

Myocardial Infarction and Metabolic Syndrome: Review of Literature

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ABSTRACT

The metabolic syndrome is one of the major public health issues worldwide. It is a constellation of physical conditions and metabolic abnormalities, commonly occurring together, that increases an individual's risk for development of type 2 diabetes mellitus and cardiovascular disease. Additionally, presence of both contribute to the overall severity in the individual patient. Identifying factors associated with mortality in acute myocardial infarction patients may help improve patient care and guide future research. This is especially the case for long-term care in an outpatient setting. To determine frequency of in hospital mortality in acute myocardial infarction patients with metabolic syndrome.

Keywords: Acute myocardial infarction; Metabolic syndrome; In-hospital mortality

INTRODUCTION

Metabolic syndrome (MetS) is a constellation of cardiometabolic risk factors that, when present in tandem, increase cardiovascular morbidity and/or mortality [1]. It has been demonstrated that the prevalence of MS is increasing worldwide, and for the adult population it is estimated to be about 20-25% [2]. The presence of metabolic syndrome is strongly associated with the development of hyperuricemia, diabetes, hypertension, cardiovascular disease and all-cause mortality [3]. The presence of the metabolic syndrome (MS) is associated with an increased risk of cardiovascular disease morbidity and mortality [4,5], Coronary artery disease is now a leading cause of death, not only in the Western countries but also in Asian countries like Pakistan [6].

Several studies showed that the presence of MetS had negative impact on the prognosis of patients who survived acute myocardial infarction (AMI). These studies mainly investigated a long-term impact of MetS in patients with AMI. They followed up the patients who had been treated in different ways, which certainly influenced survival and the appearance of new unwanted events among these patients [7-9]. In the Third National Health and Nutrition Examination Survey population, metabolic syndrome was a significant univariate correlate of prevalent coronary heart disease, but was not independently correlated with coronary heart disease in multivariate analyses adjusted for blood pressure, HDL cholesterol level, and diabetes mellitus [10]. One other study has also showed that MetS was associated with increased risk of in-hospital mortality. It showed about 10% mortality in patients with MetS and AMI [11]. A local study conducted and reported mortality rate of 15.76% among the 165 study patients with acute myocardial infarction and metabolic syndrome (MetS).

METHODS AND MATERIALS

Sample selection

- Patients diagnosed with Acute Myocardial Infarction (AMI) as per operational definition
- Patients diagnosed with metabolic syndrome (MetS) as per operational definition
- Either gender
- Age 18-70 years.
- **Exclusion criteria**
- Non consenting.
- Patient with prior history of AMI.
- Patients with prior history of any cardiac related surgery.

Data Collection Procedure

The study was started after approval from CPSP. Approval of ethical review committee of NICVD was taken prior to the data collection. The study included patients presenting with Acute

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Myocardial Infarction (AMI) to the adult cardiology department, NICVD, Karachi and also fulfilled the inclusion and exclusion criteria. Prior to inclusion the purpose, and benefits of the study was explained to all participants and verbal informed consent was taken by the principal investigator from all patients. Demographic and clinical characteristics of the patients was recorded such as age(years), gender, smoking status, waist circumference, serum triglyceride concentration, lipoproteincholesterol (HDL-C) level, blood pressure, and fasting plasma glucose level.

Literature Review

Waist circumference and blood pressure was measured by primary investigator. To measure waist circumference, locating top of right iliac crest. Measuring tape was placed in a horizontal plane around abdomen at level of iliac crest. Before reading tape measure, it was ensured that the tape is snug but does not compress the skin and is parallel to floor. Measurement was at the end of a normal expiration. Blood pressure was measured using a sphygmomanometer after the subjects had rested for more than 5 min. For those with a systolic blood pressure \geq 140 mmHg and a diastolic blood pressure \geq 90 mmHg (defined as hypertension by the 2003 JNC-7), blood pressure was measured on a further 2 occasions, two hours apart, after resting, and average will be taken then. Myocardial infarction (MI) is the leading cause of mortality in many developed and developing countries. The substrate for MI is atherosclerosis and MI occurs at the site of pre-existing atherosclerotic lesions, usually following local plaque disruption with subsequent occlusive thrombosis.

In general, factors that promote atherosclerosis also promote myocardial infarction. While therapeutic targeting of cholesterol with statins has been shown to prevent events and reduce progression of atherosclerosis, it is clear that other lipidindependent factors, such as inflammatory cytokines, also affect progression of atherosclerosis. Atherosclerosis may he considered a chronic inflammatory disease with influx of leukocytes leading to plaque growth. Factors that promote leukocyte pro-inflammatory activity may therefore lead to progression of atherosclerotic plaques. Identification of conditions in which the likelihood of MI is increased may uncover important novel triggers or pathways involved in the progression of atherosclerotic vascular disease. Individuals with the metabolic syndrome are twice as likely to die of the cardiovascular disease as those who do not, and their risk of an acute myocardial infarction or stroke is threefold higher the others. The approximate prevalence of the metabolic syndrome among these patients with coronary heart disease (CHD) is 50%, with a high prevalence of \sim 35% among patients with premature coronary artery disease (before or at age 45) and a particularly high prevalence among women. With appropriate cardiac rehabilitation and changes in lifestyle (e.g., diet control, nutrition, physical activity, weight reduction, and in some cases pharmacologic therapy), the prevalence of the syndrome can be reduced.

The relative risk for the new onset CVD in patients with the metabolic syndrome who do not have diabetes averages 1.5-3

fold risk. However, an year follow-up of middle aged participants in the Framingham offspring Study documented that the population-attributable CVD risk in the metabolic syndrome was 34% among men and only 16% among women in the study. In the same study, both the metabolic syndrome and diabetes predicted ischemic stroke, with greater risk among patients with the metabolic syndrome than among those with diabetes alone (19% vs. 7%) and a particularly large difference among the women (27% vs. 5%). Patients with the metabolic syndrome are also at increased risk for the peripheral vascular disease. overall, the risk for type 2 diabetes among patients with the metabolic syndrome is increased three- to fivefold than others. In the Framingham Offspring Study's 8-year follow-up of middle-aged participants, the population-attributable risk for developing type 2 diabetes was 62% among men and 47% among the women.

RESULTS

A total of 105 patients with metabolic syndrome in acute myocardial infarction presenting at Adult Cardiology at National Institute of Cardiovascular Disease (NICVD), Karachi who met the inclusion and exclusion criteria were included in this study. Out of 105 patients minimum age of the patient was 37 while maximum age of the patients was 69 years. Mean age in our study was 56.78 years with the standard deviation of ±7.81 (Table 1). Out of 105 patients, 16 (15.2%) had in-hospital mortality, and 89 (84.8%) did not have in-hospital mortality. As shown in Figure 1. Out of 105 patients, 61 (58.1%) were male and 44 (41.9%) were female. As shown in Figure 2.



Figure 1: In-hospital mortality distribution n=105.

MALE FEMALE



Figure 2: Gender distribution n=105.

Variable	Mean	Mean	Mean
Age (Years)	56.78	7.81	36-69

 Table 1: Descriptive statistics n=105.

DISCUSSION

The term acute coronary syndrome refers to any group of clinical symptoms compatible with acute myocardial ischemia and covers the spectrum of clinical conditions ranging from unstable angina to non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI). Metabolic syndrome is a cluster of cardiovascular disease risk factors characterized by abdominal obesity, raised fasting blood glucose, elevated triglycerides, reduced high density lipoprotein cholesterol (HDL-C) and hypertension. The metabolic syndrome is a predisposing factor for endothelial dysfunction and atherosclerotic cardiovascular disease.

Our study showed a total of 105 diagnosed acute myocardial infarction patients with metabolic syndrome were included in (Table 2). Mean age in our study was 56.78 ± 7.81 years. 61 (58.1%) were male and 44 (41.9%) were female. Out of 105 patients, 16 (15.2%) and 89 (84.8%) had did not have inhospital mortality. Pandey, et al study included 84 AMI patients, 22 (26.19%) fulfilled the criteria for metabolic syndrome. Patients with the metabolic syndrome were older (86% were>50 years of age) and females (27%) were more affected than males (25%). In-hospital case fatality was higher in patients having the metabolic syndrome.

Age (Years)	In-Hospital Mortality		Total
	Yes	No	
18-40		34 (38.2%)	37 (35.2%)
41-60	08 (50%)	47 (52.8%)	55 (52.4%)
61-70	05 (31.2%)	08 (9%)	13 (12.4%)
Total	16 (100%)	89 (100%)	105 (100%)
P-Value	0.03		

Table 2: IN-hospital mortality according to age n=105.

CONCLUSION

The present study reveals the high prevalence of the metabolic syndrome in acute myocardial infarction patients, particularly in males and older patients. Patients having the metabolic syndrome have higher in-hospital fatality. Of the individual OPEN O ACCESS Freely available online

components of the metabolic syndrome, triglyceride levels had the highest positive predictive value in AMI cases and it was followed by abdominal obesity. As the prevalence of the metabolic syndrome is high worldwide and increasing day by day due to sedentary lifestyles, the findings of the present study has important implications for clinical practice. Emphasis must be placed on the intake of balanced diets and the control of blood lipid levels, particularly that of triglycerides. So, it is recommended that every patient who presents with myocardial infarction with metabolic syndrome should be given intensive care and early intervention with aggressive risk factors modification. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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