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In-Hospital Outcome of Patients with Acute Inferior Wall Myocardial Infarction Admitted to a Tertiary Care Hospital

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Abstract
Introduction: *Cardiovascular disease is a major cause of disability, and premature death throughout the world, and contributes substantially to the escalating costs of health care. The underlying pathology is atherosclerosis, which develops over many years, and is usually advanced by the time symptoms occur, generally in middle age. Certain risk factors have consistently been identified as significant predictors of MI outcome: age, hypertension, smoking, and complication like heart block. The present study demonstrated that advanced age of more than 60 years, female gender, complete atrioventricular block, bundle branch block, and shock were found to be independent predictors of in-hospital mortality. Early detection and prevention of these factors are crucial in maximizing the benefit of MI intervention and improving the outcome of acute myocardial infarction by minimizing its complication. There is a paucity of studies looking into the in-hospital outcome for inferior MI in Bangladesh. We sought to observe the type, factors, frequency, and cause of multiple risk factors influencing the in-hospital outcome among the patient admitted toa tertiary level hospital.*
Aim of the study: *The aim of the study was to observe the in-hospital outcome of patients with acute inferior wall myocardial infarction.*
Methods: *This cross-sectional observational study was conducted at the Department of Medicine, and Coronary Care unit, Sher-e-Bangla Medical College Hospital, Barisal, Bangladesh. The study was conducted with a total of 100 participants for six months the period, from 9th September 2015 to 8th March 2016.*
Result: *In this study maximum numbers of patients (38%) were between 41-50 years of age groups, with a mean value of 53.08 ± 11.7. The present study gives the impression that chest pain, and nausea, vomiting was the most common presentation, present in 84.0%, and 78.0% of cases respectively. In general, and cardiovascular examinations, findings showed that 43% of the patients had decreased pulse rate which was less than 60 beats per minute, 37% had low systolic blood pressure, and 25% had raised jugular venous pressure. In this study, twenty-five patients (25.0%) developed arrhythmias, of which Atrial fibrillation was the commonest as 9 patients had it while First degree AV block was observed in 7 patients. Second-degree Mobitz type 1 block was present in 4 patients (4%), and it developed within the first 24 hours. Complete heart block was noted in 5 patients (5%). All the patients with complete heart block developed hypotension. The prevalence of complications was 37.0% in acute inferior MI patients in this study. The study shows that 85.0% of the patients recovered completely, 11.0% remain disabled, and they were discharged on request or risk bond. Four patients expired during the hospital stay.*
Conclusion: *The present study showed that predictors of poor in-hospital outcomes are advanced age, female gender, smoking, complete atrioventricular block, and cardiogenic shock. AMI may be complicated by a number of pathophysiologic mechanisms.*

Keywords: *Infraction, Myocardial, CAD, Cardiovascular*

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I. Introduction

Globally, cardiovascular diseases (CVD) are one of the most prevalent causes of morbidity and mortality, and this has been true even in Bangladesh. During the last few decades, the prevailing disease pattern of Bangladesh has shifted towards predominantly non-communicable diseases, to which CVD contributes a lot.[1] Among the different types of cardiovascular diseases, myocardial infarction (MI) is one of the most common ones. MI is described as the death or necrosis of myocardial cells, which can harm the afflicted area of the heart if not treated promptly. In Bangladesh, myocardial infarction (MI) is a serious public health issue.[2]The advantages of all medicines are greater when started early, therefore acute myocardial infarction (AMI) must be identified early in the emergency triage procedure since maximal mortality occurs during the first hour. AMI is traditionally diagnosed in the emergency department based on ST-segment elevation of greater than 1.5 mm in two or more leads.[3]The ECG is typically the first test used to make a diagnosis. With a sensitivity of 99 percent and a specificity of 100 percent, inferior wall MI defined by ST-segment elevation in lead III more than in lead II implies RCA blockage. It implies blockage close to the acute marginal branch when paired with ST elevation in V1. - ST-segment elevation in lead II, more than in lead III, indicates LCx blockage with a sensitivity of 93%, and a specificity of 100%. ST elevation in V5, and V6, as well as I, andaVL, is a sensitive, and specific sign for LCx lesion. Abnormal R in V1 is highly selective for LCx blockage and is associated with posterior infarction.[4]-[6] In comparison to anterior wall myocardial infarction, inferior wall myocardial infarction is considered low risk. Age, gender, lateral wall extension, complete atrioventricular block, bundle branch block, and cardiac free-wall rupture are independent indicators of poor in-hospital outcome in inferior wall myocardial infarction. Generally speaking, thrombolysis is beneficial, especially in high-risk patients.[7] A thrombus in the left ventricle and arrhythmic, mechanical, and inflammatory (early pericarditis, and post-MI syndrome) effects are some of the sequelae of MI (LVMT). Aside from these broad categories, right ventricular (RV) infarction, and cardiogenic shock are two further potential consequences of acute MI.[8] Inferior myocardial infarctions account for 40-50 percent of all acute myocardial infarctions and have a better prognosis than anterior wall infarctions.[9]-[11] Normally, the Right Coronary Artery (RCA) serves this region of the ventricle, but in around 20% of cases, the circumflex artery (a branch of the left coronary artery) wraps all the way around the left ventricle, and supplies the inferior wall. An inferior wall MI is therefore most usually caused by RCA blockage, although it can also be caused by an occluded circumflex artery.[12] In both industrialized, and developing nations, acute myocardial infarction (AMI) caused by coronary artery disease is a primary cause of mortality. The introduction of coronary care units and early reperfusion treatment (thrombolytic, and percutaneous coronary intervention) has significantly reduced in-hospital mortality rates and improved the result in acute MI survivors. The emergence of any difficulties is frequently accompanied by obvious symptoms and physical manifestations. Thus, a basic understanding of the difficulties that arise throughout the post-infarction period, as well as the clinical symptoms associated with each, would help the physician to effectively evaluate, and treat the issue.[13]The aim of this study was to find out the hospital outcome of acute inferior myocardial infarction in the CCU of SBMCH, Barisal, Bangladesh.

II. Objective

General Objective

- To observe the in-hospital outcome of patients with acute inferior wall myocardial infarction

Specific Objectives

- To see the age-gender distribution of the study subjects.
- To observe the clinical presentation of the study subjects.
- To see the risk factor profile of the study subjects.
- To observe the in-hospital complications of the study subjects
- To see the in-hospital outcome of the study subjects

III. Methods

This cross-sectional observational study was conducted at the Department of Medicine, and Coronary Care unit, Sher-e-Bangla Medical College Hospital, Barisal, Bangladesh. The study duration was six months, from 9th September 2015 to 8th March 2016. A total of 100 patients were selected from among the patients with acute inferior MI without anterior/anteroseptal MI according to selection criteria. A consecutive sampling technique was used to select the study population. Informed written consent was obtained from the participants prior to their admittance to the study. A unique ID was provided to each of the participants to ensure their

confidentiality of the participants. The pre-structured Case Record Form (CRF) was filled up by the study physician himself. The case definition of the operational variable had been described. Diagnosis and type of acute inferior MI were confirmed by ECG finding of ST-elevation of at least 1 small square in the consecutive limb leads. Patients were managed according to hospital protocol. Data for socio-demographic, and clinical variables were obtained from all participants by the use of a pre-designed, and easily understandable questionnaire. After the collection of all information, these data were checked, verified for consistency, and edited for the finalized results. After editing and coding, the coded data is directly entered into the computer by using SPSS version 6. Data cleaning validation and analysis were performed using the SPSS/PC software, and graph, and chart by MS excel. The result was presented in tables in proportion. A "P" value <0.5 is considered significant.

Inclusion Criteria

- Patients diagnosed with a case of acute inferior.
- Patients who had given consent to participate in the study.
- Age > 18 years.

Exclusion Criteria

- Patients with a history of previous inferior MI
- Previous histories of invasive coronary artery procedures such as PCI or coronary artery bypass grafting (CABG).
- Unable to answer the criteria question.
- Patients with any valvular or congenital heart disease
- Patients with severe COPD, end-stage renal or liver disease.

IV. Results

Table 1: Age, and sex distribution of the patient (n=100)

Age (years)	Number of patients		Total
	Male (n=78)	*Female(n=22)*	
31-40	24(30.76%)	2(9.09%)	26
41-50	30(38.46%)	8(36.36%)	38
51-60	16(20.5%)	12(54.55%)	28
>60	8(10.25%)	0	8

In this series, the maximum numbers of patients (38%) were between the 41-50 years age group, next (28%) were between the age group of 51-60 years, with a mean value of 53.08 ± 11.7. 78% were male, and 22% were female. The Male and female ratio was 3.54:1. the Maximum number of male patients was 30(38.46%) in the age group between 41 – 50 years. The next age group 24(30.76%) was of 31-40 years. The majority of female patients 12(54.54%) were in the age group 51-60 years.

Table 2: Social-demographic characteristics of the study participants (n=100)

Characteristics	Number of patients	Total
Body mass index (kg/m^2)		
18.5–23.0	43	43.0
23.1–25.0	31	31.0
>25.0	26	26.0
Occupation		
Service holder	14	14.0
Business	26	26.0
Daily worker	10	10.0
Housewife	16	16.0
Garments worker	6	6.0
Unemployed	12	12.0
Retired	16	16.0
Residence		
Urban	66	66.0

Rural	34	34.0

Regarding operational definition for adult men, and women, a BMI between 18.5, and 23.0 is considered healthy. Overweight is defined as a BMI between 23.1, and 25.0, and a BMI of 25.0 or higher is considered obese. The present study shows that 31.0% of patients were Overweight, and 26.0% were detected as obese. A large number of respondents were businessmen (26%) followed by housewives (16%). A considerable portion of the respondents (14%) were service holders. We observed that most of the female patients were housewives. 66% of the participants were from urban areas.

Table 3: Distribution of the patients according to clinical manifestation (n=100)

Clinical manifestation	Number of patients	Percentage (%)
Chest pain	84	84.0
Chest pain with radiation to epigastrium, neck or arms	16	16.0
Breathlessness	57	57.0
Collapse/syncope	22	22.0
Sweating	37	37.0
Nausea & vomiting	78	78.0

Chest pain, and nausea, vomiting was the commonest presentation, present in 84.0%, and 78.0% of cases respectively; other common symptoms were Breathlessness (57.0%), Sweating (37.0%), Collapse/syncope (22% of cases).

Table 4: Clinical sign of the acute inferior MI (n=100)

Clinical sign	Number of patients	Percentage (%)
Bradycardia	43	43.0
Tachycardia	14	14.0
Hypotension	37	37.0
Hypertension	17	17.0
Raised JVP	25	25.0
Pallor	12	12.0
Tender hepatomegaly	7	7.0
Murmar	3	3.0

On general, and cardiovascular examinations, findings showed that 43% of the patients had decreased pulse rate (Bradycardia) which was less than 60 beats per minute, 37% had low systolic blood pressure (Hypotension), 25% had raised jugular venous pressure (JVP), 12% had pallor, and 7% had tender hepatomegaly.

Table 5: Pre-existing risk factors/co-morbid conditions among the participants(n=100)

Risk factors	Number of patients	Percentage (%)
Hypertension	54	54.0
Smoking	67	67.0
Obesity	26	26.0
DM	21	21.0
Dyslipidemia	18	18.0
Sedentary life Style	42	42.0
Family history of IHD	17	17.0

The study revealed that several predisposing factors or risk factors were existence among the acute inferior MI patient. Among all risk factors, smoking, and hypertension was the most common risk factor, present in 67% & 54% of patients respectively; the next common risk factors were Sedentary life Style 42%; family history of IHD 17%, and obesity 26%.

Table 6: Complications of acute inferior wall myocardial infarction (n=100)

Complications	Number of patients	Percentage (%)
Post MI Angina	6	6.0
Ventricular tachycardia	11	11.0
Ventricular fibrillation	0	0.0
Shock	8	8.0
Heart failure	13	13.0
Arrhythmia (25)		
Atrial Fibrillation	9	9.0
1st degree AV Block	7	7.0
2nd degree AV Block	4	4.0
CHB	5	5.0
No complication	63	63.0

Heart failure was a common complication, observed in 13 patients, followed by Ventricular tachycardia in 11 patients, and cardiogenic shock in 8 patients. In this study, twenty-five patients (25.0%) developed arrhythmias, of which Atrial fibrillation was the commonest as 9 patients had it while First degree AV block was observed in 7 patients. Second-degree Mobitz type 1 block was present in 4 patients (4%), and it developed within the first 24 hours. Complete heart block was noted in 5 patients (5%). All the patients with complete heart block developed hypotension which was refractory to interventions with fluid, and inotropes (Dopamine), and three patients died within 24 hours of admission. Two of them developed a posterior wall infarction on the third day of admission and expired on the 4th day.

Table 7: Outcome, andthe fate of acute inferior MI patient (n=100)

Outcome	Number of patients	Percentage (%)
Complete recovery	85	85.0
No improvement	11	11.0
Death	4	4.0

The study shows that 85.0% of the patients recovered completely, 11.0% remain disabled, and they were discharged on request or risk bond. Four patients had expired during the hospital stay.

Table 8: Outcome evaluation according to Age of patients (n=100)

Age (years)	Complete recovery	No improvement	Death	Total
31-40	24	2	0	26
41-50	38	0	0	38
51-60	23	4	1	28
>60	0	5	3	8

The present study showed that maximum patients inthe younger age group are improved during the hospital stay. Amongst the four patients of death, three were aged>60 yrs

Table 9: Outcome evaluation according to gender variation (n=100)

Gender	Complete recovery	No improvement	Death
Male (n=78)	68(87.1%)	8(10.2%)	2(2.5%)
Female(n=22)	17(77.2%)	3(13.6%)	2(9.0%)
Total	*85*	*11*	*4*

The mortality rate was predominance in female patients (2.5% vs. 9.0% in males, and females respectively). The present study shows that male 68(87.1%) patients recovered completely, whereas it was 17 (77.2%) female subjects.

Table 10: Outcome evaluation according to complications of acute inferior wall myocardial infarction (n=100)

Complications	Complete recovery	No improvement	Death	Total
Post MI Angina	6	0	0	6
Ventricular tachycardia	10	1	0	11
Ventricular fibrillation	0	0	0	0
Shock	5	2	1	8
Heart failure	8	5	0	13
Arrhythmia				
Atrial Fibrillation	9	0	0	9
1st degree	7	0	0	7
2nd degree	2	2	0	4
CHB	1	1	3	5

Complete heart block was noted in 5 patients (5%). All the patients with complete heart block developed hypotension which was refractory to interventions with fluid, and inotropes (Dopamine), and three died within 24 hours of admission. Two of them developed a posterior wall infarction on the third day of admission and expired on the 4th day. The single patientwith cardiogenic shock expired within 24 hrs.

V. Discussion

In this study, the maximum numbers of patients (38%) were between the 41-50 years of age group, followed by 28% who were between the age group of 51-60 years, with a mean age of 53.08 ± 11.7 years. Out of 100 cases, 78% were male, and 22% were female. The Male, and female ratio was 3.54:1. Overall demographic features demonstrated that the frequency of CAD was predominantin middle to elderly age in both sexes, but more female population were affected at an older age. The present study shows that 31.0% of patients were Overweight, and 26.0% were detected as obese. These findings were consistent with the results of another study.[14] In general, the signs, and symptoms of inferior wall MI are similar to those of any other MI. Among the present study participants, chest pain, nausea, and vomiting, shortness of breath were some of the most prevalent clinical presentations. These complications are often found in many other studies of MI, and one of the more common symptoms, nausea, and vomiting, is thought to be a result of vagal nerve stimulation.[12]the prevalence of clinical conditions in our study was supported by the findings of another study as well.[14] In regards to clinical signs of acute MI, on general, and cardiovascular examinations, findings showed that 43% of the patients had decreased pulse rate which was less than 60 beats per minute, 37% had low systolic blood pressure, 25% had raised jugular venous pressure, 12% had pallor, and 7% had tender hepatomegaly. Acute MI patients often have some pre-existing risk factors or comorbidities, which was supported by the findings of our study. It was observed that smoking and hypertension were the most common risk factors, present in 67% & 54% of patients respectively. A sedentary lifestyle was also observed as a risk factor among 42% of the participants, and some less common risk factors were obesity anda family history of ischemic heart disease. Smoking is an extremely common risk factor for many diseases, including cardiac diseases.[15]-[17] Hypertension was also a common risk factor in various global studies.[18]-[20]About 90% of patients who have an acute myocardial infarction (AMI) develop some form of cardiac arrhythmia during or immediately after the event. In 25% of patients, such rhythm abnormalities manifest within the first 24 hours. In such cases, the risk of serious arrhythmias, such as ventricular fibrillation, is greatest in the first hour and declines thereafter.[8] In our study, heart failure was a common complication, observed in 13 patients, followed by Ventricular tachycardia in 11 patients, and cardiogenic shock in 8 patients. In this study, twenty-five patients (25.0%) developed arrhythmias, of which Atrial fibrillation was the commonest as 9 patients had it while First degree AV block was observed in 7 patients. Second-degree Mobitz type 1 block was present in 4 patients (4%), and it developed within the first 24 hours. Complete heart block was noted in 5 patients (5%). All the patients with complete heart block developed hypotension which was refractory to interventions with fluid, andinotropes (Dopamine), and three patients died within 24 hours of admission. Two of them developed a posterior wall infarction on the third day of admission and expired on the 4th day.Patient symptoms, degree of disability or dependence in daily activities, andthe clinical outcome had been evaluated. The study showed that 85.0% of the patients had recovered completely, 11.0% remained disabled, and were discharged on request or risk bond. Four patients expired during the hospital stay. Patient outcome was evaluated along with factors such as age, gender, and acute MI-related complications. It was observed that in regards to age, younger patients showed higher rates of complete recovery, while none of the patients over the age of 61 had a complete recovery. All 4 mortalities of the present study occurred among patients over 50 years of age. In regards to gender, the male population had a much higher rate of complete recovery compared to females. However, the distribution of death was similar among both males and females.Among the heart-related complications, complete heart block had the most severe

outcome, as out of the 5 patients with CHB, 3 had died, and only one had a complete recovery. The other death occurred among single patients with cardiogenic shock that expired within 24 hours.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

VI. Conclusion

The present study showed that predictors of poor in-hospital outcomes are advanced age, female gender, smoking, complete atrioventricular block, and cardiogenic shock. AMI may be complicated by a number of pathophysiologic mechanisms.

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