lifestyle interventions and early screening for metabolic risk factors are essential to improve well-being in this population.

Keywords: Obesity, Metabolic syndrome; Health-related quality of life; Nigeria; Public health

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Introduction

Obesity is a chronic multifactorial disorder characterized by excessive accumulation of body fat that increases the risk of adverse health outcomes [1-3]. Globally, the prevalence of obesity has nearly tripled since 1975, making it a major contributor to morbidity and mortality [4,5]. Obesity is strongly associated with several non-communicable diseases including cardiovascular diseases, diabetes mellitus, and Metabolic Syndrome (MetS), thereby imposing substantial burdens on individuals and healthcare systems [1].

In sub-Saharan Africa, rapid urbanization, reduced physical activity, and unhealthy dietary patterns have accelerated the rise in obesity. Nigeria reflects this global trend, with increasing prevalence across different socioeconomic groups. Beyond its physical complications, obesity also affects psychological wellbeing, social participation, and overall quality of life [6,8].

Metabolic syndrome is a cluster of metabolic abnormalities including central obesity, hypertension, dyslipidaemia, and hyperglycaemia. These abnormalities significantly increase the risk of cardiovascular disease and type 2 diabetes mellitus. The prevalence of metabolic syndrome in Africa is increasing, indicating a growing burden across the continent [9]. Similarly, studies have reported high prevalence rates across the six geopolitical zones of Nigeria [10].

The coexistence of metabolic syndrome and obesity not only increases cardiometabolic risk but may also negatively influence perceived health status and Health-Related Quality of Life (HRQOL) [11-13]. While several international studies have explored the relationship between metabolic syndrome and HRQOL, evidence from Nigeria remains limited [14,15]. Understanding this relationship in local clinical populations is essential for designing targeted interventions.

Therefore, this study assessed the relationship between metabolic syndrome and health-related quality of life among obese adults attending a tertiary hospital in Edo State, Nigeria.

Methods

Study Design and Setting

This hospital-based cross-sectional study was conducted at the General Outpatient Department (GOPD) of Irrua Specialist Teaching Hospital (ISTH), Edo State, Nigeria, between June and September 2023. ISTH serves as a major referral center for surrounding communities. The study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline.

Population

Adults aged 18 years and above with obesity attending the General Outpatient Department during the study period were eligible for inclusion. Pregnant women, individuals with severe psychiatric illness, and patients with terminal conditions were excluded.

Size Determination

The sample size was calculated using the formula for estimating a single proportion: [16]

$N = (Z^2pq) / d^2$

Where:

Z = standard normal deviate at 95% confidence level (1.96)

p = estimated proportion of cardiometabolic comorbidities among obese adults (22.9%) from a previous study 13.

q = 1 – p

d = margin of error (0.05)

The calculated minimum sample size was 270. After adjusting for a 10% non-response rate, the final sample size was 300 participants.

Sampling Technique

A total of 300 participants were selected using systematic random sampling. The sampling interval was determined from average daily clinic attendance and adjusted for non-response.

Data Collection

Data were collected using interviewer-administered questionnaires and anthropometric measurements. The questionnaire included socio-demographic variables and assessment of HRQOL using the World Health Organization Quality of Life-BREF (WHOQOL-BREF) instrument [17].

The WHOQOL-BREF is a validated 26-item instrument assessing four domains of quality of life:

- Physical health
- Psychological health
- Social relationships
- Environmental health

Each item is rated on a 5-point Likert scale. Negatively phrased items were reverse-coded so that higher scores indicate better quality of life. Domain scores were calculated according to WHOQOL guidelines [8,18].

The domain scores were normally distributed, a score of mean minus one (-1) Standard Deviation (SD) was graded poor, while a score of the mean plus one (+1) Standard Deviation (SD) was graded good [8].

Blood pressure, and waist circumference were measured using standard procedures. Fasting blood glucose and lipid profiles were analyzed in the hospital laboratory.

Definition of Variables

Obesity was defined based on the World Health Organisation definition as Body Mass Index (BMI) ≥30 kg/m² [19] Participants with BMI ≥ 30kg/m² were categorized as obese while those with BMI < 30kg/m² were categorized as not obese.

Metabolic Syndrome (MetS) was defined according to the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria [20] Participants were categorized as having MetS if they had three or more of the following

1. Serum triglycerides ≥ 150mg/dl or on treatment for elevated triglycerides

2. High density lipoprotein (HDL) cholesterol < 40mg/dl in men and < 50mg/dl in women or on treatment for low HDL.

3. Systolic blood pressure ≥ 130mmHg and diastolic blood pressure ≥ 85mmHg or on treatment for hypertension.

4. Fasting plasma glucose ≥ 110mg/dl or previously diagnosed with Type 2 Diabetes.

5. Waist circumference > 102cm in men and 88cm in women.

Health Related Quality of Life (HRQOL) was evaluated across four domains physical, psychological, social, and environmental with scores categorized as good or poor based on WHOQOL-BREF guidelines [8,21,22].

Data Analysis

Data were analyzed using SPSS version 25. Descriptive statistics summarized participant characteristics. Associations between categorical variables were assessed using Chi-square tests, with

p<0.05 considered statistically significant.

Results

Study Participants

A total of 300 participants, who met the inclusion criteria and gave informed consent were recruited for the study. All the participants completed the study and their data were analyzed giving a total completion rate of 100%.

Demographic and Economic Characteristics of Adult Obese Patients

The sociodemographic characteristics of respondents are displayed in Table 1. Of the 300 participants, 215 (71.7%) were female and 85 (28.3%) were male. The mean age was 51.6 ± 8.9 years. Most respondents were married (82%), and traders constituted 41% of the sample.

Laboratory Measurements of Adult Obese Patients

The average total cholesterol level was 204.9 ± 46.2mg/dL, triglycerides 146.8 ± 75.8mg/dL, LDL 141.3 ± 9.9mg/dL, HDL 51.1 ± 13.4mg/dL and fasting blood sugar averaged 112.4 ± 66.1mg/dL Table 2.

Metabolic Syndrome

Figure 1 shows the proportion of patients with metabolic syndrome. The prevalence of metabolic syndrome among obese adults was 26.3%. The most common component was abdominal obesity 294 (98.0%), followed by elevated blood pressure 250 (83.3%), elevated triglycerides 126 (42.0%), elevated fasting plasma glucose 98 (32.7%), and low HDL cholesterol being the least 46 (15.3%) (Figure 2).

Health Related Quality of Life

Overall, 72.3% of respondents reported good HRQOL, while 27.7% reported poor HRQOL (Table 3).

Quality of Life Domain Score

Across the other 4 domains, respondent reported the highest mean score of 72% in the social domain, followed by the environmental domain of 62%, physical domain with a mean score of 60% and the lowest being psychological domain with an average score of 59%. This is as shown in Table 4.

Relationship Between Quality of Life and Metabolic Syndrome Among Obese Patients

Participants without metabolic syndrome reported better HRQOL in the physical (p=0.022) and overall domains (p=0.001). No significant associations were found between MetS and the social or environmental domains (Table 5).

Table 6 is the logistic regression of predictors of poor quality of life among respondents. Multivariate logistic regression was performed adjusting for age, sex, education level and occupation. Those without MetS had 0.4 times less risk of poor overall quality of life compared to those with MetS (p=0.001; OR 0.408; CI: 0.236-0.704). Also, participants without MetS had 0.5 times less risk of having poor quality of life in the physical health domain compared to those with MetS (p=0.023; OR 0.535; CI: 0.312-0.917).

Table 6 is the logistic regression of predictors of poor quality of life among respondents. Multivariate logistic regression was performed adjusting for age, sex, education level and occupation.

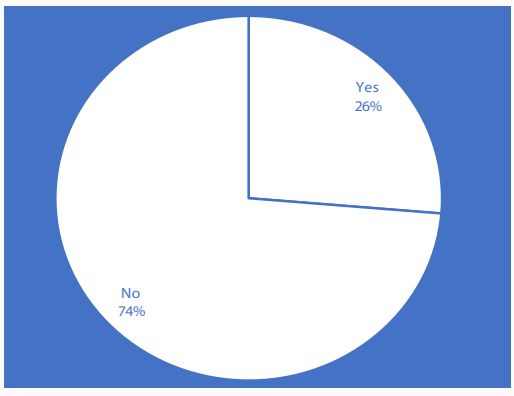

Figure 1: Metabolic Syndrome.

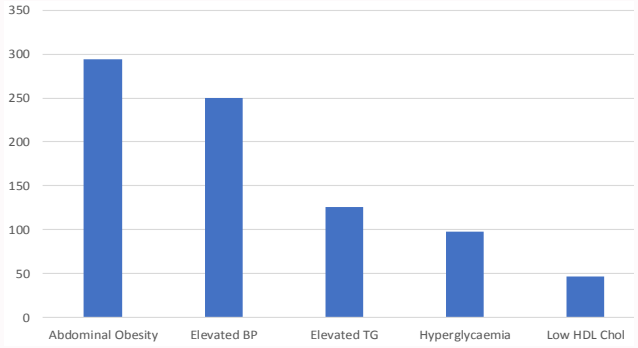

Figure 2: Components of Metabolic Syndrome.

Table 1: Social -Demographic Characteristics of Adult Obese Patients.

Variable	Frequency n= 300	Percent (%)
Age (years)		
< 40	25	8.3
40 – 49	99	33
50 – 59	107	35.7
≥ 60	69	23
Mean ± SD Gender	51.6 ± 8.9	
Male	85	28.3
Female	215	71.7
Marital Status		
Single	8	2.7
Married	269	89.6
Widow	23	7.7
Level of Education		
No Formal Education	35	11.7
Primary	136	45.3
Secondary	104	34.7
Tertiary	25	8.3
Occupation		
Trader	195	65
Farmer	80	26.7
Civil Servant	22	7.3
Student	3	1

Table 2: Laboratory Measurements of Adult Obese Patients.

Variable	Frequency n=300 Mean ± SD
Total Cholesterol	204.9 ± 46.2
Triglyceride	146.8 ± 75.8
Low-Density Lipoprotein	141.3 ± 9.9
High-Density Lipoprotein	51.1 ± 13.4
Fasting Blood Sugar	112.4 ± 66.1
Systolic Blood Pressure	139.3 ± 18.4
Diastolic Blood Pressure	85.8 ± 10.3

Table 3: Health Related Quality of Life of Respondents (N=300).

Variables	Frequency (n)	Percentage (%)
Overall Quality of Life Perception		
Good	217	72.3
Poor	83	27.7
General Health Satisfaction		
Good	196	65.3
Poor	104	34.7
Physical Health		
Good	217	72.3
Poor	83	27.7
Psychological Health		
Good	179	59.7
Poor	121	40.3
Social Relationship		
Good	257	85.7
Poor	43	14.3
Environmental Health		
Good	266	88.7
Poor	34	11.3

Table 4: Quality of Life Domain Score.

Variable	Mean ± SD
Overall Quality of Life Perception	60.67 ± 23.20
General Health Satisfaction	55.08 ± 24.39
Physical Health	60.74 ± 7.30
Psychological Health	59.03 ± 8.64
Social Relationship	72.10 ± 8.96
Environmental Health	62.60 ± 7.35

Those without MetS had 0.4 times less risk of poor overall quality of life compared to those with MetS (p=0.001; OR 0.408; CI: 0.236-0.704). Also, participants without MetS had 0.5 times less risk of having poor quality of life in the physical health domain compared to those with MetS (p=0.023; OR 0.535; CI: 0.312-0.917).

Discussion

This study examined the relationship between metabolic syndrome and Health-Related Quality of Life (HRQOL) among obese adults attending a tertiary hospital in Edo State, Nigeria. The findings demonstrate that metabolic syndrome is relatively common in this population and is significantly associated with poorer physical health and overall quality of life. These results highlight the multidimensional burden of obesity and its metabolic complications within clinical populations in Nigeria.

The predominance of female participants in this study reflects

Table 5: Relationship between Quality of Life and Metabolic Syndrome among Obese Patients.

Variables	Metabolic Syndrome		X^2	P-value
	Yes 79 (%)	No 221 (%)		
Overall Quality of Life Perception			10.66	0.001*
Good				
Poor	46 (58.2)	171 (77.4)		
	33 (41.8)	50 (22.6)		
General Health Satisfaction			0.52	0.472
Good				
Poor	49 (62.0)	147 (66.5)		
	30 (38.0)	74 (33.5)		
Physical Health			5.25	0.022*
Good	47 (59.5)	162 (73.5)		
Poor	32 (40.5)	59 (26.7)		
Psychological Health			2.93	0.087
Good	41 (51.9)	139 (62.9)		
Poor	38 (48.1)	82 (37.1)		
Social Relationship			1.34	0.248
Good	64 (81.0)	191 (86.4)		
Poor	15 (19.0)	30 (13.6)		
Environmental Health			0.02	0.896
Good	34 (43.0)	97 (43.9)		
Poor	45 (57.0)	124 (56.1)		

Table 6: Logistic Regression of the Relationship between Quality of Life and Metabolic Syndrome among Obese Patients.

Variables	Odd Ratio	95% CI	Z statistics	p-value
Overall Quality of Life Perception				
Poor	Ref			
Good	0.408	0.236 to 0.704	3.216	0.001*
General Health Satisfaction				
Poor	Ref			
Good	0.822	0.482 to 1.402	0.719	0.472
Physical Health				
Poor	Ref			
Good	0.535	0.312 to 0.917	2.275	0.023*
Psychological Health				
Poor	Ref			
Good	0.637	0.379 to 1.070	1.706	0.088
Social Relationship				
Poor	Ref			
Good	0.67	0.339 to 1.325	1.151	0.25
Environmental Health				
Poor	Ref			
Good	0.966	0.575 to 1.622	0.131	0.896

the gender pattern of obesity observed in several Nigerian and sub-Saharan African populations. Cultural perceptions that associate larger body size with prosperity and attractiveness, combined with gender differences in occupational physical activity and hormonal influences, may partly explain this pattern. Previous studies conducted in Nigeria and other African settings have similarly reported higher obesity prevalence among women compared with men [23-25]. This gender imbalance among clinic attendees may also reflect greater health-seeking behaviour among women.

The prevalence of metabolic syndrome among obese patients in this study (26.3%) indicates a substantial burden among obese adults attending tertiary care. This estimate is comparable to the prevalence reported in community-based studies in southern Nigeria but higher than figures reported in some regions of the country [26,27]. Differences in prevalence across studies may be attributable to variations in study design, population characteristics, lifestyle factors, and diagnostic criteria. Furthermore, the hospital-based nature of this study may partially explain the relatively higher prevalence observed, as individuals seeking care may already have underlying metabolic abnormalities.

The pattern of metabolic syndrome components observed in this study is consistent with findings from other African populations. Abdominal obesity and elevated blood pressure were the most common components, while low HDL cholesterol was the least frequent. This distribution suggests that central adiposity and hypertension remain key drivers of cardiometabolic risk in this setting. Rapid urbanization, dietary transitions toward energy-dense foods, and declining physical activity levels have been widely implicated in the growing cardiometabolic burden in sub-Saharan Africa [7,28]. These findings reinforce the need for integrated preventive strategies addressing both lifestyle risk factors and early metabolic screening.

With regard to quality of life, the majority of respondents in this study reported good overall HRQOL. Similar findings have been reported in studies conducted in Poland, India, and Bangladesh [29-31]. Cultural perceptions of body size may influence these findings. In many African contexts, obesity may be perceived as a sign of social status, beauty, or affluence, which may positively influence self-perceived wellbeing despite the presence of medical risk factors. However, studies from other Nigerian regions and high-income countries have reported poorer quality of life among obese individuals [8,32-36]. These discrepancies may reflect differences in study populations, comorbid disease burden, cultural norms, and healthcare access.

Importantly, the present study demonstrated a significant association between metabolic syndrome and poorer HRQOL, particularly in the physical health domain. Individuals with metabolic syndrome were more likely to report limitations in physical functioning and overall health perception. These findings are consistent with previous research suggesting that metabolic abnormalities may contribute to fatigue, reduced functional capacity, and poorer self-rated health [37-39] Evidence from longitudinal studies also suggests that persistent metabolic syndrome may negatively affect both physical and mental health domains of HRQOL over time [40].

The findings also align with the conclusions of a systematic review by Saboya, et al. Which reported that metabolic syndrome is associated with reduced quality of life across several domains [41]. Although the relationship between metabolic syndrome and HRQOL has been widely explored in high-income countries, evidence from African settings remains limited. Therefore, the present study contributes important regional evidence to the growing literature on the broader impact of metabolic disorders beyond traditional clinical outcomes.

From a clinical and public health perspective, these findings underscore the importance of integrating metabolic risk assessment into obesity management strategies. Routine screening for metabolic syndrome among obese patients could facilitate early identification of high-risk individuals and enable timely intervention. Lifestyle modification programs focusing on physical activity, weight management, and dietary improvement are likely to play a central role in improving both metabolic health and quality of life. Additionally, psychosocial support may be beneficial, as quality of life is influenced by both physical and psychological factors.

Limitations

Despite these important findings, several limitations should be considered. First, the cross-sectional design limits the ability to establish causal relationships between metabolic syndrome and HRQOL. Second, HRQOL was assessed using self-reported measures, which may be influenced by recall bias or social desirability bias. Additionally, the WHOQOL-BREF instrument was administered through interviewer-assisted questionnaires rather than self-completion, which may have influenced responses. However, interviewer administration was necessary to accommodate participants with limited literacy and has been reported as acceptable in similar settings. Finally, as the study was conducted in a single tertiary hospital, the findings may not be fully generalisable to community populations.

Conclusion

Overall, this study highlights the significant burden of metabolic syndrome among obese adults and its negative implications for quality of life. Addressing the growing epidemic of obesity and its metabolic consequences will require coordinated clinical, behavioural, and public health interventions aimed at reducing cardiometabolic risk and improving overall wellbeing.

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