

# Frequency of in-Hospital Mortality in Acute Myocardial Infarction Patients with Metabolic Syndrome

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## ABSTRACT

**Background:** Metabolic syndrome is one of the major public health issues worldwide. It is a pattern of physical conditions and metabolic abnormalities, commonly occurring together and increases an individual's risk of developing type 2 diabetes mellitus and atherosclerotic cardiovascular disease.

**Aim:** To determine the frequency of in hospital mortality and in acute myocardial infarction patients with metabolic syndrome and its association with components of metabolic syndrome.

**Study Design:** Prospective cross-sectional study

**Place and Duration of Study:** National Institute of Cardiovascular Diseases (NICVD), Karachi from 1<sup>st</sup> May 2019 to 31<sup>st</sup> December 2020.

**Methodology:** Two hundred and ten patients with acute myocardial infarction were taken and assessed for metabolic syndrome. Participants of either gender having age 18-70 years were included in the study. Demographic, clinical characteristics and in-hospital mortality were recorded.

**Results:** Mean age of the participants was 55.68±7.81 years. Total 88 (~41%) were female and 122 (~58%) were male. Thirty two (15.2%) participants had in-hospital mortality. Moreover, the in-hospital mortality was associated with higher age, waist circumference, and high triglyceride levels with p values <0.05.

**Conclusions:** The waist circumference and high triglyceride component of metabolic syndrome were found to be associated with high mortality in patients who presented with acute myocardial infarction. It is essential therefore for focus on these modifiable risk factors associated with higher mortality as a secondary prevention strategy.

**Keywords:** In-hospital mortality, Cardiovascular diseases, Metabolic syndrome, Myocardial infarction

## INTRODUCTION

Myocardial infarction (MI) is one of the leading cause of mortality worldwide<sup>1</sup> which results due to pre-existing atherosclerotic lesions followed by local plaque disruption.<sup>2</sup> Atherosclerosis is defined as deposition of plaques formation in the coronary arteries.<sup>3-7</sup> Knowing and preventing the pathophysiology of conditions that increase the risk of MI may help attenuate the progression of atherosclerotic vascular disorders leading to MI.<sup>8,9</sup>

Metabolic syndrome increases the chances of death up to double in patients with cardiovascular disease and chances of stroke of MI is three times higher as compared to normal persons.<sup>10-14</sup> Reported frequency of metabolic syndrome in atherosclerosis patients is ~50% and its prevalence was observed higher among females.<sup>15-17</sup> Lifestyle modifications, physical activity and exercise, taking good balanced diet can minimize the related complications present with metabolic syndrome.<sup>18-20</sup>

Diabetes mellitus further worsen the condition and onset of CVD in metabolic syndrome patients is higher upto 1.5 to 3-folds. Conversely, another study documented that, prevalence of metabolic syndrome was higher in man (34%) in contrast to women (16%).<sup>21</sup> It was found that higher prevalence of ischemic strokes in MetS as compared to diabetics alone in which it was reported that prevalence was higher in metabolic syndrome participants (19%) than to diabetic patients (7%). Increased risk of peripheral vascular disease has also been observed in metabolic syndrome patients.<sup>22-23</sup>

The higher mortality rate in patients with MetS and AMI was found. Among several components of MetS, different components are found to have impact on prognosis and outcome of the disease. The purpose of this study is to measure the prevalence of mortality rate among patients who had metabolic syndrome and myocardial infarction and identify the risk factors associated with higher mortality in these patients.

## MATERIALS AND METHODS

This descriptive cross-sectional study conducted at National Institute of Cardiovascular Disease (NICVD), Karachi, Pakistan. Patients within age group of 18-70 years, diagnosed with Acute Myocardial Infarction (AMI) and of either gender were included in

the study. Written and informed consent was obtained from patients or family member in case patient was unable to approach due to medical condition prohibiting timely approach of research team. With an estimated 5% margins of type 1 error (level of significance 0.5) and 95% confidence interval an approximate, sample size of 210 was calculated. Demographic and clinical characteristics were recorded. For MetS, we recorded serum triglyceride concentration, blood pressure, waist circumference, fasting plasma glucose level and lipoprotein-cholesterol (HDL-C) level.

Abdominal obesity was defined as waist circumference ≥ 102 cm for males and ≥88 cm for females, while high serum triglyceride levels were taken ≥150 mg/dl and serum HDL levels were taken <40 mg/dl for males (<50 mg/dl for females). Hypertension was defined as blood pressure measuring ≥130/85 mmHg and diabetes were defined as FBS ≥110 mg/dl. All the patients were followed by research team during the index hospitalization and in-hospital mortality was recorded.

Data was entered and analyzed using SPSS-21. Effect modifiers like age groups, gender, smoking status, and five metabolic syndrome (MetS) criteria were compared through stratification. Post stratification chi-square test or fisher exact test was applied. Two-sided p-value of ≤0.05 was taken as criteria of statistical significance.

## RESULTS

There were 122 (58.1%) males and 88 (41.9%) females with mean age was 56.78±7.81 years. Eighty four (40%) were found to be smokers. 134 (63.8%) had abdominal obesity and high blood pressure was found in 92 (43.8%) participants. High blood glucose was found in 112 (53.3%) while high triglyceride levels were observed in 134 (63.8%). Frequency distribution of low HDL showed that out of 210 patients, 102 (48.6%) had low HDL levels (Table 1).

There were 32 (15.2%) participants had in-hospital mortality. According to age with respect to in-hospital mortality showed that 6 (18.8%), 16 (50%) and 10 (31.2%) patients who were in age group 18-40 years, 41-60 years and 61-70 years had in-hospital mortality respectively with P-value of 0.03, for gender showed 18 (56.2%)

male and 14 (43.8%) females have in-hospital mortality with P-value of 0.54 and for smoking status, data shows hospital mortality in 16 (50%) smokers with P-value of 0.26. (Table 2)

Twenty four (75%) participants had abdominal obesity with significant P value of 0.023. Moreover, 12 (37.5%) participants had hypertension with insignificant P value of 0.39, 14 (43.8%) had high fasting glucose levels with insignificant P value 0.28. High triglycerides were found in 28 (87.5%) with significant P value of 0.027 and 16 (50%) had low HDL levels with no significant P value (p=0.55) [Table 3].

Table 1: Characteristics of participants (n=210)

Variable	No.	%
Smoking status (smokers)	82	40.0
Abdominal obesity (obese)	134	63.8
High blood pressure (≥130/85mmHg)	92	43.8
In-Hospital Mortality		
High blood glucose (≥110 mg/dl)	112	53.3
High triglyceride (≥150 mg/dl)	134	63.8
Low HDL (<40 mg/dl)	102	48.6

Table 2: In-hospital mortality with respect to age, gender and smoking status (N=32)

Variable	In-hospital mortality	P value
Age (years)		
18-40	6 (18.8%)	0.03
41-60	16 (50%)	
61-70	10 (31.2%)	
Gender		
Female	14 (43%)	0.54
Male	18 (56%)	
Smoking Status		
Yes	16 (50%)	0.26
No	16 (50%)	

Table 3: In-hospital mortality in patients with respect to abdominal obesity, high BP, high Sugar, High triglycerides and low HDL levels (n=32)

Variable	In-hospital mortality	P value
Abdominal obesity = 134 (63.8%)		
Yes	24 (75%)	0.023
No	10 (25%)	
High blood pressure = 92 (43.8%)		
Yes	12 (37.5%)	0.39
No	22 (62.5%)	
High blood glucose = 112 (53.3%)		
Yes	14 (43.8%)	0.28
No	18 (56.2%)	
High triglyceride level = 134 (63.8%)		
Yes	28 (87.5%)	0.02
No	4 (12.5%)	
Low HDL level = 102(48.6%)		
Yes	16 (50%)	0.55
No	16 (50%)	

## DISCUSSION

Metabolic syndrome is considered as a marker for cardiovascular diseases which is characterized by central obesity, raised triglycerides, low concentration of HDL, and elevated fasting blood glucose and hypertension. It is a known factor of atherosclerotic cardiovascular disease.<sup>24</sup> In present study, out of 210 MI patients with metabolic syndrome, 32 (15.2%) were found to have in-hospital mortality which was associated with age, abdominal obesity, and high triglyceride.

Different studies have reported association of in-hospital mortality with different component of MetS in patients with AMI. Pandey et al<sup>25</sup> found fatality rate was higher in MetS patients in contrast to patients without the syndrome. Among components of MetS, elevated triglycerides appeared to be positive predictor of acute myocardial infarction followed by elevated fasting glucose concentration and Maqbool et al<sup>26</sup> reported the frequency of in-hospital mortality in patients of acute myocardial infarction with metabolic syndrome to be 15.76%.

A Korean study concluded old age, cholesterol, low density lipoprotein, diabetes mellitus and hypertension were associated with in-hospital mortality in patients with AMI. However, they did not find correlation with abdominal obesity and in-hospital mortality.<sup>27</sup> While Abdulla Shehab et al<sup>28</sup> reported in hospital mortality in 851 AMI cases with MetS. It was found to be associated with male gender, HTN, DM and abdominal obesity. Jung Kim et al<sup>29</sup> found higher death rate in diabetic persons as compared to non-diabetic AMI patients which was found to be correlated to HbA1c. Madrid-Miller et al<sup>30</sup> had reported the association of in-hospital mortality with female gender DM, HTN and dyslipidemia.

Our study reports two of the component of metabolic syndrome associated with mortality in patients with AMI which is in accordance with many studies. This may be due to the underlying disease process which is common to all races and ethnicity around the world.

## CONCLUSION

This study showed that higher and equal prevalence of in-hospital mortality in patients with MetS presented with AMI compared to global data. However, more males and 40-60 years of age group died. Among component of the metabolic syndrome, triglyceride levels and abdominal obesity were found to have higher association with mortality. Result of the present study is significant for clinical practitioners as it has indicated that sedentary lifestyle is further exacerbating the complications of metabolic syndrome. Lifestyle modifications, balanced dietary habits, maintaining lipid levels may prove beneficial against poor prognosis of acute myocardial infarction.

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