

Original Article

Clinical Manifestation of Acute Myocardial Infarction in Elderly Patients

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Abstract

Myocardial Infarction is one of the most common causes of mortality and morbidity among the elderly patients. It is known as wide range of clinical presentations other than chest pain. A large number of patients may have atypical or no symptoms. As an indication of a cardiac problem, resulting in a delay in seeking medical care, the absence of typical chest pain and the vagueness of symptoms might not be recognized. This cross sectional descriptive study was carried out among 50 patients more than 60 years of old irrespective of sex with acute myocardial infarction in the Department of Medicine and Coronary Care Unit (CCU) of Dhaka Medical College Hospital, Dhaka, from January to July 2018. Ethical clearance was obtained from the Ethical Review Committee (ERC) of Dhaka Medical College (DMC) and verbal with written consent was obtain from the patients. History of illness were taken and physical examination were done in a predesigned data collection sheet. Then required investigation like Electrocardiography (ECG), cardiac enzymes and relevant laboratory investigations were done. After collecting all available information statistical analysis was done using statistical package for the social sciences (SPSS) of windows

version 20. Result of this study was expressed as frequency, percentage, mean ( $\pm$ SD), range, p-value. Among the 50 patients majority of them (58%) were male and more than one-fourth (28%) of patients were diagnosed as having Acute Myocardial Infection (AMI) and their presentation was also atypical in the hospital. Half (50%) of the atypically presenting AMI patients were in age group 60-69 years. More than one-fourth (28%) of patients had no complaints of chest pain, out of which, both dyspnea + epigastric pain were found in equal number of patients 28.6% + 28.6% patients. Atypical presentation was found in more than one-third (38.1%) of elderly female patients and more than one-fifth (20.7%) in male patients ( $p=0.002$ ). Regarding risk factors, hypertension in 66%, diabetes mellitus in 64% and hypercholesterolemia in 56% were found in this study. More than one-fourth (28%) of patients were smoker. More than one-fourth (26%) of patients of diabetes mellitus presented with atypical symptoms among atypical group ( $p=0.008$ ). Most of the patients (78%) with atypical symptoms presented more than 12 hours lately compared to patients with typical symptom. Mortality rate was higher (42.3%) among the patient presented with atypical symptoms than the patients presented with typical chest pain (27.7%). More than one-fourth (28%) of patients with atypical chest pain was found to have inferior MI and mortality was highest among those with inferior MI and patients had atypical symptoms. This study found that even though chest pain was the most common presentation in elderly AMI patients, they were also found to have atypical presentations like dyspnea, vomiting, sweating and epigastric pain. This signifies the need of examining physicians to meticulously identify AMI in elderly for successful and immediate treatment. Immediate and accurate diagnosis of Acute Coronary Syndrome (ACS) could reduce mortality and morbidity.

**Keyword:** Acute myocardial infarction, mortality and morbidity, elderly patients

INTRODUCTION

Longevity in developing as well as developed countries has improved significantly in recent years. It is estimated that the number of people aged >65 years in 2025 about 1 billion.<sup>1</sup> Bangladesh has life expectancy of 71 years now.<sup>2</sup> Myocardial infarction (MI) remains the leading cause of

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hospitalizations as well as the leading cause of death worldwide. The frequency and prevalence of MI increase progressively with age. In the United States, over 60% of acute MIs occur in patients 65 years of age or older, and approximately one third occur in persons over age 75.<sup>3</sup> In patients with acute myocardial infarction (AMI) who are older than 70 years, mortality rates exceed 30%.<sup>4</sup> Both in-hospital and long-term mortality are significantly higher in the elderly, regardless of the type of treatment.<sup>5-6</sup> Chest pain has been reported as the cardinal clinical feature among patients who present with MI.<sup>7</sup> WHO requires the presence of chest pain as one of the cornerstone features in its diagnosis of MI.<sup>8</sup> However, a substantial number of patients may have atypical or no symptoms on initial evaluation.<sup>9</sup> The clinical features of acute MI vary by age in many aspects. The elderly with acute myocardial infarction (AMI) have been reported to present with more atypical symptoms.<sup>10</sup> Atypical presentation is defined as the absence of chest pain before or during admission, and may have included gastrointestinal or respiratory symptoms such as dyspnea, nausea, vomiting, abdominal discomfort or any other symptoms like nonproductive cough, fatigue, syncope, or palpitation, back pain, leg pain, neck pain, weakness etc. The prevalence of this presentation was 8.4% in the Global Registry of Acute Coronary Events (GRACE), 33% in the National Registry of Myocardial Infarction 2 (NRFMI-2) and the dominant symptoms in these patients were dyspnea, nausea and syncope.<sup>11</sup> The cases of myocardial ischemia without pain, the so-called asymptomatic or silent ischemia, it is more frequent in elderly patients.<sup>12</sup> Considering patients with acute coronary syndrome, as myocardial infarction with ST-segment elevation, among those under 65 years of age, only 11.1% do not have precordial pain, unlike those over 85 years old, among which 43.2% have precordial pain.<sup>13</sup> Similarly, among elderly patients with Q wave in electrocardiogram (ECG), 78% did not have symptoms of precordial pain.<sup>14</sup> AMI is associated with significantly higher mortality in the elderly compared with the young yet the elderly are treated less aggressively than the young.<sup>15</sup> The absent or atypical clinical signs in elderly persons hinder the management of coronary atherosclerotic disease. JG. Canto et al., studied that MI patients without chest pain were significantly less likely to receive a timely ECG or reperfusion strategies. For differences in clinical presentation characteristics patients who experienced MI without chest pain had more than a 2-fold increased risk of in-hospital death than MI patients who presented with chest pain, even after adjusting.<sup>10</sup>

Apart from diagnostic difficulty of AMI in elderly due to atypical clinical presentation, management of such cases is also challenging. Because of advanced atherosclerotic disease and ventricular dysfunction particularly diastolic dysfunction they may be more refractory to medical therapy possibly. Never the less, they are more intolerant to therapy with multiple anti ischemic agents of management decisions during the first 24 hours. As is true with all age group the greatest effect have on survival in the elderly.<sup>16</sup> Meanwhile elderly patients with AMI differ in clinical presentation than young patients with AMI, this issue needs perfect understanding. It will help us to decrease mortality and morbidity. The purpose of this study is to describe the Risk factors, Clinical features, outcomes in AMI in Elderly (>65 years).

## MATERIALS AND METHODS

This cross sectional descriptive study was carried out among 50 patients >60 years of old irrespective of sex with AMI in the Department of Medicine and CCU of Dhaka Medical College Hospital, Dhaka, Bangladesh. Conducted from July to January, 2018. The study included all the patient that fulfilled diagnostic criteria and age >60 years. Diagnostic criteria were included-

A. MI was confirmed by ECG changes and/ or cardiac enzymes

Our criteria for ECG changes were as follows:

- I. ST-segment elevation of more than 2 mm.
- II. Pathological Q-Wave.
- III. Inverted or flattened T-Wave.

The CARDIAC ENZYMES included in the diagnostic criteria were CK-MB [normal: 0-5 ng/ml] and/or Troponin-I [+ve/ >0.4 ng/ml]

B. Our criteria for diagnosis of site of infarction was ECG

All patient with clinical symptom mimicking MI but having no ECG changes and no significantly raised CARDIAC ENZYMES were not included in the study. Patient who fulfilled the inclusion criteria were enrolled in this study. Informed consent was taken from all the cases. Written informed consent was taken from each patient. All patient underwent complete medical assessment after admission to the hospital including collection of demographic information, history and physical examination with vital signs, documentation of etiology of AMI and presenting

clinical symptoms. Blood for laboratory testing (complete blood count, CKMB, Trop-I) were done. Ethical clearance of the study was taken from the ethical committee of Dhaka Medical College. All the data were analyzed by SPSS version 20.0 for windows 7 program. An analysis plan was developed keeping in view with the objectives of the study. Frequency distribution and normal distribution of all continuous variables was calculated.

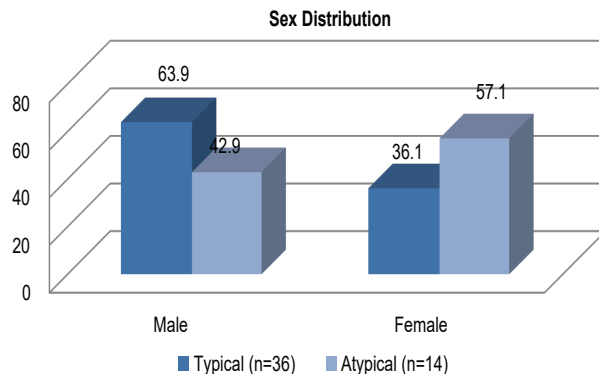
**RESULTS**

This study is a cross-sectional follow-up study done over a period of 6 months and 50 elderly patients with the diagnosis of AMI were included in the study and their clinical profile was recorded. Among the 50 respondents, 14 (28%) of respondents were diagnosed as having Acute Myocardial Infection (AMI) and their presentation was also atypical in the hospital.

Table I states the distribution of respondents by age and sex; among the respondents 56% was in age group 60-69 years, 32% was in age group 70-79 years and mean age ( $\pm$ SD) was  $69.82 \pm 5.6$  years. Male female ratio was 1.38:1 and 58% of respondents were males.

**Table- I: Distribution of study population by age and sex (N=50).**

Age category (in years)	Male (%)	Female (%)
60-69 yrs.	17(34.0)	11(22.0)
70-79 yrs.	10(20.0)	6(12.0)
>80 yrs.	2(4.0)	4(8.0)
Mean Age ( $\pm$ SD)	69.82 $\pm$ 5.6	
Male Female ratio	1.38:1	



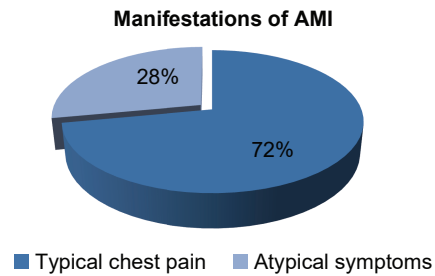
**Figure- 1.** Bar chart shows participants by sex distribution (N=50).

Figure 1 Bar chart shows distribution of respondent’s presentation by sex. Atypical presentation was found in 57.1% of female patients and 42.9% in male ( $p=0.002$ ).

Table II shows the distribution of complaints of patients. Out of the patients with typical chest pain, 28.6% patients had complaints of dyspnea; 14.1% patients of syncope and 7.1% patients of vomiting. Epigastric pain in the absence of chest pain was presented in 28.6% patients.

**Table- II: shows the distribution of complaints of patients (n= 14)**

Complaints with chest pain	Percentage (%)
Dyspnea	28.6%
Syncope	14.1%
Vomiting	7.1%
Complaints in the absence of chest pain	
Epigastric pain	28.6%



**Figure- 2:** Pie chart shows manifestations of AMI among the participants (N=50).

Figure 2 shows the distribution of respondent’s manifestations regarding typical chest pain and atypical symptoms of AMI among them 36 (72%) respondents had typical chest pain and 14 (28%) had atypical symptoms.

Table III states the distribution of atypical symptoms and typical chest pain in various age group; here 58.33%, 30.56% and 11.11% had typical chest pain among the respondents of total typical chest pain (n=36) in the age groups 60-69 years, 70-79 years and >80 years respectively. Atypical symptoms was found in 50.00%, 35.71% and 14.29% among the total respondents who had atypical symptoms (n=14) in the age group of 60-69 years, 70-79 years and >80 years respectively.

**Table- III: Presentation according to age (N=50).**

Age group	Typical chest pain (n=36)	With atypical symptom (n=14)
60-69 yrs.	21 (58.33%)	7 (50.00%)
70-79 yrs.	11 (30.56%)	5 (35.71%)
>80 yrs.	4 (11.11%)	2 (14.29%)

Table IV illustrates the ECG findings of respondents conducted during hospital admission; Out of 50 respondents 45 showed ECG changes and 12 (24%) respondents had atypical symptoms. NSTEMI in 26% patients and LBBB in 20% patients with atypical symptoms among them 41.6% had ST elevation.

**Table- IV: ECG findings of respondents conducted during hospital admission (N=50).**

Variables	No. of typical cases	No. of atypical cases	P value
STEMI	17(34.0)	5(10.0)	
NSTEMI	9(18.0)	4(8.0)	0.866
Acute LBBB	7(14.0)	3(6.0)	
Others (No changes found)	3(6.0)	2(4.0)	

Table V states the distribution of commonest risk factors among the respondents both in typical and atypical cases; here, hypertension was found in 66% of the respondents, diabetes mellitus in 64%, hypercholesterolemia in 56% and smoking in 28% of respondents, however 13 (26%) patients having diabetes presented with atypical symptoms (p=0.008,).

**Table- V: Distribution of risk factor profile (N=50)**

Risk factors	Manifestation				P value
	Typical (n=36)	Atypical (n=14)	Total (n=50)	%	
Hypertension	21(42.0)	12(24.0)	33	66.0	0.066
Diabetes Mellitus	19(18.0)	13(26.0)	32	64.0	0.008
Smoking	8(16.0)	6(12.0)	14	28.0	0.145
Hypercholesterolemia	18(36.0)	8(16.0)	26	52.0	0.650
Obesity	14(28.0)	7(14.0)	21	42.0	0.475

Table VI illustrates the distribution of time interval between onsets of symptoms and presentation in hospital. Among the total respondents 38% of them presented to the hospital within 12 hours of onset of symptoms, out of which 84% was with typical chest pain; another 30% presented in the next 12 hours and the remaining presented after 24 hours onset of symptoms. Here, 78% respondents with atypical symptoms presented lately more than 12 hours compared to patients with typical symptom.

**Table- VI: Time interval between onsets of symptoms and presentation in hospital. (N=50)**

	Typical (n=36)		Atypical (n=14)	
	n	%	n	%
<3 hours	6	85.7	1	14.3
3-12 hours	8	80.0	2	20.0
12-24 hours	16	80.0	4	20.0
>24 hours	6	46.2	7	53.8

Table VII shows the distribution of mortality in patients with typical and atypical presentation of AMI; Mortality rate was among atypical symptoms was 42.3% and 27.7% among the patients presented with typical chest pain.

**Table-VII: Mortality in patients with typical and atypical presentation of AMI. (N=50)**

Type of presentation	No.	Mortality	%	P value
Atypical presentation	14	6	42.9	0.243
Typical presentation	36	10	27.8	

Table VIII reveals that 28% patient with atypical chest pain was found to have inferior MI and mortality was greater among the patients with inferior MI and atypical symptoms according to duration of delay in arrival at hospital.

**Table-VIII: Mortality for inferior MI according to delay of arrival in hospital. (N=50)**

Inferior MI	Time			
	< 3 hrs	3-12 hrs	12-24 hrs	>24 hrs
Atypical symptoms	1	2	5	6
Mortality	0	1	3	3

Table IX shows the mode of presentation and prognosis according to site of infarction. Site of infarction on inferior wall was 5 (35.7%) in atypical patients and 5 (35.7%) in typical patients.

**Table- IX: Mode of presentation and prognosis according to site of infarction. (N=50)**

Site of infarction	Total cases	Atypical	Typical	Mortality
Anterior wall	15	3 (20.0%)	13	4 (26.7%)
Lateral wall	1	0 (0.0%)	1	0 (0.0%)
Inferior wall	14	5 (35.7%)	9	5 (35.7%)
Ant + Lat	5	1 (20.0%)	3	2 (40.0%)
Ant + Inf + Lat	7	3 (42.9%)	4	2 (28.6%)
Ant + Inf	3	1 (33.3%)	2	1 (33.3%)
Ant + Septal	5	1 (20.0%)	4	2 (40.0%)

## DISCUSSION

In present study, amongst the elderly, the sub group of patients who were in majority belonged to 60-69 years. This is in concordance to other studies wherein the number of elderly presenting with AMI decreases as age increases.<sup>19</sup> This is attributed to the comorbid conditions like cognitive problems, renal insufficiency depression and added to it the atypical vague symptoms of AMI with increasing age, forbidding very elderly patients proper access to health care. 58% of patients were males in present study, Male: female ratio being 1.38:1. Compared to young females who are hormonally protected against CAD, this indicates an increase in prevalence of disease in elderly females. Similar to present study, Alexander K et al. in their study had identified that with progressively older age, patients with ACS are more likely to be female; from 30% below age 65 to 62% over age 85 years.<sup>19</sup> Thus, gender and CV risk reverses past age 65. Although cardiovascular disease has a greater prevalence in men prior to this age, its prevalence in women exceeds that in men past this age. In a statistical study by the AHA, the prevalence of cardiovascular diseases increased in females as the age increases (male to female ratio: 1.3:1 in 35-44 year's age group compared to 0.89:1 in 75+ age group).<sup>20</sup> Vaccarino V et al. published in their article that by 80 years of age, similar frequencies of symptomatic CAD of about 20 to 30 percent are seen in men and women.<sup>21</sup> Another study wherein the sex ratio is similar to ours is that by Bhatia LC et al, the ratio becoming smaller with increase in age (1.27:1 in elderly as against 3.43:1 in young patients). About 28% of patients with acute myocardial infarction presented with atypical symptoms (without chest pain) on

initial evaluation. So, one fourth of elderly MI patients presented with atypical symptoms. According to 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, arm numbness, headache, syncope, sweating, palpitations, nausea, weakness (32%) were more common.<sup>22,23</sup> Dyspnea in the elderly MI patient may be due to age-related diastolic dysfunction and associated pulmonary disease and Giddiness likely due to acute reduction in cardiac output in the setting of an aging brain and diminished autonomic responsiveness. Compared to young though exact physiology unknown, changes in pain perception and altered ischemic thresholds may be contributory, elderly patients have atypical pain.<sup>22,23</sup> Patients experiencing MI without chest pain tended to be older (33.4% in age group more than 80 years). In the Reykjavik study, about 30% of myocardial infarction presented with atypical symptoms.<sup>24</sup> Results from other population studies have shown that between 20% and 60% of all MI are presented with atypical symptoms. Study by Holay MP and others was consistent with this.<sup>25</sup> According to study done by John G. Canto and others patients presenting with atypical symptoms were older (mean age 74.2 years vs 66.9 years).<sup>10</sup> We have documented a pronounced gender difference with males far outnumbering female (38.1% vs 20.7%) in the incidence of atypical presentation ( $p=0.002$ ). This is similar to the results found in the study conducted by Muller RT et al.<sup>26</sup> In this study, among the risk factors in the elderly, commonest risk factor was hypertension (66%). After hypertension, diabetes was more prevalent in our patients.

Diabetic patients were more likely to be presented with atypical presentation ( $p=0.002$ ). This supports the Honolulu Hawaii Heart program study.<sup>27</sup> In which the patients with atypical symptoms were more likely to be hypertensive and to have diabetes or impaired glucose tolerance but they were less likely to have angina pectoris. A greater prevalence of hypertension and diabetes in the atypical MI group was also noted in Framingham study<sup>28</sup> and study by John G Canto.<sup>10</sup> In present study almost 45% patients had specific ECG changes. NSTEMI in 28% patients and LBBB in 21% patients with atypical symptoms. This is in contrast to various previous studies wherein Non ST-segment elevation MI is the most common form of myocardial infarction in the elderly, accounting for 55% of MIs in patients above age 85 but less than 40% of MIs in patients below age 65. Increased sub endocardial ischemia due to higher prevalence of previous MIs, multi-vessel disease, hypertension, and LVH is the reason behind the increased proportion of NSTEMI in elderly.<sup>29</sup> Also in elderly, the ECG is more likely to be non-diagnostic with baseline abnormalities of ventricular hypertrophy and intraventricular conduction disturbances in this study a higher percentage of inferior wall MI patients presented with atypical symptoms (35.5%). Honolulu Hawaii Heart program study<sup>27</sup> also supports the same thing, of demonstration a distinct increase in painless infarction with inferior wall MI patients (51%). That is, higher proportion of inferior wall MI tends to cause atypical symptoms, such as epigastric pain or abdominal distress which would fail to be recognized as MI. But study by William B. Kennel and others showed that there was no difference in the electrocardiographic location of infarct between those with atypical and typical symptoms of MI.<sup>30</sup> In the Framingham study<sup>28</sup> the proportion of atypical MI did not vary with electrocardiographic location of the infarct. Only 38% of patients presented to the hospital within 12 hours of onset of symptoms. Most of the patients with atypical symptoms (78%) presented lately more than 12 hours compared to patients with typical symptoms. This accounted for one of the major reasons for not thrombolysing the patients. Prehospital delays in older adults, might be caused as they have atypical chest pain, decreased cognition, and especially social constraints.<sup>31</sup> In the Global Registry of Acute Coronary Events (GRACE) registry, the median time from symptom onset to presentation was 2.3 hours in those under 45 years, but 3.0 hours over age 85.<sup>4</sup> In the Cooperative Cardiovascular Project, one significant determinant of late arrival (>6

hours after symptom onset) was advanced age.<sup>32</sup> Mortality rate in this study was 32%. Patients with atypical MI group showed a higher mortality than did the typical MI group (42.3 % vs 27.7%) This high percentage of mortality can be attributed to the inadequate usage of thrombolysis in elderly patients in present study. In a comparative study between elderly and young MI, mortality was on higher side in the elderly group.<sup>33</sup> Also in another study, Thirty-day and one-year mortality rates were markedly higher for older patients compared with younger patients.<sup>34</sup> In PURSUIT trial, patients admitted with a first ST-segment elevation myocardial infarction and treated with thrombolytic therapy, in-hospital mortality increases exponentially as a function of age from 1.9 percent among patients age 40 years or younger to 31.9 percent among patients older than age 80 years. In the Framingham study also, age adjusted long term mortality for all cases were slightly worse among unrecognized MI cases than among recognized MI.<sup>28</sup>

#### LIMITATIONS

The first limitation of the study was small sample size with a short period of time. Secondly, the study was a hospital-based study in the capital city. This study did not use any in-depth analysis.

#### CONCLUSIONS

The results of this study showed that elderly patients with myocardial ischemia often have atypical clinical manifestations. Identifying the symptoms of ACS is important for successful and immediate treatment. Accurate diagnosis of ACS could reduce mortality and morbidity. In this study, it seems typical symptoms of ACS in older patients are affected by risk factors such as female gender and diabetes.

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