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To Determine the Frequency of Central Obesity in Acute Coronary Syndrome Patients Presenting to a Cardiac Care Health Facility

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ABSTRACT

Background: Central obesity, characterized by excessive fat accumulation in the abdominal region, is a major risk factor for cardiovascular diseases. Unlike general obesity assessed by body mass index (BMI), central obesity has been shown to have a stronger correlation with acute coronary syndromes (ACS) due to its association with insulin resistance, inflammation, and endothelial dysfunction. **Objective:** To determine the frequency of central obesity among patients presenting with acute coronary syndrome (ACS) at a tertiary cardiac care facility in Karachi, Pakistan. **Methods:** This descriptive cross-sectional study was conducted at the Department of Cardiology, National Institute of Cardiovascular Diseases (NICVD), Karachi. A total of 370 patients with ACS were enrolled using non-probability consecutive sampling. Waist-hip ratio (WHR) was measured, and central obesity was defined as WHR >0.90 for males and >0.85 for females. Data on demographics, comorbidities, and anthropometrics were collected via structured questionnaire. **Results:** The overall prevalence of central obesity was 60.3 percent among ACS patients. A higher frequency was observed in females (75.7%) compared to males (50.0%). Central obesity was significantly associated with female gender ($p < 0.001$), hypertension ($p = 0.02$), and family history of obesity ($p = 0.016$). Multivariate logistic regression showed that female gender (OR = 2.74), hypertension (OR = 1.65), and family history of obesity (OR = 1.89) were independent predictors of central obesity. **Conclusion:** It is concluded that central obesity is common among patients with acute coronary syndrome, especially in females. These findings highlight the need for routine assessment of waist-hip ratio in cardiac care settings and support the development of targeted strategies to reduce central obesity in high-risk populations.

INTRODUCTION

Acute coronary syndrome (ACS) refers to a group of conditions that include ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI), and unstable angina. It is a type of coronary heart disease (CHD), which is responsible for one-third of total deaths in people older than 18 years. Some forms of CHD can be asymptomatic, but ACS is always symptomatic.[1-3] ACS is a manifestation of CHD (coronary heart disease) and usually a result of plaque disruption in coronary arteries (atherosclerosis). The common risk factors for the disease are smoking, hypertension, diabetes, hyperlipidemia, male sex, physical inactivity, family obesity, and poor nutritional practices. Cocaine abuse can also lead to vasospasm. A family history of early myocardial infarction (55 years of age) is also a high-risk factor.[4-6] Obesity is a multifactorial disease with a complex pathogenesis related to biological, psychosocial, socioeconomic, and environmental factors and heterogeneity in the pathways and mechanisms by which it leads to adverse health outcomes.[7-13] The presence of cardiometabolic disease and CVD in those with "normal weight obesity" leads to misclassification and underdiagnosis of CVD risk in clinical practice, particularly among patients who have excess fat but not obesity as classified by BMI.[14-16] Thus, high waist circumference (WC) even in individuals with normal weight may unmask higher CVD risk because WC is an indicator of abdominal body fat, which is associated with cardiometabolic disease and CVD and is predictive of mortality.[17,18] Although WC is meaningful on its own, the ratio of WC to height, which takes body size into account, may be a better predictor of CVD and may be considered a measure of adiposity.[19,20] Moreover, waist-to-hip ratio (WHR) has been shown to predict cardiovascular mortality independently of BMI. According to data from the National Health and

Nutrition Examination Survey, those in the US population with a WHR indicative of central obesity had a higher risk of cardiovascular mortality compared with those with the same BMI but without central adiposity.[18,21] A study on Acute coronary syndrome founds that Increased Neck Circumference and increased WHR are statistically significantly associated and strong predictors of AMI in ACS patients. Raised WHR was found in 108(60%) patients with ACS.[22] In a local study, out of the total 388 acute coronary syndrome patients, 59.5% patients of ACS had abnormal waist hip ratio (>0.9) that is central obesity. Out of these 62.9% were males and 51.3% were females. 71.6% patients presented with STEMI, 18.8% with NSTEMI and 9.5% with unstable angina.[23]

The rationale of the study is that local literature on this topic is scarce. Therefore, the present study is designed to generate the local data and to validate the international data. So that an easily available marker could be utilized to screen out such patients and counselling for life style and prompt therapeutic intervention may yield good outcome.

OBJECTIVE

To determine the frequency of central obesity in Acute Coronary Syndrome patients presenting to a cardiac care health facility

MATERIAL AND METHODS

This Descriptive cross-sectional study was conducted at Department of Cardiology, National Institute of Cardiovascular diseases, Karachi from January 2025 to March 2025. Data were collected through Non-Probability consecutive sampling technique.

Sample Size

It was calculated with the help of WHO sample size calculator on the basis of following parameters:
Confidence Level: 95%
Central obesity in ACS patients: 60%.[22]
Absolute precision= 5%
The total sample size came out to be 370 patients with ACS

Inclusion Criteria

- ✓ Patients aged 18 to 70 years
- ✓ Either gender
- ✓ Patients presenting with Acute coronary syndrome (non-ST elevation myocardial infarction, ST elevation MI and unstable angina)

Exclusion Criteria

- ✓ Pregnancy
- ✓ Patients with chronic kidney disease
- ✓ Patients with compensated or decompensated liver disease

Data Collection

Prior to data collection, ethical approval was obtained from the Ethical Review Committee and the Research Department of the College of Physicians and Surgeons Pakistan. Patients who met the inclusion criteria were approached after clinical stabilization in the emergency department of NICVD. After explaining the purpose, procedure, and potential risks of the study, informed written consent was obtained. Information was gathered using a structured questionnaire, which documented demographic and clinical characteristics including age, gender, history of diabetes mellitus, hypertension, family history of obesity, family history of ACS, smoking status, residential status, educational level, occupation, and family monthly income. Clinical classification of ACS into STEMI, NSTEMI, or unstable angina was also recorded. Waist-hip ratio (WHR) was assessed using a non-stretchable measuring tape, following a standardized technique. Participants were instructed to stand upright with feet together, arms relaxed, and weight evenly distributed. Waist circumference was measured at the midpoint between the last rib and iliac crest, while hip circumference was recorded at the level of the greater trochanters. A WHR of >0.85 in females and >0.90 in males was defined as central obesity. All enrolled patients received medical management in accordance with standard clinical protocols under the supervision of a consultant cardiologist.

Data Analysis

The collected data were entered and analyzed using SPSS version 24. The normality of continuous variables was assessed using the Shapiro-Wilk test. Quantitative data such as age, family income, and waist-hip ratio were summarized using either mean ± standard deviation (SD) or median with interquartile range (IQR), depending on the distribution. Categorical variables including gender, history of diabetes mellitus, hypertension, smoking status, educational status, residential area, type of ACS, and central obesity were presented as frequencies and percentages. To control for confounding factors and effect modifiers, logistic regression analysis was performed. Variables such as age, gender, diabetes, hypertension, family history of obesity and ACS, smoking, educational level, occupation, residential status, and type of ACS (STEMI, NSTEMI, unstable angina) were included in the regression model. Both univariate and multivariate analyses were conducted. Variables with a p-value less than 0.25 in univariate analysis were considered for inclusion in the multivariate model, where statistical significance was defined as a p-value less than 0.05. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported to assess the strength of associations.

RESULTS

Among the 370 patients included in the study, central obesity was present in 223 individuals (60.3%). The mean age of patients with central obesity was 56.7 ± 10.2 years, slightly higher than those without central obesity (55.4 ± 10.6 years), though the difference was not statistically significant (p = 0.28). Central obesity was significantly more prevalent among females (50.2%) compared to those without central obesity (24.5%), with a p-value of <0.001. Hypertension was also more common in the central obesity group (65.9%) compared to 45.6% in those without central obesity (p = 0.002). Similarly, diabetes mellitus was significantly more prevalent among centrally obese patients (57.4%) than in the non-obese group (41.5%, p = 0.005). Interestingly, smoking was more frequent in patients without central obesity (70.7%) compared to those with central obesity (57.8%), showing an inverse relationship (p = 0.015). A family history of obesity was present in 39.5% of patients with central obesity, significantly higher than 18.4% among those without (p = 0.001).

Table 1

Comparison of Clinical and Demographic Variables Between Patients with and Without Central Obesity

Variable	With Central Obesity (n=223)	Without Central Obesity (n=147)	p-value
Mean Age (years)	56.7 ± 10.2	55.4 ± 10.6	0.28
Female Gender (%)	112 (50.2%)	36 (24.5%)	<0.001
Hypertension (%)	147 (65.9%)	67 (45.6%)	0.002
Diabetes Mellitus (%)	128 (57.4%)	61 (41.5%)	0.005
Smoking (%)	129 (57.8%)	104 (70.7%)	0.015
Family History of Obesity (%)	88 (39.5%)	27 (18.4%)	0.001

Regarding the types of acute coronary syndrome observed in the study population, the most common presentation was ST-elevation myocardial infarction (STEMI), accounting for 198 cases (53.5%). This was followed by non-ST elevation myocardial infarction (NSTEMI) in 110 patients (29.7%), while unstable angina was identified in 62 patients, representing 16.8% of the total sample.

Table 2

Distribution of ACS Type Among Patients

ACS Type	Frequency (n)	Percentage (%)
STEMI	198	53.5%
NSTEMI	110	29.7%
Unstable Angina	62	16.8%

The mean waist-hip ratio (WHR) among male patients was 0.95 ± 0.05, while for female patients it was 0.89 ± 0.06. Central obesity was present in 50.0% of the male participants (111 out of 222) and was notably more prevalent in females, affecting 75.7% (112 out of 148).

Table 3

Waist-Hip Ratio Distribution by Gender

Gender	Mean WHR	Central Obesity Present (n,%)
Male	0.95 ± 0.05	111 (50.0%)
Female	0.89 ± 0.06	112 (75.7%)

Among patients with central obesity, hypertension was the most prevalent risk factor, affecting 147 individuals (65.9%). Diabetes mellitus was present in 128 patients (57.4%), while smoking was reported by 129 patients (57.8%). A family history of obesity was noted in 88 cases (39.5%), and a family history of acute coronary syndrome (ACS) was found in 90 patients (40.4%).

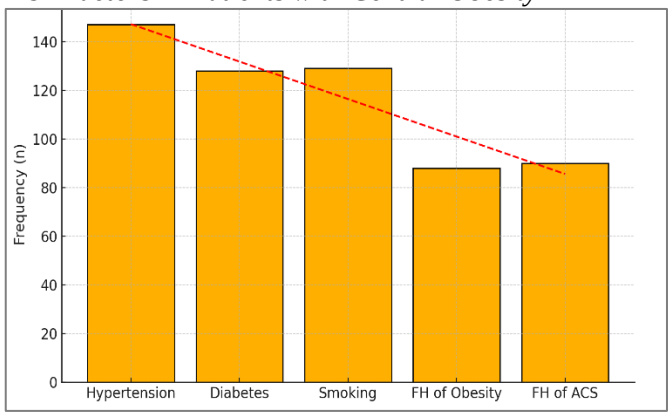
Table 4

Risk Factors in Patients with Central Obesity

Risk Factor	Frequency (n)	Percentage (%)
Hypertension	147	65.9%
Diabetes Mellitus	128	57.4%
Smoking	129	57.8%
Family History of Obesity	88	39.5%
Family History of ACS	90	40.4%

Figure 1

Risk Factors in Patients with Central Obesity



Multivariate logistic regression analysis identified several independent predictors of central obesity among ACS patients. Female gender was strongly associated with central obesity, with an adjusted odds ratio (OR) of 2.74 (95% CI: 1.68–4.48, p < 0.001). Hypertension was also a significant predictor (OR: 1.65, 95% CI: 1.08–2.52, p = 0.02). Additionally, a family history of obesity increased the likelihood of central obesity (OR: 1.89, 95% CI: 1.12–3.20, p = 0.016).

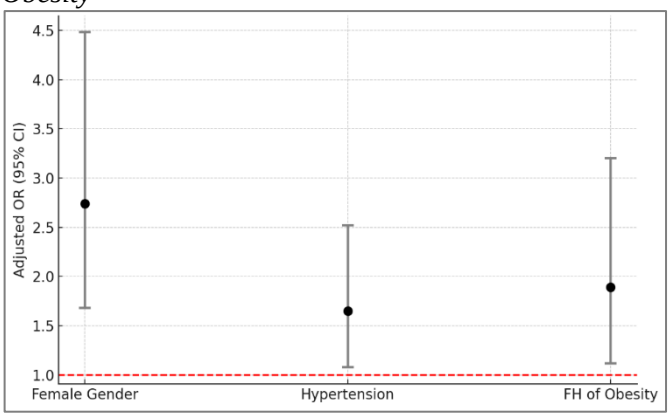
Table 5

Multivariate Logistic Regression Analysis for Central Obesity

Variable	Adjusted OR	95% CI	p-value
Female Gender	2.74	1.68–4.48	<0.001
Hypertension	1.65	1.08–2.52	0.02
Family History of Obesity	1.89	1.12–3.20	0.016

Figure 2

Multivariate Logistic Regression Analysis for Central Obesity



DISCUSSION

This study was conducted to determine the frequency of central obesity among patients presenting with acute coronary syndrome at a tertiary cardiac care facility. The results indicated a high prevalence of central obesity, affecting 60.3 percent of the total sample. The proportion was notably higher among female patients at 75.7 percent compared to 50.0 percent in male patients. These findings are consistent with global patterns and reinforce the importance of central obesity as a cardiovascular risk factor. Several studies have previously demonstrated that central adiposity, as measured by waist-hip ratio or waist circumference, is a stronger predictor of cardiovascular events than overall body mass index. The INTERHEART study and similar large-scale investigations have reported a direct association between abdominal fat and myocardial infarction, independent of other traditional risk factors.[20] In this study, significant associations were found between central obesity and factors such as female gender, history of hypertension, and family history of obesity. These remained statistically significant even after adjusting for confounding variables through multivariate logistic regression.[21] The greater prevalence of central obesity in females may reflect the influence of hormonal, behavioral, and cultural factors, particularly in South Asian populations where lifestyle patterns and physical activity levels differ across genders. Additionally, the coexistence of hypertension and diabetes in patients with central obesity suggests a clustering of metabolic abnormalities commonly referred to as the metabolic syndrome, which is known to accelerate the development of coronary artery disease. An interesting observation was the lower prevalence of central obesity among smokers.[22] While smoking is a known risk factor for acute coronary events, some studies have shown that it is inversely related to body fat due to its appetite-suppressing effects. However, the adverse effects of smoking on cardiovascular health remain substantial, regardless of its association with weight or fat distribution. The study underscores the need to include waist-hip ratio or waist circumference as part of routine cardiovascular risk assessments, especially in populations with high rates of metabolic disorders. Relying solely on body mass index may result in underdiagnosis of patients who are at considerable risk of coronary events due to central obesity. Gender-specific strategies may also be necessary to address the unique risk profiles seen in men and women.[23] This study has several strengths, including a reasonable sample size and the use of objective anthropometric measures. However, there are also limitations. The cross-sectional design restricts the ability to draw conclusions about causality. The use of a non-probability sampling method may limit the generalizability of the findings. Furthermore, important confounders such as diet, physical activity, and socioeconomic status were not included, which may influence the observed associations. Future research should explore the longitudinal impact of central obesity on cardiovascular outcomes in diverse populations. Interventions aimed at reducing abdominal fat and improving metabolic health could provide valuable insights into the prevention of acute coronary syndromes. Public health programs should also prioritize early screening and lifestyle interventions targeting high-risk individuals, particularly women.

CONCLUSION

It is concluded that central obesity is highly prevalent among patients presenting with acute coronary syndrome, with a significantly higher frequency observed in female patients. The study highlights a strong association between central obesity and key cardiovascular risk factors such as hypertension, diabetes mellitus, and a family history of obesity. These findings underscore the importance of assessing central adiposity using waist-hip ratio as a more reliable predictor of cardiovascular risk than body mass index alone. Incorporating simple, cost-effective measurements like waist and hip circumference into routine clinical evaluations can greatly enhance early identification of high-risk individuals. Furthermore, gender-specific preventive strategies and targeted lifestyle interventions should be integrated into public health programs to address the rising burden of central obesity and its role in the development of coronary artery disease.

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