

PREDICTORS OF FATAL OUTCOME IN ACUTE MYOCARDIAL INFARCTION

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Background: Myocardial infarction is one of the most common life threatening diagnoses in emergency hospital admissions. Most of the complications occur during the first few hours while the patients are likely to be in the hospital. Although the mortality rate after admission for myocardial infarction has declined significantly over the last two decades but it still remains high. Survival is markedly influenced by age of the patient, presence of different risk factors and complications that patients develop after myocardial infarction. We conducted a study at Armed Forces Institute of Cardiology/National Institute of Heart Diseases (AFIC/NIHD) to document the predictors of mortality in patients with acute myocardial infarction. **Methods:** Patients with first acute myocardial infarction admitted to the hospital from Feb. 2007 to June 2007 were included in the study. It was a descriptive case series study and data was collected on a pre-designed proforma with convenient sampling technique. Patients were assessed clinically with special emphasis on history of typical chest pain and physical examination. Relevant investigations were carried out to establish the diagnosis. **Results:** Two hundred and fifty cases were assessed. Mean age was 57.94 ± 14.00 years. Males were 74.4% and Females were 25.6%. Overall in-hospital mortality was 9.2%. Females had a higher mortality (14.06%) as compared to males (7.52%). Mortality was also related with age of the patient and Diabetes Mellitus. Other features adversely affecting the in-hospital mortality included higher Killip class, anterior wall myocardial infarction and higher peak Creatine Kinase (CK) levels. Mortality was also higher in patients who did not receive thrombolytic therapy for different reasons. **Conclusion:** Patients with certain risk factors are more prone to develop complications and have a higher mortality rate. Identification of some of these risk factors and timely management of complications may reduce mortality.

Keywords: Myocardial infarction, Cardiac enzymes, Thrombolytic therapy.

INTRODUCTION

Myocardial infarction is one of the most common life threatening diagnoses in emergency hospital admissions. Most of the complications occur during the first few hours while the patients are likely to be in the hospital. Although the mortality rate after admission for myocardial infarction has declined by about 30% over the last two decades but it still remains high. Survival is markedly reduced in elderly patients (over age 70) whose in-hospital mortality rate is 21% as compared to 2.8% among patients 60 years old or younger.¹

Myocardial infarction generally occurs when there is abrupt decrease in coronary blood flow following a thrombotic occlusion of a coronary artery previously narrowed by atherosclerosis. Slowly developing, high-grade coronary artery stenosis usually does not precipitate acute infarction because of the development of a rich collateral network over time. Instead infarction occurs when a coronary artery thrombus develops rapidly at a site of a vascular injury. This injury is produced or facilitated by factors such as cigarette smoking, hypertension, and lipid accumulation. In most cases infarction occurs when an atherosclerotic plaque fissures, ruptures or ulcerates and when conditions (local or systemic) favour thrombogenesis, so that mural thrombus forms at the site of rupture and leads to coronary artery occlusion.

The laboratory tests of value in confirming the diagnosis of Myocardial infarction may be divided into four groups:

1. Electrocardiogram (ECG)
2. Serum cardiac markers
3. Cardiac imaging and
4. Non-specific indices of tissue necrosis and inflammation.

The aim of our study was to document the predictors of fatal outcome in acute myocardial infarction.

MATERIAL AND METHODS

The study was carried out at armed forces institute of cardiology and national institute of heart diseases (AFIC/NIHD) Rawalpindi. Two hundred and fifty cases admitted to the hospital from Feb 2007 to June 2007 with first acute myocardial infarction were included in the study. It was a descriptive case series study and data was collected on a pre-designed Performa with convenient sampling technique. The diagnosis of acute myocardial infarction was confirmed on the presence of any two of the (a) Typical chest pain (b) Electrocardiogram (ECG) evidence of persistently ST segment elevation in two or more contiguous leads (c) Raised cardiac enzymes (CK more than twice the upper limits of normal). Patients with previous history of acute myocardial infarction, congestive heart failure, valvular heart diseases, coronary bypass

surgery, coronary angioplasty, patients with congenital heart diseases and patients with non ST-elevation myocardial infarction were not included in the study. Patients were assessed clinically with special emphasis on history of chest pain and physical examination including Pulse rate, Blood pressure, Temperature, Respiratory rate, and examination of respiratory and cardiovascular systems. Investigations like ECG, serial estimations of cardiac enzymes, serum lipid profile, X-Ray chest (portable) were done. Other investigations like Blood complete picture, Urine routine examination, Serum urea Creatinine/Electrolytes and liver function tests were also done in all cases. Electrocardiograms were recorded daily and when required clinically. Depending upon the site of acute myocardial infarction it was classified as anterior and non-anterior myocardial infarction. Patients were managed according to clinical condition and all patients presented within 12 hours of onset of chest pain received thrombolytic therapy, if there was no contraindication. All patients were monitored for 48 hours and closely followed during the hospital stay. Quantitative data were presented as Mean±SD and qualitative variables were presented as frequency and percentages. χ^2 test was used to find the association of mortality with gender, age of the patient, diabetes mellitus, Killip class, location of MI, thrombolytic therapy and CPK levels.

RESULTS

In the study a total 250 consecutive cases with first acute myocardial infarction admitted to AFIC/NIHD from Feb 2007 to June 2007 were studied. Out of 250 patients 186 (74.4%) were males and 64 (25.6%) were females. Their mean age was 57.94±14.00 years, 23 (9.2%) patients died during admission, out of which 14 (7.52%) were male and 9 (14.06%) were female. Mean stay in the hospital was 5.94±3.40 days.

There were 118 patients of ≤60 years of age and out of them, 5 deaths (4.23%) occurred, while 10 patients died out of 97 patients (10.30%) of 61–70 years of age and 8 deaths were recorded out of 35 cases (22.85 %) in patients more than 70 years of age.

Overall incidence of diabetes mellitus among patient population was 30.8% being 37.5% in females (27 out of 64) and 28.49% in males (53 out of 186). Out of these diabetic males, 5 deaths (9.43%) and out of diabetic females also 5 deaths (20.83%) were recorded. Overall mortality in diabetic patients was 12.98% and it was 7.51% in non-diabetics (13 deaths out of 173 in non-diabetic patients).

Mortality was significantly increased with increase in Killip class (class III and IV). Total 151 patients presented with Killip class I and only 3 deaths (1.98%) were recorded. Sixty patients were having Killip class II. Out of these, 3 patients died and overall mortality of 5% was recorded in patients with Killip class II. Total 27 patients presented with Killip class III, out of these, 7

(25.92%) died. Twelve patients presented in Killip class IV and 10 (83.33%) of them died.

Higher mortality was observed in patients with anterior wall myocardial infarction. One hundred and fifty-three patients presented with anterior myocardial infarction and out of these 17 (11.11%) patients died while 6 out of 97 patients (6.18%) died who presented with non-anterior wall myocardial infarction.

Higher of mortality was observed in patients with higher peak CK levels. Eighty-one patients had their peak CK level of 2–6 times upper normal and 4 deaths (4.93%) were recorded and peak CK level of >6 times normal was present in 169 patients and 19 (11.24%) patients died, confirming higher mortality is present in patients with higher serum CK levels.

Thrombolytic therapy was found to have favourable impact on mortality in patients with acute myocardial infarction. In this study, 163 patients received streptokinase and 11 (6.74%) patients died. Eighty-seven patients were either late for thrombolytic therapy or some contraindication was present, and 12 (13.79%) deaths were recorded in these patents.

Table-1: Predictors of survival by uni-variate analysis

Variables	Patients Positive for Variable		p-Value
	Patients who survived (n=227)	Patients who died (n=23)	
Gender			
Males	172	14 (7.52%)	0.119
Females	55	9 (14.06%)	
Age			
<60 yrs	113	5 (4.23%)	0.003
61–70 yrs	87	10 (10.30%)	
>70 yrs	27	8 (22.85%)	
Diabetes Mellitus			
Diabetics	67	10 (12.98%)	0.167
Non Diabetics	160	13 (7.51%)	
Killip Class			
I	148	3 (1.98%)	0.000
II	57	3 (5%)	
III	20	7 (25.92%)	
IV	2	10 (83.33%)	
Location of MI			
Anterior	136	17 (11.11%)	0.189
Non Anterior	91	6 (6.18%)	
Thrombolytic Therapy			
Received	152	11 (6.74%)	0.066
Did not receive	75	12 (13.78%)	
CPK Levels			
2–6 times upper normal	77	4 (4.93%)	0.107
>6 times upper normal	150	19 (11.24%)	

DISCUSSION

Ischemic heart disease is leading cause of morbidity and mortality in present day world. Although mortality has declined significantly but still it is high. Presence of certain risk factors, laboratory investigations and other co-morbid non-cardiac conditions can affect the outcome in patients with acute myocardial infarction. Outcome is also affected by the treating physician as patients treated by cardiologist have a lower in-hospital mortality for acute myocardial infarction.²

Age is a powerful predictor of short term outcome in acute myocardial infarction.^{1,3} We observed increase in mortality after myocardial infarction with increase in age of the patients. As the age of the patients increased, there was an increase in the frequency of Killip classes III and IV, with increasing Killip class, i.e., worsening heart failure signs, the mortality rose as would be expected. Thus older patients had more severe haemodynamic compromise than younger patients.

In a study by Gurwitz *et al.*,⁴ showed that although in-hospital death after acute myocardial infarction has recently declined for patients less than 65 years of age but improvements have not been realized for old age groups. Similarly Erne P *et al.*⁵ showed in their study that early start of treatment with anti-platelets, B-Blockers, nitrates, ACE inhibitors and Reperfusion therapy had a beneficial effect on in-hospital mortality, but both beta blocker and reperfusion therapy were much less frequently used in elderly patients. They also found that both Age and Diabetes Mellitus had negative effect on in-hospital mortality.

Female gender was another feature which has higher mortality in patients with Acute Myocardial Infarction.⁶⁻¹⁰ This may be due to the fact that females are usually older than males at presentation and also females were more likely to be diabetic and usually receive less aggressive in-hospital therapy for acute myocardial infarction than do men. Probably, female patients were more likely to present too late to be eligible for thrombolytic therapy which itself has a number of reasons, i.e., in our social setup people are less enthusiastic for the treatment of females and also females were more likely to present with atypical chest pain which may be due to increased incidence of diabetes mellitus.^{6,7,11-13}

Diabetes Mellitus is another feature that increases the mortality in patients with acute myocardial infarctions.⁵ Norhammar *et al.*¹⁴ showed improved but still high short and long term mortality rates after myocardial infarction in patients with Diabetes Mellitus. Other features which adversely effect in-hospital mortality are higher Killip class, anterior location of infarction, high peak creatine kinase levels and patients who did not receive thrombolytic therapy.^{15,16}

CONCLUSION

Acute myocardial infarction is known to be a serious medical condition with significant overall morbidity and mortality. However, patients with certain risk factors, clinical features and associated conditions are more prone to develop complications and have a higher mortality rate.

Early diagnosis and treatment of these features may improve outcome of acute myocardial infarction. Furthermore larger studies are needed to elaborate and possibly identifying more of such features.

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