

Prevalence of Overweight and Obesity and Their Association with Cardiovascular Risk Factors among Patients with Acute Myocardial Infarction Attending a Tertiary Care Centre

Snigdha Bhowmik¹, Ameet Fadia², Soham Kishor Gholba³

¹Senior Resident, Department of Physiology, BJGMC, Pune

²Professor and Head, Department of Physiology, Seth G. S. Medical College and KEM Hospital, Parel, Mumbai

³Senior Resident, Department of Physiology, BJGMC, Pune

Corresponding Author Email ID: snigdha171@gmail.com

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Abstract

Background: Acute myocardial infarction (AMI) remains one of the leading causes of morbidity and mortality worldwide. Overweight and obesity have emerged as major modifiable risk factors for cardiovascular disease because of their association with hypertension, diabetes mellitus, dyslipidaemia, and chronic inflammation. However, data regarding the proportion of overweight and obese individuals among patients with AMI in the Indian population remain limited. **Objectives:** To determine the prevalence of overweight and obesity among patients diagnosed with acute myocardial infarction and to evaluate their association with major cardiovascular risk factors in a tertiary care centre. **Methods:** A hospital-based observational cross-sectional study was conducted among 100 consecutive patients diagnosed with acute myocardial infarction. Socio-demographic characteristics, clinical profile, anthropometric measurements, and cardiovascular risk factors were recorded using a predesigned case record form. Body mass index (BMI) was calculated and classified according to World Health Organization criteria. Data were analysed using descriptive statistics, and associations between obesity and cardiovascular risk factors were evaluated using the Chi-square test. A p-value of <0.05 was considered statistically significant. **Results:** The majority of patients belonged to the 40–59 years age group (60%), with a male predominance (68%). Forty-eight percent of participants were overweight, while 26% were obese, indicating that 74% of patients had excess body weight. Smoking was the most prevalent cardiovascular risk factor, followed by hypertension, diabetes mellitus, alcohol consumption, sedentary lifestyle, obesity, and positive family history. Although hypertension was more frequent among obese patients, the association between obesity and hypertension was not statistically significant ($\chi^2 = 0.8497$, $p = 0.3566$). **Conclusion:** Overweight and obesity were highly prevalent among patients with acute myocardial infarction and were frequently associated with multiple cardiovascular risk factors. Early identification of excess body weight and comprehensive risk factor modification may contribute significantly to reducing the burden of acute myocardial infarction.

Keywords: Myocardial infarction, Overweight, Obesity

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Introduction

Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide and continue to impose a substantial burden on health systems, particularly in low- and middle-income countries. According to the World Health Organization (WHO), an estimated 19.8 million people died from CVDs in 2022, accounting for nearly one-third of all global deaths, with approximately 85% of these deaths resulting from myocardial infarction and stroke. Most cardiovascular events are preventable through effective control of modifiable risk factors, including obesity, unhealthy diet, physical inactivity, tobacco use, hypertension, diabetes mellitus, and dyslipidaemia.¹

Obesity has emerged as one of the most important public health challenges of the twenty-first century. The WHO

estimates that in 2022 approximately 2.5 billion adults were overweight, of whom 890 million were living with obesity. The prevalence of obesity has more than doubled since 1990, making it one of the fastest-growing non-communicable disease risk factors worldwide. Body mass index (BMI) remains the most widely accepted and practical anthropometric measure for categorizing overweight (BMI ≥ 25 kg/m²) and obesity (BMI ≥ 30 kg/m²), although abdominal adiposity provides additional prognostic information for cardiovascular risk.²

The association between obesity and cardiovascular disease is well established. Excess adiposity contributes to the development of hypertension, insulin resistance, dyslipidaemia, endothelial dysfunction, chronic low-grade inflammation, oxidative stress, and activation

of neurohormonal pathways, all of which accelerate atherosclerosis and increase the likelihood of acute coronary events. Obesity also independently increases cardiovascular mortality, even after adjustment for conventional cardiovascular risk factors.³

Acute myocardial infarction (AMI) is a major manifestation of atherosclerotic cardiovascular disease and remains a leading cause of morbidity and mortality worldwide. Most cases occur following rupture or erosion of an atherosclerotic plaque with subsequent coronary thrombosis, resulting in myocardial ischemia and irreversible myocardial necrosis. The pathological process underlying AMI is influenced by multiple metabolic abnormalities commonly associated with obesity, including hyperglycaemia, dyslipidaemia, elevated blood pressure, increased inflammatory cytokines, and pro-thrombotic states. These interrelated mechanisms explain why overweight and obese individuals experience a substantially greater risk of coronary artery disease and myocardial infarction than individuals with normal body weight.³⁻⁵

Beyond overall obesity, increasing evidence suggests that visceral adiposity plays a particularly important role in cardiovascular risk. Visceral fat functions as an active endocrine organ by secreting adipokines and inflammatory mediators such as tumour necrosis factor- α (TNF- α), interleukin-6 (IL-6), leptin, resistin, and plasminogen activator inhibitor-1, thereby promoting endothelial injury, plaque instability, insulin resistance, and thrombogenesis. Consequently, obesity contributes not only to the initiation of atherosclerosis but also to plaque rupture and acute coronary syndromes.^{3,6}

India is experiencing a rapid epidemiological transition characterised by increasing urbanisation, sedentary lifestyles, dietary changes, and rising prevalence of obesity and metabolic disorders. These changes have been accompanied by a marked increase in coronary artery disease occurring at younger ages compared with Western populations. Obesity frequently coexists with hypertension, diabetes mellitus, and dyslipidaemia, creating a clustering of cardiometabolic risk factors that substantially increases the likelihood of acute myocardial infarction. The growing prevalence of obesity among Indian adults has therefore become an important public health concern requiring early identification and preventive interventions.^{1,2}

Although obesity is recognised as an important cardiovascular risk factor, the proportion of overweight and obese individuals among patients presenting with acute myocardial infarction varies across populations because of differences in ethnicity, lifestyle, socioeconomic status, and associated comorbidities. Furthermore, limited hospital-based data are available from many regions of India regarding the burden of overweight and obesity among patients with acute myocardial infarction and their associated

cardiovascular risk profiles. Understanding these patterns is essential for developing targeted preventive strategies and strengthening risk factor modification programmes.

Therefore, the present study was undertaken to determine the prevalence of overweight and obesity among patients diagnosed with acute myocardial infarction attending a tertiary care centre and to evaluate their association with major cardiovascular risk factors. The findings may contribute to improved risk stratification and reinforce the importance of obesity prevention as an integral component of cardiovascular disease control.

Material and Methods

A hospital-based observational cross-sectional study was conducted in the Department of Medicine of a tertiary care teaching hospital after obtaining approval from the Institutional Ethics Committee. Adult patients diagnosed with acute myocardial infarction (AMI) based on clinical presentation, electrocardiographic findings, and cardiac biomarkers, who fulfilled the inclusion criteria and provided written informed consent, were consecutively enrolled during the study period. Socio-demographic characteristics, medical history, lifestyle factors, and clinical details were recorded using a predesigned and prevalidated case record form. Anthropometric measurements, including height and weight, were obtained using standardized techniques, and body mass index (BMI) was calculated as weight (kg)/height (m²). Participants were categorized into BMI groups according to the World Health Organization (WHO) classification. Clinical evaluation and relevant laboratory investigations, including blood glucose, lipid profile, and other routine investigations, were recorded from hospital records. Cardiovascular risk factors such as hypertension, diabetes mellitus, dyslipidaemia, smoking, alcohol consumption, physical inactivity, and family history of cardiovascular disease were documented. Data were entered into Microsoft Excel and analysed using appropriate statistical software. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Associations between BMI categories and cardiovascular risk factors were evaluated using the Chi-square test, with a p-value <0.05 considered statistically significant.

Results and Observations

A total of 100 patients diagnosed with acute myocardial infarction (AMI) were included in the study. The majority of participants belonged to the 40–49 years and 50–59 years age groups, each accounting for 30% of the study population, followed by 24% in the 60–69 years age group. Patients aged 70 years and above constituted only 16% of the study population, indicating that AMI was predominantly observed among middle-aged individuals. A marked male predominance was noted, with 68% of the participants being males and 32% females, suggesting a higher burden of AMI among men in the present study.

Table 1: Baseline Characteristics of Study Participants (n = 100)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	40–49	30	30.0
	50–59	30	30.0
	60–69	24	24.0
	70–79	14	14.0
	≥80	2	2.0
Sex	Male	68	68.0
	Female	32	32.0

Table 2: Distribution of body mass index (BMI) among study participants (n = 100)

BMI Category	Frequency	Percentage (%)
Healthy weight	26	26
Overweight	48	48
Obese	26	26
Total	100	100

Assessment of body mass index (BMI) revealed that 48% of the participants were overweight and 26% were obese, whereas only 26% had a healthy BMI. None of the participants were underweight. These findings indicate that nearly three-fourths of the patients with AMI had excess body weight, highlighting overweight and obesity as common characteristics among individuals presenting with myocardial infarction.

Evaluation of cardiovascular risk factors demonstrated that smoking was the most prevalent risk factor, followed by hypertension, diabetes mellitus, alcohol consumption, sedentary lifestyle, obesity, and positive family history. The coexistence of multiple cardiovascular risk factors among study participants suggests that AMI results from the cumulative effect of several modifiable and non-modifiable determinants rather than a single etiological factor.

Analysis of the association between obesity and hypertension showed that hypertension was more frequent among obese patients than non-obese patients; however, the association was not statistically significant ($\chi^2 = 0.8497$, $p = 0.3566$). This finding indicates that although hypertension

Table 3: Association between obesity and hypertension

Hypertension	Obese (n=26)	Non-obese (n=74)
Yes	15	33
No	11	41
Total	26	74
Statistical test	Value	
Chi-square	0.8497	
p-value	0.3566	

was common among obese individuals, obesity alone did not demonstrate a significant independent association with hypertension in the present study.

Discussion

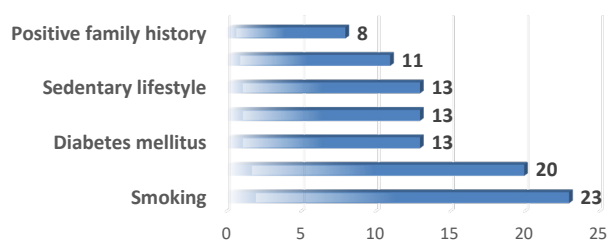
The present study evaluated the prevalence of overweight and obesity among patients with acute myocardial infarction attending a tertiary care centre and explored their association with major cardiovascular risk factors. The findings demonstrated that overweight and obesity were highly prevalent among AMI patients, with nearly three-fourths of the study population having a BMI above the normal range. These observations support the growing evidence that excess body weight plays a substantial role in the development of cardiovascular disease.^{1,2}

Most patients in the present study were between 40 and 59 years of age. This observation is consistent with the changing epidemiology of coronary artery disease in developing countries, where myocardial infarction increasingly affects younger adults because of rapid urbanization, sedentary lifestyle, obesity, and metabolic disorders. The World Health Organization has similarly reported a rising burden of cardiovascular disease among economically productive age groups, emphasizing the importance of early prevention and lifestyle modification.¹

A clear male predominance was observed in the present study, with males accounting for more than two-thirds of all cases. Similar findings have been reported in the INTERHEART study, which demonstrated that coronary artery disease occurs more frequently in men, although the incidence among women increases after menopause due to the loss of the cardioprotective effects of estrogen.⁵ Hormonal differences, smoking, occupational stress, and lifestyle factors may explain the higher incidence among males.

The most important finding of the present study was the high prevalence of overweight and obesity among AMI patients. Almost half of the participants were overweight, while more than one-fourth were obese. These findings are comparable to the American Heart Association Scientific Statement by Powell-Wiley et al., which concluded that obesity independently contributes to cardiovascular disease through chronic inflammation, endothelial dysfunction, insulin resistance, sympathetic activation, and accelerated

RISK FACTOR

**Chart 1:** Distribution of cardiovascular risk factors among study participants

atherosclerosis.³ Excess adiposity promotes dyslipidaemia, hypertension, and impaired glucose metabolism, thereby increasing the risk of coronary artery disease and myocardial infarction.

Smoking emerged as the most common cardiovascular risk factor in the present study, followed by hypertension and diabetes mellitus. Similar observations were reported in the INTERHEART study, where smoking, hypertension, diabetes, abdominal obesity, dyslipidaemia, and physical inactivity collectively explained the majority of myocardial infarction risk across different populations.⁵ These findings emphasize that effective prevention of AMI requires simultaneous control of multiple modifiable risk factors rather than isolated management of obesity alone.

Although hypertension was more common among obese patients, the association between obesity and hypertension was not statistically significant in the present study. This may be attributable to the relatively small sample size and the presence of several confounding cardiovascular risk factors. Larger multicentric studies have demonstrated a significant positive association between obesity and hypertension through activation of the sympathetic nervous system, renin-angiotensin-aldosterone system, insulin resistance, and endothelial dysfunction.^{3,6}

Overall, the findings of the present study reinforce the growing body of evidence that overweight and obesity substantially contribute to the burden of acute myocardial infarction. Identification and modification of obesity and associated cardiovascular risk factors through lifestyle interventions, weight reduction, smoking cessation, and optimal management of hypertension and diabetes are likely to reduce the incidence of coronary artery disease and improve cardiovascular outcomes.

The findings of the present study have important clinical and public health implications. The high prevalence of overweight and obesity among patients with acute myocardial infarction underscores the need for routine assessment of body mass index and comprehensive cardiovascular risk profiling in clinical practice. Early identification of overweight individuals provides an opportunity for timely lifestyle interventions, including dietary modification, regular physical activity, smoking cessation, and weight management, which have been shown to significantly reduce the incidence of cardiovascular events.⁷⁻⁸ Furthermore, multidisciplinary approaches involving physicians, physiologists, dietitians, and rehabilitation specialists are essential for effective long-term risk reduction and secondary prevention following myocardial infarction. At the population level, strengthening public health policies that promote healthy lifestyles, obesity prevention, and early screening for cardiometabolic risk factors may substantially reduce the future burden of

coronary artery disease, particularly in developing countries where the prevalence of obesity continues to rise.^{9,10}

Conclusion

The present study demonstrated a high prevalence of overweight and obesity among patients with acute myocardial infarction attending a tertiary care centre. Most patients were middle-aged males, and overweight constituted the most common BMI category. Smoking, hypertension, diabetes mellitus, and sedentary lifestyle were the predominant associated cardiovascular risk factors. Although obesity showed a higher frequency of hypertension, no statistically significant association was observed in the present study. The findings highlight the important contribution of excess body weight to the burden of acute myocardial infarction and underscore the need for early identification of overweight and obese individuals, comprehensive cardiovascular risk assessment, and implementation of lifestyle-based preventive strategies. Public health measures focusing on weight reduction, smoking cessation, regular physical activity, and effective control of hypertension and diabetes may substantially reduce the incidence of acute myocardial infarction and improve long-term cardiovascular health.

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