



Comparison of in Hospital Complications and Mortality between Diabetic and Non-Diabetic Patients Admitted with Acute Anterior MI

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Abstract: Background: Myocardial infarction (MI) or acute myocardial infarction (AMI), commonly known as a heart attack, occurs when blood flow stops to a part of the heart causing damage to the heart muscle. The most common symptom is chest pain or discomfort which may travel into the shoulder, arm, back, neck, or jaw.

Objective: To see the comparison in hospital complications and mortality between diabetic and non-diabetic patients of acute anterior MI. **Methodology:** This cross-sectional observational study was conducted in the Department of Cardiology, Sylhet MAG Osmani Medical College Hospital, Sylhet over a period of two years from July 2015 to June 2017. A total of 100 acute anterior MI patients (50 diabetic and 50 non diabetic) were included in this study. Acute anterior MI patients admitted after 6 hours of symptom onset or who did not receive streptokinase were excluded. **Results:** Male predominance was obvious in both groups [40 (80%) versus 42 (84%); $p > 0.05$] in diabetic and non-diabetic group respectively. Mean age was 53.34 ± 11.32 and 54.84 ± 14.12 years in diabetic and non-diabetic groups respectively. Dyslipidemia [6 (12%) versus 6 (12%); $p > 0.05$], Smoking [32 (64%) versus 34 (68%); $p > 0.05$] and Family history of cardiovascular disease [6 (12%) versus 4 (8%); $p > 0.05$] were similar among diabetic and non-diabetic respectively. Hypertension was found more among non-diabetic [27 (54%) versus 19 (38%); $p > 0.05$] but difference was not statistically significant. Diabetic group had more acute MR [2 (4%) versus 0 (0%); $p > 0.05$] but was not significant. Death was more in diabetic group than that of non-diabetic group [7 (14%) versus 3 (6%); $p > 0.05$] but it was statistically not significant. **Conclusion:** Post MI angina was higher in diabetic than non-diabetic patients. Mechanical complications were also more in diabetic patients. However rate of reinfarction was higher among non-diabetic than that in diabetic patients. Mortality rate was higher in diabetic than that in non-diabetic patients. So, it may be concluded from the present study that in-hospital complications and mortality of acute anterior myocardial infarction are comparatively more in diabetic patients than in non-diabetic patients.

Keywords: Mortality, Diabetic and Non-Diabetic Patients, Acute Anterior MI.

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INTRODUCTION

Myocardial infarction (MI) or acute myocardial infarction (AMI), commonly known as a heart attack occurs when blood flow stops to a part of the heart causing damage to the heart muscle. The most common symptom is chest pain or discomfort which may travel into the shoulder, arm, back, neck, or jaw. Often it is in the center or left side of the chest and lasts for more than a few minutes. The discomfort may occasionally feel like heartburn. Other symptoms may include shortness of breath, nausea, feeling faint, a cold sweat, or feeling tired. Anterior myocardial infarction is the commonest cardiac emergency and accounts for very high rate of morbidity and mortality. Diabetes mellitus is one of the six primary risk factors identified for myocardial infarction and among them 10-25% have diabetes mellitus. Diabetic patients are at increased risk of acute heart failure, cardiogenic shock, re-infarction and death after acute MI than non-diabetic patients. MI is defined in pathology as myocardial cell death due to prolonged myocardial ischemia. About 30% of people have atypical symptoms [1], with women more likely than men to present atypically [2]. Among those over 75 years old, about 5% have had an MI with little or no history of symptoms [3]. An MI may cause heart failure, an irregular heartbeat (including serious types), cardiogenic shock, or cardiac arrest. Most myocardial infarctions occur due to coronary artery disease. Risk factors include high blood pressure, smoking, diabetes, lack of exercise, obesity, high blood cholesterol, poor diet, and excessive alcohol intake, among others [4]. The mechanism of an MI often involves the complete blockage of a coronary artery caused by a rupture of an atherosclerotic plaque. MIs are less commonly caused by coronary artery spasms, which may be due to cocaine, significant emotional stress, and extreme cold, among others [5]. STEMI is a clinical syndrome defined by characteristic symptoms of myocardial ischemia in association with persistent ST elevation in ECG and subsequent release of biomarkers of myocardial necrosis [6]. There is limited data available about the outcome of acute anterior myocardial infarction in diabetic and non-diabetic hospitalized patients in our region. Community incidence rates for STEMI have declined over the past decade, where as those for non-ST-elevation ACS have increased. At present, STEMI comprises approximately 25% to 40% of MI presentations [6]. The traditional risk factors for CAD, the inflammatory marker and coronary angiographic results were recorded. Older, multi-vessel diseases, poor renal function, higher killip class and the higher inflammatory marker level were associated with in-hospital mortality in patients with STEMI. The aggressive treatment early in the course of diabetic patients with acute STEMI is

important. So, this study has been designed to see the in-hospital outcome of acute anterior myocardial infarction in diabetic and non-diabetic patients.

METHODOLOGY

This cross-sectional observational study was conducted in the Department of Cardiology, Sylhet MAG Osmani Medical College Hospital, Sylhet over a period of two years from July 2015 to June 2017. A total of 100 acute anterior MI patients (50 diabetic and 50 non diabetic) were included in this study. Acute anterior MI patients admitted after 6 hours of symptom onset or who did not receive streptokinase were excluded. All patients with acute anterior myocardial infarction admitted in the department of cardiology, Sylhet MAG Osmani medical college hospital, Sylhet fulfilling the inclusion and exclusion criteria were enrolled as the study population.

Inclusion criteria

- All patients with acute anterior myocardial infarction, admitted within 6 hours of symptom onset who received streptokinase.
- Both diabetic and non-diabetic patients.
- Age: 18 years and above.
- Both sexes.

Exclusion criteria

- Patients with Non-STE myocardial infarction.
- Acute anterior MI patients admitted after 6 hours of symptom onset or who did not receive streptokinase.
- Other STEMI.
- Patients with renal impairment.
- Age below 18 years.
- Prior myocardial infarction.
- Cardiomyopathy.
- Valvular heart disease.
- Previous MI with revascularization.
- Those who did not want to enroll in this study.

Method of data collection

Both quantitative and qualitative data were collected by using pre designed questionnaire designed for the study. The questionnaire was prepared reviewing literature and by consulting with experts.

Follow up

All patients were followed up hourly in CCU and 3 times in 24 hours (8.00am, 2.00pm and 8:00pm) in post-CCU up to discharge of the patients. During follow up a 12 lead ECG were recorded daily till discharge. Development of chest pain (post MI

angina), any arrhythmias, cardiogenic shock, and heart block were observed and recoded. In-hospital mortality was also observed. All patients were observed meticulously during their hospital stay to follow up the course and end result.

Data analysis and Interpretation

Data were processed and analyzed manually and using SPSS (Statistical Package for Social Sciences) Version 22.0. Quantitative data were expressed as mean and standard deviation; and comparison was done by “Z” test. Qualitative data were expressed as frequency and percentage and comparison was carried by Chi-square (χ^2) Test. Multivariate regression analysis was done to find

predictor of in-hospital mortality. A probability (p) value of <0.05 was considered as significant, p <0.01 is considered as highly significant but p >0.05 is considered as insignificant.

RESULTS AND OBSERVATIONS

This cross-sectional observational study was conducted in the Department of Cardiology, Sylhet M.A.G. Osmani Medical College Hospital, Sylhet from July 2015 to June 2017 over a period of 2 years to see the in-hospital outcome of acute anterior myocardial infarction in diabetic and non-diabetic patients. Results are as follows:

Table I: Distribution of patients according to age in both groups (n=100)

Age (years)	Group		p value
	Group A Anterior MI in diabetic (n =50)	Group B Anterior MI in non-diabetic (n =50)	
<40	6 (12.0)	10 (20.0)	0.142 ^{ns}
41 - 50	17 (34.0)	11 (22.0)	
51 - 60	16 (32.0)	15 (30.0)	
61 - 70	9 (18.0)	7 (14.0)	
>70	2 (4.0)	7 (14.0)	
Mean \pm SD	53.34 \pm 11.32	54.84 \pm 14.12	0.559 ^{ns}
Range	(28 - 80)	(25 - 85)	

Unpaired t test was done to measure the level of significance

Table I shows distribution of patients according to age in diabetic and non-diabetic groups. Mean age was 53.34 \pm 11.32 and 54.84 \pm 14.12 years in diabetic and non-diabetic groups respectively. No significant difference was seen between two groups (p>0.05). Table II shows distribution of patients

according to gender in diabetic and non-diabetic groups. Males were predominant in both groups. In group A, males were 40 (80.0%) and females were 10 (20.0%). Similarly in group B, males were 42 (84.0%) and females were 8 (16.0%). No significant difference was seen between two groups (p>0.05).

Table II: Comparison of risk factors between group A and group B (n=100)

Risk factors	Group		p value
	Group A Anterior MI in diabetic (n =50)	Group B Anterior MI in non-diabetic (n =50)	
Known Diabetes	32 (64.0)	0 (0.0)	0.001
Newly detected DM	18 (36.0)	0 (0.0)	
Hypertension	19 (38.0)	27 (54.0)	0.070
Dyslipidemia	6 (12.0)	6 (12.0)	1.000
Smoking	32 (64.0)	34 (68.0)	0.405
Family history of cardiovascular disease	6 (12.0)	4 (8.0)	0.505

Chi square test was done to measure the level of significance

Table II shows comparison of risk factors between diabetic and non-diabetic patients. Dyslipidemia was similar in both groups i.e., 6 (12 %) in each group. Smokers were 32 (64%) in group A and 34 (68%) in group B. Family history of cardiovascular disease was almost same in both groups i.e., 6 (12%) in group A and 4 (8%) in group

B. Among Diabetic patients, 32 (64%) were known diabetics and 18 (36%) were newly detected after admission. Hypertension was found more in non-diabetic 27 (54%) than that in diabetic 19 (38%) patients. All the above risk factors were statistically insignificant (p>0.05).

Table III: Comparison of laboratory examination findings between group A and group B (n=100)

Laboratory examination findings	Group		p value
	Group A Anterior MI in diabetic (n =50)	Group B Anterior MI in non-diabetic (n =50)	
Troponin-I (elevated)	50 (100.0)	50 (100.0)	<0.001
Plasma glucose (elevated)	50 (100.0)	0 (0.0)	
FBG (elevated)	50 (100.0)	0 (0.0)	<0.001
HbA1C (%)	8.45 ± 1.42	5.51 ± 0.60	<0.001
TC (mg/dl)	229.00 ± 28.70	225.80 ± 37.55	0.633
LDL (mg/dl)	142.80 ± 33.16	143.02 ± 31.56	0.973
TG (mg/dl)	237.82 ± 59.79	247.50 ± 65.26	0.441
HDL (mg/dl)	35.72 ± 4.63	35.04 ± 5.19	0.491
Serum creatinine (mg/dl)	0.83 ± 0.23	0.68 ± 0.26	0.003
LV Ejection (%)	43.96 ± 5.95	53.68 ± 6.36	<0.001

Chi square and unpaired t test was done to measure the level of significance

Table III shows comparison of laboratory examination findings between diabetic and non-diabetic patients. Troponin-I was elevated in all patients in both groups. Plasma glucose was elevated among all cases in diabetic patients. HbA1C and serum creatinine were found significantly high

in diabetic group. LV ejection was found low in diabetic patients 43.96 ± 5.95 % as compared to non-diabetics 53.68 ± 6.36 % and it was statistically highly significant (p<0.001). There was no significant difference in lipid profiles between the two groups.

Table IV: Comparison of in hospital outcome between group A and group B (n=100)

In hospital outcome	Group		p value
	Group A Anterior MI in diabetic (n =50)	Group B Anterior MI in non-diabetic (n =50)	
Mechanical complications			
MR	2 (4.0)	0 (0.0)	0.360
VSR	1 (2.0)	1 (2.0)	
Outcome			
Discharge	43 (86.0)	47 (94.0)	0.182
Death	7 (14.0)	3 (6.0)	

Chi square test was done to measure the level of significance

Table IV shows comparison of hospital outcome between diabetic and non-diabetic patients. Killip Class III was more in diabetic [24 (48%) versus 9 (18%)] and Killip Class I [3 (6%) versus 18 (36%)] was more in non-diabetic group according to Killip classification of HF. There was significant difference between two groups (p<0.05). There was also significant difference in post MI arrhythmia between two groups.

Mechanical complications were more in diabetic group than in non-diabetic group. Death was also more in diabetic group 7 (14%) than in non-diabetic group 3 (6%).

DISCUSSION

The clinical course of myocardial infarction is frequently complicated and carries a higher mortality rate in the diabetic than in the non-diabetic patient. Pathophysiology of myocardial infarction differs to some degree in diabetic patients from those in patients without diabetes [7]. This study was done to see the in-hospital outcome of

anterior myocardial infarction in diabetic and non-diabetic patients. In this study, MI was prone among the younger in diabetic but not in diabetic cases MI was seen among the older age population but the difference was not statistically significant. MI is more among elderly people [8]. MI occurred in early ages in diabetic patients than non-diabetic patients in this study. Mean age was 53.34 ± 11.32 and 54.84 ± 14.12 years in diabetic and non-diabetic groups respectively. Similar findings were also found in the study of Mak *et al.*, [9] where they have shown that MI occurred at early age in diabetic patients comparing to non-diabetic patients. Anterior MI was found higher among male in both diabetic and non-diabetic groups. In group A, males were 40 (80.0%) and females were 10 (20.0%). Similarly in group B, males were 42 (84.0%) and females were 8 (16.0%). No significant difference was seen between two groups. Prevalence of MI in male is higher than in female [8]. Male was 61.2% in diabetic and 79.5% in non-diabetic patients with MI [10]. Male was 75.5% in diabetic and 86.2% in not diabetic patients in the study of Hsu *et al.*, [11]. Hypertension was found

76.6% and 62.1% in diabetic and non-diabetic patients with MI; Current smoker was 26.0% and 42.9% in diabetic and non-diabetic patients with MI [11]. Troponin-I was elevated in all patients in both groups. Plasma glucose was elevated among all cases in diabetic patients. Admission glucose was also higher in diabetic patients compared to non-diabetic patients (212.38 ±107.9 mg/dl vs. 128.89 ±52.76 mg/dl, $p < 0.001$) [11]. HbA1C and serum creatinine were found significantly high in diabetic group. HbA1c and serum creatinine were significantly higher in diabetic group [11] which was consistent with this study result. Left ventricular (LV) ejection fraction was found significantly low in diabetic patients. LV ejection fraction was lower in diabetic group [11] which is consistent with this study result. There was no significant difference in lipid profiles between diabetic and non-diabetic groups. TG, TC, HDL and LDL were lower in diabetic group [11]. Mortality among diabetic patients with MI was reported to be as high as 40% and at least double the mortality rate in patients without diabetes [12]. In this study, death was 7 (14.0%) and 3 (6.0%) cases in diabetic and non-diabetic patients respectively. In hospital mortality in non-diabetic patients was 5.8% (men) & 13.9% (women) and in diabetic patients was 10.1% (men) and 24.0% (women) [13]. Death was found in 7.1% and 1.9% of cases in diabetic and non-diabetic group respectively [10].

CONCLUSION

Post MI angina was higher in diabetic than non-diabetic patients. Mechanical complications were also more in diabetic patients. However rate of reinfarction was higher among non-diabetic than that in diabetic patients. Mortality rate was higher in diabetic than that in non-diabetic patients. So, it may be concluded from the present study that in-hospital complications and mortality of acute anterior myocardial infarction are comparatively more in diabetic patients than in non-diabetic patients.

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