

Frequency of Mortality and Risk Factors Associated to Acute Myocardial Infarction in Pakistan

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Abstract:

Aim: To determine the frequency of mortality and risk factors associated to acute myocardial infarction.

Methods: This cross sectional study was conducted at cardiology ward of tertiary care hospital Karachi. We enrolled 165 patients with acute myocardial infarction. We assessed the risk factors and mortality of the patients. Chi square test was applied for association between risk factors and mortality.

Results: We conducted this study on 165 patients. Mean age was 49.93±9.91 years. Males were 96 (58.2%) while the female patients were 69 (41.8%). Mortality in acute myocardial infarction patients was 12.1%. Risk factors of acute myocardial infarction were, age greater than 40 years 139 (84.2%), obesity 23 (13.9%), diabetes 37 (22.4%), hypertension 57 (34.5%), family history of cardiovascular diseases 32 (19.4%), smoking 20 (12.1%) and elevated cholesterol levels 14 (8.5%). Obesity, diabetes, hypertension, smoking and elevated cholesterol levels were significantly associated with mortality among AMI patients.

Conclusion: We conclude that the frequency of mortality in acute myocardial infarction patients was 12.1%, age greater than forty, diabetes, hypertension, smoking, family history of cardiovascular diseases and elevated cholesterol levels were risk factors of acute myocardial infarction.

Keywords: Acute myocardial infarction, Risk factors, Mortality

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Introduction: In the developed world, acute myocardial infarction is a major killer ¹. Almost a million Americans die every year from the disease, and the global prevalence is nearing three million ². Non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI) are the two subtypes of acute myocardial infarction.

NSTEMI is quite similar to unstable angina. On the other hand, there is no evidence of an increase in cardiac markers ^{2,3}.

Acute myocardial infarction is caused by insufficient blood supply to the heart's coronary arteries. Ischemia of the heart occurs when oxygen supply falls short of demand. Many factors that contribute to impaired coronary blood flow ⁴. Commonly, atherosclerotic plaques rupture and cause thrombosis, which in turn contributes to sudden reductions in coronary blood flow. Coronary artery embolism, cocaine-induced ischemia, coronary dissection, and coronary vasospasm, are other causes of hypoxia/myocardial ischemia ⁵.

Most fatalities following acute myocardial infarction are caused by blockage from atherosclerotic plaques, which account for 70% of all such cases. Since that atherosclerosis is the leading cause of acute myocardial infarction, it makes sense to focus on lowering the risk factors associated with this condition. In men, 90% of heart attacks are caused by preventable variables, while among women, 94% of MIs can be attributed to such factors. Smoking, physical activity, hypertension, obesity, cholesterol, LDL, and triglyceride levels are all modifiable risk factors. Yet, there are other risk factors for atherosclerosis that can't be changed, such as gender, age, age, and family history ^{6,7}.

The most common cause of coronary artery thrombosis in patients with acute MI is atherosclerotic plaque, as revealed by postmortem examinations ⁸. Second, the most prevalent cause of endoluminal thrombosis without rupture is degraded plaque ⁹. Hypercoagulability, substance addiction, and non-atherosclerotic coronary artery disease are some additional causes. The rising prevalence of risk factors such as obesity, diabetes mellitus, hypertension, smoking, and high cholesterol level or lipid profile makes it difficult to protect the young at present ¹⁰. Other causes include a lack of education concerning coronary artery disease and a reluctance to seek medical help due to a misplaced sense of confidence ¹¹. The key to a healthy lifestyle is early disease detection and the reduction of risk factors. Several studies have compared the risk variables for STEMI in younger and older patients ¹².

Individuals all across the world face the devastating effects of acute myocardial infarction. Preventable risk factors for cardiovascular disease are likewise receiving less attention. Nonetheless, this study has been undertaken to highlight the present information regarding the involvement of these factors in developing cardiovascular events by determining the frequency of mortality and the risk factors of ST-elevation myocardial infarction.

Material And Methods:

We conducted this cross sectional study at department of Cardiology of tertiary care hospital Karachi, March 2022 to September 2022 after taking ethical approval from the hospital's ethical board. Patients with myocardial infarction presenting to our ward were enrolled in the study using non probability consecutive sampling. All the patients were subjected to sign a written consent. Those patients who refused to sign the written consent were excluded. Detail

examination was performed on patients. Demographics and risk factors were noted on a pre-designed pro-forma. Mortality and risk factors were assessed.

We calculated the sample size using WHO calculator taking previous frequency of obesity 19%, with 6% margin of error and 95% confidence interval, sample size was 165.

Data was analyzed using IBM SPSS-20. Age was recorded as mean and standard deviation while risk factors and mortality was presented as frequencies and percentages. We used Chi-Square test for association between risk factors and mortality keeping level of significance (P value) at 0.05%.

Results:

This study was conducted on 165 patients. Patients mean age was 49.93 ± 9.91 years. The frequency of male patients was 96 (58.2%) while the frequency of female gender was 69 (41.8%). Regarding the age distribution there were 26 (15.8%) patients in the age group of 30 to 40 years while there were 139 (84.2%) patients having age greater than 40 years. The mortality rate in our study was 20 (12.1%).

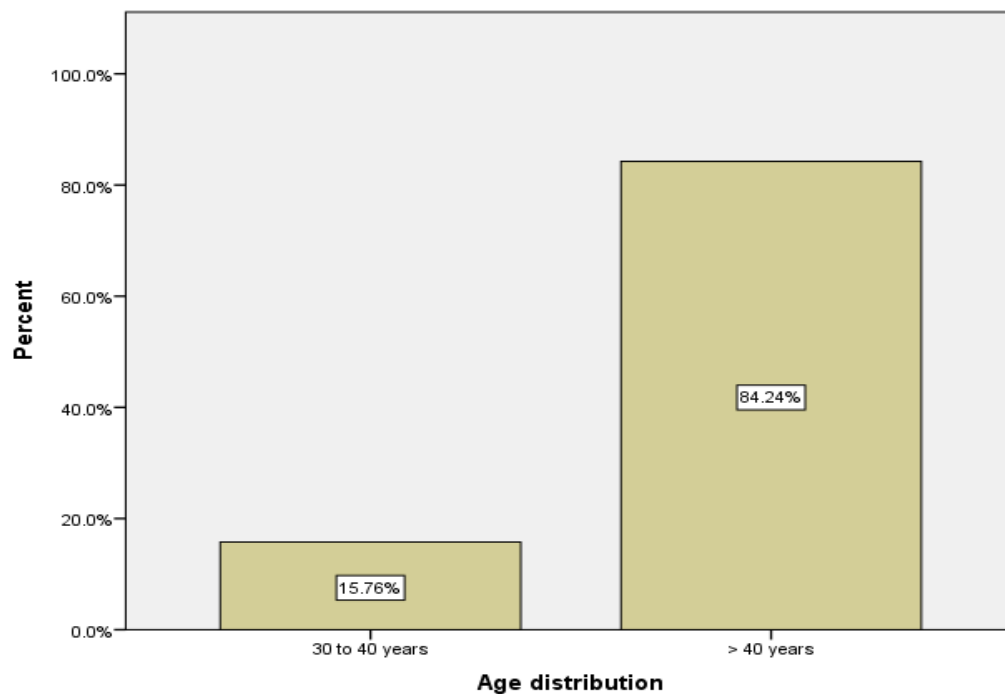
We identified seven risk factors of acute myocardial infarction which includes age greater than 40 years 139 (84.2%), obesity 23 (13.9%), diabetes 37 (22.4%), hypertension 57 (34.5%), family history of cardiovascular diseases 32 (19.4%), smoking 20 (12.1%) and elevated cholesterol levels 14 (8.5%). Regarding the association between mortality and risk factors we found that obesity, diabetes, hypertension, smoking and elevated cholesterol levels were significantly associated with mortality among AMI patients. While age groups and family history of cardiovascular diseases were not significantly associated with mortality.

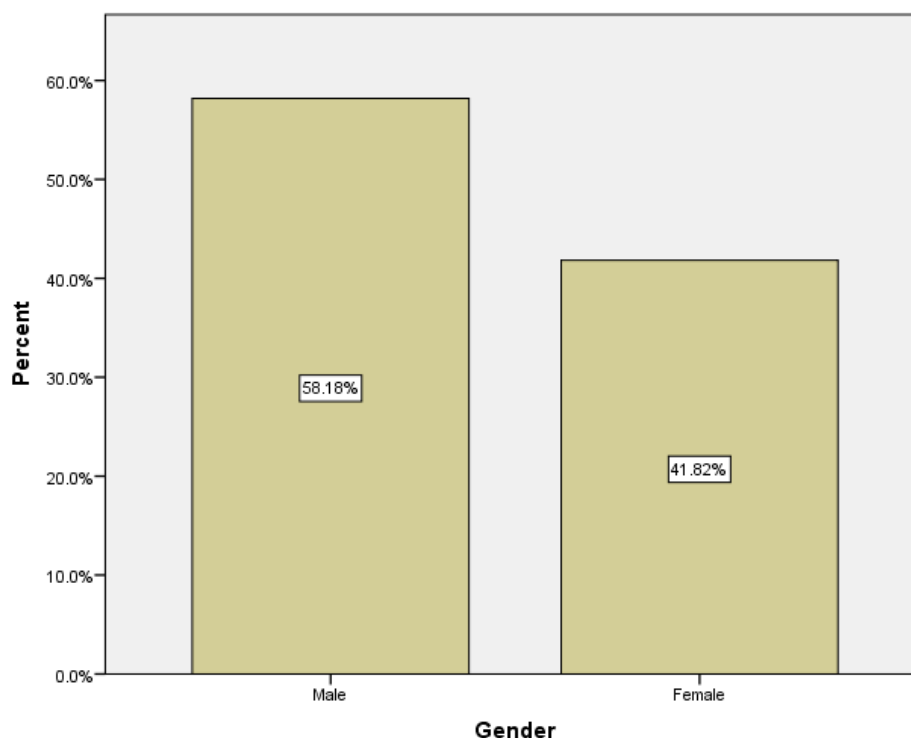
Table 1 Risk factors

| Risk factors | | Frequency | Percentage |
|---|----------------|-----------|------------|
| Age groups | 30 to 40 years | 26 | 15.8 % |
| | > 40 years | 139 | 84.2 % |
| Obesity | Yes | 23 | 13.9% |
| | No | 142 | 86.1% |
| Diabetes | Yes | 37 | 22.4% |
| | No | 128 | 77.6% |
| Hypertension | Yes | 57 | 34.5% |
| | No | 108 | 65.5% |
| Family history of cardiovascular diseases | Yes | 32 | 19.4% |
| | No | 133 | 80.6% |
| Smoking | Yes | 20 | 12.1% |
| | No | 145 | 87.9% |
| Elevated cholesterol | Yes | 14 | 8.5% |
| | No | 151 | 91.5% |

Table 2 Association of risk factors with mortality

| Risk factors | | Mortality | | | | P value |
|---|-------------------|---------------|-------|---------------|-------|---------|
| | | Yes | | No | | |
| | | Frequen cy | % | Frequen cy | % | |
| Age distribution | 30 to 40 years | 5 | 25.0% | 21 | 14.5% | 0.22 |
| | > 40 years | 15 | 75.0% | 124 | 85.5% | |
| Obesity | Yes | 12 | 60.0% | 11 | 7.6% | 0.0001 |
| | No | 8 | 40.0% | 134 | 92.4% | |
| Diabetes | Yes | 8 | 40.0% | 29 | 20.0% | 0.04 |
| | No | 12 | 60.0% | 116 | 80.0% | |
| Hypertension | Yes | 15 | 75.0% | 42 | 29.0% | 0.0001 |
| | No | 5 | 25.0% | 103 | 71.0% | |
| Family history of cardiovascular diseases | Yes | 7 | 35.0% | 25 | 17.2% | 0.06 |
| | No | 13 | 65.0% | 120 | 82.8% | |
| Smoking | Yes | 7 | 35.0% | 13 | 9.0% | 0.001 |
| | No | 13 | 65.0% | 132 | 91.0% | |
| Elevated cholesterol | Yes | 11 | 55.0% | 3 | 2.1% | 0.0001 |
| | No | 9 | 45.0% | 142 | 97.9% | |

Graph 1 Age distribution**Graph 2 Gender distribution**



Discussion:

AMI is the leading causes of death in developing countries. After resting for an extended period of time, the myocardium in a patient with myocardial infarction (MI) still does not receive enough oxygen because of the pathogenic mechanism that caused it. Stroke and heart attacks are just two of the cardiovascular diseases (CVDs) that can be brought on by this underlying pathology. It is no surprise that South Asia, which includes Pakistan, India, Sri Lanka, Nepal, and Bangladesh, has the highest prevalence of cardiovascular disease (CVD) in the world, with 25% of the global population¹⁴. Atherosclerotic/coronary heart disease (CHD) is the most frequent clinical manifestation, and it's associated with a greater risk of mortality and disability. Worldwide, CHD is the leading cause of death. Around 31% of all fatalities worldwide are attributable to cardiovascular disease, which affects 17.7 million people annually. Eighty percent of deaths from cardiovascular disease are caused by strokes and heart attacks. More than 75% of CAD-related deaths occur in countries with middle-income and low-income levels.¹⁵

Acute coronary syndrome includes unstable angina, non-ST-elevation myocardial infarction (NSTEMI), and ST-elevation myocardial infarction (STEMI). Acute myocardial infarction (AMI) includes both ST-elevation and non-ST-elevation MI and is a clinical emergency condition associated with a high mortality and morbidity rate¹⁶. Myocardial ischemia (typically diagnosed in the presence of ischemic chest pain), ST elevation, and increased biochemical markers (including troponin level, which indicates myocardial necrosis due to complete occlusion of the coronary arteries or its branches) are the hallmarks of the clinical syndrome known as ST-elevation myocardial infarction (STEMI). Nevertheless, non-ST-elevation myocardial infarction (NSTEMI) is characterized by ischemic chest discomfort and elevated biochemical markers due to incomplete blockage of the culprit artery in 60-90% of cases.¹⁷

The leading cause of AMI is atherosclerotic cardiovascular disease (ASCVD), which is present in the majority of patients with AMI. There are a small number of unusual non-atherosclerotic causes of AMI, including thromboembolism, congenital anomalies, and problems of cardiac catheterization, coronary arteritis, dissection, trauma, and cocaine usage.¹⁸

In our study the mean age at presentation was 49.93 ± 9.91 years. Male patients were 58.2% while female patients were 41.8%. A study conducted in Pakistan reported that the mean age of the patients at presentation in their study was 56.78 ± 7.81 years while they also had male gender dominance in their study as compared to our results¹⁹. We observed that majority of our patients were over 40 years of age and the mortality rate was higher in patients over 40 years of age but the association was not statistically significant.

We observed that the most common risk factors of acute myocardial infarction in our patients were presented with were obesity (13.9%), diabetes (22.4%), hypertension (34.5%), about 19.4% patients family history of cardiovascular diseases, smokers were 12.1% while 8.5% patients had elevated cholesterol levels. Several studies have identified the above mentioned risk factors in their reports.^{13, 18, 19}

The frequency of mortality in our study was 12.1% which is in accordance to a study¹⁹ conducted in Pakistan which reported the mortality in Acute Myocardial Infarction Patients 15.2%. In our study we observed that diabetes, hypertension, smoking and elevated cholesterol levels were significantly associated with mortality.

Conclusion:

From our study we conclude that diabetes, hypertension, smoking, family history of cardiovascular diseases and elevated cholesterol levels are associated risk factors of acute myocardial infarction while the mortality rate in our study was 12.1%.

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