

ORIGINAL ARTICLE

RISK FACTORS, CLINICAL PRESENTATION AND IN-HOSPITAL OUTCOME OF ACUTE MYOCARDIAL INFARCTION IN ELDERLY PATIENTS

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Abstract:

Background: Coronary artery disease (CAD) is the leading cause of mortality, morbidity in the developed and developing country. Ageing is important risk factor for coronary artery disease. The role of conventional cardiovascular risk factors in older persons is incompletely understood because only fragmentary and inadequate data are available in most instance and manifestations of acute myocardial infarction are generally believed to be atypical in the elderly. The aim of the study was to find out the clinical presentation, common risk factors and In-hospital Outcome of Acute Myocardial Infarction in Elderly Patients. **Methods:** An observational study in tertiary level hospital. Study protocol was approved by ethical review committee of Sir Salimullah Medical College & Mitford Hospital, Dhaka. Sample was selected from the population by purposive sampling technique. Detail demographic data were collected from the subject and recorded in structured case report form. Researchers make contact with patient and patient's caregiver, and describe them about study aim-objective, and then informed consent was taken. All collected questionnaire checked very carefully to identify the error in the data. Data processing work were consisting of registration of schedules, editing, coding and computerization, preparation of dummy tables, analysis and matching data. **Results:** In this series, the maximum number of patients (57.0%) was between 60-69 years age group, with mean value 67.21 ± 9.05 years. Out of 100 cases (62%) cases were male and (38%) were female (Figure 1). Male - female ratio was 1.63:1. Large numbers of respondents came from urban area (58%). Among the patients the poor class (44%) comprising the major percentage of the myocardial infarction patients. In this study majority (58%) of the patients had sedentary lifestyle before the onset of myocardial infarction. Among all the risk factors hypertension was the most common risk factor, present in 62% cases; next common risk factors were Diabetes mellitus 56%, dyslipidemia 32%, obesity 22%, smoking 40%. In this study majority of patients (56%) presented with shortness of breath as predominant symptoms. Besides typical chest pain others important atypical symptoms were atypical chest pain (31%), upper abdominal pain (18%), giddiness (4%) and confusional state (3%). In this study many of the patients had developed acute LVF (34%), arrhythmia (17%), cardiogenic shock (8%). **Conclusion:** We concluded that the manifestations of AMI are more subtle in the elderly, with different risk factors. The elderly subjects are under thrombolysed and have higher complication rate.

Key words: Acute myocardial infarction, elderly, AMI, Arrhythmia, Dyspnoea, Aging, Ischemic heart disease, Congestive heart failure

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Introduction:

The global demographic shift toward an aging population has brought to the forefront the increasing prevalence of cardiovascular diseases, particularly among the elderly. Heart disease, being the leading cause of mortality in this demographic, presents unique challenges owing to physiological changes and prevalent comorbidities associated with aging¹.

A study has highlighted that among the elderly, the most encountered cardiac disorders are ischemic heart disease, congestive heart failure, and atrial fibrillation. The hospitalization rates for ischemic heart disease exponentially rise in the 75-84 age group compared to younger individuals². However, the impact of cardiovascular disease in this demographic is compounded by reduced homeostatic reserves, increased comorbidities, polypharmacy, and complex social issues like social deprivation and age-related devaluation.

Myocardial Infarction (MI) stands as a leading cause of mortality and morbidity among the elderly, often manifesting with a broader range of clinical presentations beyond chest pain. Symptoms may encompass chest pain, dyspnea, giddiness, vomiting, and sweating³. Understanding the risk factors for cardiovascular diseases, primarily atherosclerosis, categorizes them into modifiable and non-modifiable factors. Hypertension, diabetes, smoking, unhealthy diet, physical inactivity, obesity, and raised cholesterol are among the modifiable risk factors, while age, race, ethnicity, and genetic factors constitute the non-modifiable ones⁴.

The aging process in the cardiovascular system involves progressive loss of cardiac myocytes, hypertrophy of remaining cells, and increased connective tissue accumulation. Structural and functional changes in cardiomyocytes (CMs) precede alterations in heart anatomy. The aged heart experiences diminished compensatory capacity, with changes in maximal heart rate, end-systolic volume (ESV), end-diastolic volume (EDV), contractility, and altered sympathetic signaling. Atherosclerosis, a common disorder in the elderly, entails the accumulation of lipids, inflammatory cells, and plaque formation. Aging-induced endothelial dysfunction contributes to stroke, with modifications in brain microvasculature and white matter increasing vulnerability to myocardial infarction^{5,6}.

The research hypothesizes and investigates the risk factors, clinical presentations, and in-hospital outcomes of acute myocardial infarction in elderly patients (≥ 60 years). The objectives encompass evaluating sociodemographic characteristics,

identifying risk factors, understanding clinical presentations, and assessing complications and in-hospital outcomes of MI in this specific demographic. This study endeavors to fill the knowledge gap by providing insights that could contribute to better care and outcomes for elderly patients experiencing acute myocardial infarction.

Methods:

The study was designed as a cross-sectional observational study and was conducted at the in-patient department of Cardiology and Medicine at Sir Salimullah Medical College & Mitford Hospital in Dhaka. This hospital is one of the largest tertiary care facilities in the country, comprising eight units in the Medicine department and a well-equipped cardiology department. Patients admitted to the hospital primarily reside in urban and semi-urban areas around Dhaka city, with some being transferred from rural hospitals across the country. The study took place from May 21, 2018, to November 20, 2018.

The study population included patients clinically diagnosed with acute myocardial infarction and evidenced through noninvasive tests such as ECG or laboratory profiles. The sampling technique used was purposive, and the sample size was estimated considering the statistical formula, resulting in 100 patients being included in the study.

Data collection was carried out using a preformed structured questionnaire that was developed considering the research questions, objectives, and variables of the study. Prior to the study, the questionnaire was pretested among 15 patients to ensure clarity, accuracy, and validity of the questions.

Various demographic and clinical variables were considered, such as age, sex, socio-economic status, occupation, clinical presentations of myocardial infarction (including symptoms like shortness of breath, chest pain, sweating, etc.), risk factors (hypertension, diabetes, obesity, smoking, physical inactivity, etc.), and in-hospital outcomes (recovery without complications, complications, death).

The selection criteria involved the inclusion of elderly patients (aged 60 years or above) diagnosed with acute myocardial infarction based on typical ECG patterns and elevated cardiac biomarker levels. Patients with valvular heart disease, stable or unstable angina, and those unwilling to provide informed consent were excluded from the study.

The methodology employed included consecutive sampling, detailed history taking, physical examination, investigations, and the collection of

patient data using the structured questionnaire. The data was entered into a computerized database for analysis.

Ethical measures were strictly adhered to, with informed consent obtained from both patients and their guardians before their inclusion in the study. Patients were informed about the aims, procedures, benefits, and any potential drawbacks of participating in the study, with the freedom to withdraw at any time.

The data collection procedure involved a cross-sectional observational study conducted over a six-month period. It included the enrollment of eligible patients, collection of demographic and clinical information, and close supervision of patients' conditions with appropriate management and record-keeping of any adverse events.

Data analysis was conducted using SPSS version 21, and the results were presented through tables, graphs, percentages, and charts. The statistical significance was determined with a threshold set at a "P" value of less than 0.05.

A quality assurance strategy was implemented, which included the development of a standard questionnaire, pretesting, and careful data collection to maintain the quality of the study.

Operational definitions for various parameters were established, such as defining the elderly population, risk factors of myocardial infarction, hypertension, diabetes mellitus, acute myocardial infarction, and other relevant clinical terms. These definitions were essential for consistency and understanding among researchers involved in the study.

This methodological approach ensured the systematic collection, analysis, and interpretation of data, in line with ethical considerations and maintaining a high standard of quality for the study.

Results:

In this cross-sectional observational study involving 100 patients aged 60 years and above with clinically diagnosed acute myocardial infarction (MI), several significant findings were observed.

Table-I
Age distribution of the patients (n=100)

Age (years)	Number of patients	Percentage	Mean ± SD
60-69	57	57.0	67.21 ± 9.05
70-79	31	31.0	
≥80	12	12.0	

Table-II
Life style pattern of study cases (n=100)

Life style pattern	Number of patients			Total	p-value
	60-69 yrs.	70-79 yrs.	≥80 yrs.		
Active	31	10	1	42.0	0.018
Sedentary	26	21	11	58.0	

The age distribution of the patients revealed that the majority (57.0%) fell within the 60-69 years age group, followed by 31.0% in the 70-79 years age group, and 12.0% aged 80 and above, with a mean age of 67.21 ± 9.05. The study also indicated a higher prevalence of sedentary lifestyle among patients aged 80 and above, with statistical significance (p < 0.05).

Table-III
Risk factors profile of the study subjects (n=100)

Risk factors	Number of patients			Total
	60-69 yrs.	70-79 yrs.	≥80 yrs.	
Hypertension	24	28	10	62 (62%)
Diabetes mellitus	23	24	9	56 (56%)
Obesity	15	5	2	22 (22%)
Dyslipidemia	11	10	11	32 (32%)
Smoking	23	12	5	40 (40%)
Physical inactivity	26	21	11	58 (58%)

The risk factors profile of the study subjects demonstrated that hypertension was the most common risk factor (62%), followed by diabetes mellitus (56%), dyslipidemia (32%), obesity (22%), and smoking (40%). Additionally, 45% of patients had three or more risk factors, emphasizing the multifactorial nature of acute coronary syndrome.

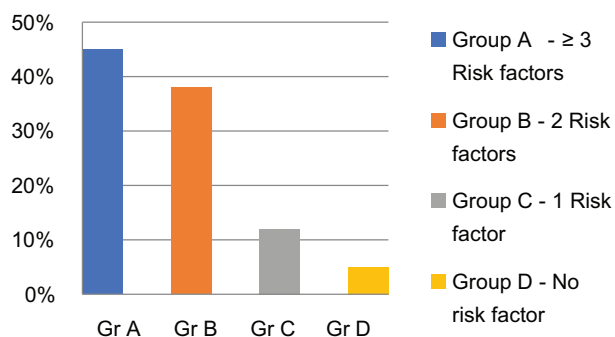


Fig.-1: Number of risk factors of the study subjects (n = 100)

(Risk factors are - Hypertension, diabetes mellitus, dyslipidemia, obesity, smoking, physical inactivity).

Table-IV
Clinical presentation of MI patient (n=100)

Presentation	Number of patients		Percentage (%)
Shortness of breath	56		56.0
Typical chest pain	42		42.0
Sweating	40		40.0
Palpitation	40		40.0
Vomiting	36		36.0
Restlessness	32		32.0
Atypical chest pain	31		31.0
Upper abdominal pain	18		18.0
Giddiness	4		4.0
Confusional state	3		3.0

In this study majority of patients presented with respiratory distress (56%) as a predominant symptom. Though typical chest pain was common, but 31% of patients presented with atypical chest pain and among 27% patients there was no chest pain at all. Others atypical presentation was upper abdominal pain, giddiness and confusional state. It was evident that typical chest pain was common (e.g., 42%), although 31% of patients presented with atypical chest pain and 27% patients with no chest pain at all.

Table-V
Time interval between symptoms and hospital admission (n=100)

Duration (hrs.)	Number of patients			Total
	60-69	70-79	≥80	
	yrs.	yrs.	yrs.	
Within 6 hrs.	13	4	1	18
Within 12 hrs.	14	5	3	22
More than 12 hrs.	30	22	8	60

The time interval from the onset of symptoms to presentation revealed that 60% of patients were admitted to the hospital more than 12 hours after symptom onset, mainly due to atypical presentation and the absence of typical chest pain in the elderly.

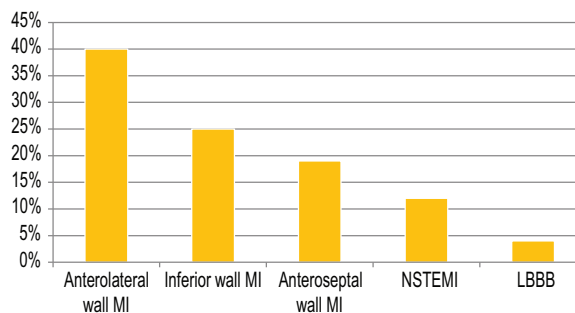


Fig.-2: *Types of acute myocardial infarction (n=100)*

Types of acute myocardial infarction indicated that anterolateral wall MI was the most common (40%), followed by inferior wall MI (25%), anteroseptal MI (19%), and NSTEMI (12%).

Table- VI
Assessment of different complications of the patient (n=100)

Complications	Number of patients			Total
	60-69 yrs.	70-79 yrs.	≥80 yrs.	
Uneventful	18	5	1	24
Acute LVF	19	11	4	34
Arrhythmia	12	4	1	17
Cardiogenic shock	3	4	1	8
Pericarditis	2	2	0	4
Thromboembolism	0	0	1	1
LBBB	2	1	1	4
RBBB+LAHB	0	1	0	1

Amongst the complications noted during hospital stay the commonest were acute LVF (34%), arrhythmia (17%) and cardiogenic shock (8%). Frequency of complications was more in advanced age group.

Table-VII
Various arrhythmias observed during in-hospital stay (n=17)

Arrhythmia	Number of patients	Percentage (%)
Premature ventricular contraction	4	23.5
Atrial fibrillation	2	11.8
AV block	9	52.9
1 st degree	2	11.8
2 nd degree	1	5.9
Complete heart block	6	35.3
Ventricular fibrillation	2	11.8

Complete heart block (35.3%) was the most common arrhythmia occurring elderly. Other arrhythmias were premature ventricular contraction (23.5%), AF (11.8%) and VF (11.8%). Out of the 100 patients, only 25% of patients were thrombolysed. The main reason for not thrombolysing the patients were delayed presentation to the hospital due to atypical presentation. In this study, total 24 patients recovered without any complications during hospital stay, but 69 patients developed some sort of complications and 7 patients expired during hospital stay.

Table - X
Outcome of the patient (n=100)

Outcome	Number of patients			Total
	60-69 yrs.	70-79 yrs.	≥80 yrs.	
Recovered without complications	18	5	1	24
Complications	38	23	8	69
Death	1	3	3	7

Discussion:

The demographic characteristics of the studied group revealed a higher prevalence of AMI in the age group of 60-69 years followed by the age group of 70-79 years indicating a notable burden of AMI in these age brackets. The male-female ratio was approximately 1.63:1. The majority of patients hailed from urban areas (58%). The study corroborates findings from previous research, reflecting an increased prevalence of angina with age in both sexes, highlighting the rise in angina cases as individuals grow older. The prevalence of angina increases sharply with age in both sexes from 0.1-1% in women aged 45-54 to 10-15% in women aged 65-74 and from 2-5% in men aged 45-54 to 10-20% in men aged 65-74¹. In another study with a male, female ratio of 5.3: 4.7, 45.90% patients were over 55 years and 69.62% patients had come from urban area⁷.

The study's observations align with other research, indicating that hypertension, diabetes mellitus, obesity, smoking, and dyslipidemia are among the common risk factors contributing to the development of AMI in the elderly⁸.

Regarding the clinical presentation, the study pointed out that while typical chest pain was common, a substantial percentage of patients presented with atypical symptoms like respiratory distress, atypical chest pain, and in some instances, no chest pain at all. Findings consistent with result of other study⁸. In

an analysis of symptomatology revealed that atypical chest pain, sweating, dyspnoea and giddiness were observed predominantly in the elderly group. In that study, typical chest pain was (48%), dyspnea (40%), atypical chest pain (29%) and in 21% there was no chest pain. In Worcester Heart Attack Study, chest pain was reported in less than half of the patients over age 75 years (45.5%) while dyspnea or cough (22%) and other symptoms like dizziness, syncope, sweating, palpitations, nausea were more common^{9,10}.

One significant finding was the delay in hospital presentation after the onset of symptoms, with nearly 60% of patients arriving at the hospital more than 12 hours after symptom onset. This delay in seeking medical care among the elderly might be due to societal neglect or lack of health awareness. Complications during hospital stay were noted, with acute left ventricular failure (LVF) being the most common, followed by arrhythmias and cardiogenic shock. Findings accordance with the result of other studies. Assessment of complications of AMI revealed that 45 (70.2%) cases presented with congestive cardiac failure, 37 (57.8%) cases had arrhythmias, and AV block was seen in 16 (28.6%). The complications like arrhythmias, CCF, cardiogenic shock, re-infarction, CVE and mortality were commonly seen in elderly population⁸. In a study among the complications noted during hospital stay commonest were acute pulmonary oedema (18%), cardiogenic shock (16%) and arrhythmias (13%). Arrhythmias noted were varying degrees of heart block (8%), atrial fibrillation (3%) and ventricular tachycardia (2%). Severe LV dysfunction which contributes to the development of pulmonary edema and cardiogenic shock was reported in 15% of patients³.

The study also noted a mortality rate of 7%, with a higher mortality rate observed among patients aged 80 years or older, aligning with the understanding that mortality tends to increase with advancing age in AMI cases. In other study³, mortality rates were 20%. In that study, 4 out of 9 patients died in the age group e" 80 yrs. So, like other study, with the advancement of age, the rate of mortality is also increased.

Overall, these findings underscore the diverse clinical presentation, varied risk factors, delayed presentation to hospitals, and notable complications and mortality rates associated with AMI in the elderly. These insights are crucial for better understanding and addressing the unique challenges and healthcare needs of this demographic group, thereby facilitating improved management and care for elderly patients suffering from AMI.

Conclusion:

This cross-sectional study of 100 elderly patients with acute myocardial infarction highlighted the prevalence of sedentary lifestyles, with a significant association in those aged 80 and above. The most common risk factors were hypertension, diabetes, and smoking, contributing to the majority having three or more risk factors. Respiratory distress was the predominant presentation, with atypical chest pain noted in 31%. Delayed hospital presentation occurred due to atypical symptoms, influencing treatment decisions. Complications, notably acute LVF and arrhythmias, were more frequent in advanced age groups. The study emphasizes the complexity of managing myocardial infarction in the elderly, requiring tailored interventions for optimal outcomes.

Limitations:

This is a small study; only patients of acute MI admitted in the Department of Medicine & Cardiology, SSMC MH were taken for the study. So, this will not reflect the overall picture of the country. A large scale, preferably, nationwide survey should be conducted to reach to a definitive conclusion. Sample were taken by purposive method in which question of personal biasness might arise.

Conflict of Interest:

The authors stated there is no conflict of interest in this study.

Funding:

No funding.

Ethical Consideration:

Ethical measures were taken throughout the study period to maintain a high standard of confidentiality and anonymity of the participants. Formal approval was taken from the ethical committee of Sir Salimullah Medical College Mitford Hospital.

Acknowledgement:

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