Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 10, ISSUE 02, 2019

ORIGINAL RESEARCH

Evaluation of outcome of acute anterior myocardial infarction in diabetic and non-diabetic patients at a tertiary care centre

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Received: 19 March, 2019 Accepted: 24 April, 2019

ABSTRACT

Background: One of the most frequent life-threatening illnesses in emergency hospital admissions is myocardial infarction (MI). The present study was conducted to evaluate outcome of acute anterior myocardial infarction in diabetic and non-diabetic patients.

Materials & Methods: 108 acute anterior MI patients of both genders were divided into 2 groups of 54 each. Group I had diabetics and group II had non- diabetics. Parameters such as Troponin-I, Serum creatinine, LVH and lipid profile was recorded. Risk factors and outcome was recorded in both groups.

Results: Out of 108 patients, males were 60 and females were 48.The mean age was 52.95 ± 12.50 and 55.02 ± 12.97 years in diabetic and non-diabetic patients. Common risk factors were hypertension seen in 19 (35.18%) in diabetic group and 29 (53.07%) in non-diabetic group. Dyslipidaemia in 12 in diabetic group and 13 in non-diabetic group (almost similar in both group), smoking in 9 in diabetic group and 12 in non-diabetic group and family history of CVD in 4 in diabetic group and 7 in non-diabetic group. The difference was non- significant (P>0.05).

Conclusion: Diabetic patients have poor in-hospital outcomes after acute anterior MI. In-hospital outcomes of acute anterior myocardial infarction are worse in diabetic patients than in nondiabetic patients.

Keywords: diabetic, myocardial infarction, coronary artery disease

Introduction

One of the most frequent life-threatening illnesses in emergency hospital admissions is myocardial infarction (MI). The initial few hours of hospitalization are when the majority of complications happen.[1] It is a leading global cause of death and disability. MI can occur often in patients with established coronary artery disease (CAD) or it might be the initial sign of the illness. Pathology defines MI as myocardial cell death brought on by extended myocardial ischemia.[2]The clinical state known as STEMI is characterized by the typical signs and symptoms of myocardial ischemia along with a sustained ST elevation in the ECG and the subsequent release of biomarkers indicative of myocardial necrosis. A sudden reduction in coronary blood flow after thrombotic blockage of a coronary artery precedes MI in about 80% of instances.[3] The remaining 20 percent of cases have nonatherosclerotic etiology of MI. Factors like DM, cholesterol buildup, hypertension, and cigarette smoking can cause or exacerbate this harm. Atherosclerotic plaques typically fissure, rupture, or ulcerate, causing a murural thrombus to form at the site of rupture and coronary artery blockage. This is how infarctions happen.[4]Over the past 20 years, there has been a 30% decrease in the death rate

ISSN: 0975-3583, 0976-2833 VOL 10, ISSUE 02, 2019

upon MI admission, but it is still quite significant. individuals over 70 years of age had a much lower survival rate (21% in hospital death rate) than individuals 60 years of age or younger (2.8%).[5]

Diabetes is a global issue that is growing increasingly problematic, particularly for obese and inactive individuals. An International Diabetes Federation survey from 2013 found that 382 million individuals worldwide had diabetes, and by 2035, that figure is predicted to increase to 592 million referred to the illness as a new worldwide epidemic.[6]

Aims and objectives

The present study was conducted to evaluate outcome of acute anterior myocardial infarction in diabetic and non-diabetic patients.

Materials & Methods

The present cross-sectional observational study was conducted on 108 acute anterior MI patients of both genders in the Department of Cardiology, Indira Gandhi Institute of Medical Sciences, Sheikhpura, Patna, Bihar, India. The duration of the study was from June 2016 to May 2017. A total of 108 acute anterior MI patients (54 diabetic and 54 non-diabetic) were included in this study. The Institutional Ethics Committee gave the study its approval. All were informed regarding the study, and their written consent was obtained. Data such as name, age, gender, etc. was recorded. Acute anterior MI patients admitted after 6 hours of symptom onset or who did not receive treptokinase were excluded.

Inclusion criteria

- All patients with acute coronary myocardial infarction admitted within 6 hours of symptom onset received streptokinase.
- Both diabetic and non-diabetic patients of both sexes.
- Age: 20 years and above.

Exclusion criteria

- Patients with Non-STE myocardial infarction.
- Acute-anterior MI patients were admitted after 6 hours of symptom onset or who did not receive streptokinase.
- Age below 20 years.
- Prior myocardial infarction, Cardiomyopathy, Valvular heart disease, liver disease, Patients with renal impairment, Previous MI with revascularization.
- Those who did not want to participate in this study

Sampling Size Determination and Sampling Technique

The following simple formula would be used for calculating the adequate sample size in prevalence study

$N= Z^2 P (1-P)/d^2$

N= sample size, Z= level of confidence, P= prevalence, d= Absolute error or precision

Z = Is standard normal variate (at 5% type 1 error (P< 0.05) it is 1.96 and at 1% type 1 error (P<0.01) it is 2.58). As in majority of studies P values are considered significant below 0.05 hence 1.96 is used in formula. p = Expected proportion in population based on previous studies or pilot studies.

The sample size was calculated using a single population proportion formula, by considering, 95% confidence level, a 5% margin of error, and a 6% estimated proportion of overall prevalence

Sample size = $1.96^2 \times 0.06 (1-0.06)/0.05^2$

=86.67

ISSN: 0975-3583, 0976-2833 VOL 10, ISSUE 02, 2019

Considering 10% non-response rate, the total minimum sample size for study was 96 patients. We included 108 (more than the minimum required number of cases) acute anterior myocardial infarction in diabetic and non-diabetic patients in the present study.

Detailed history, and general and physical examination was performed. Patients were divided into 2 groups of 54 each. Group I had diabetics and group II had non- diabetics. Parameters such as Troponin-I, Serum creatinine, LVH and lipid profile was recorded. Risk factors and outcome was recorded in both groups.

Assessment of the patients, after admission, a thorough medical history as well as a general and physical examination were conducted for patients suffering from acute myocardial infarction. A clinical assessment was conducted, with particular focus on the Kllip class of heart failure. It was also noted whether any arrhythmias were present. When the patient was admitted, a 12-lead ECG was obtained with the leads positioned correctly. Upon detection of a rise or fall in cardiac troponin, a cardiac biomarker measurement with at least one value above the upper reference limit (URL) and with at least one of the following characteristics was used to confirm the diagnosis of acute myocardial infarction: 1) Ischemia symptoms; 2) new or presumed significant abnormalities in the ST-T wave or left bundle branch block (LBBB); 3) the development of a pathological Q wave in the ECG; 4) imaging evidence of a new regional wall motion abnormality or loss of viable myocardium.[7]

Statistical Analysis

The data was obtain was subjected to statistical analysis using Microsoft Excel spread sheet and analyzed using SPSS version 21.0 software. Categorical data were shown using frequencies and proportions. The data's significance was assessed by the Chi-square test. The continuous data were expressed as the mean and standard deviation. The data's significance was assessed by an independent t-test. A p-value less than 0.05 were deemed significant.

Results

The present study included a total of 108 acute-anterior MI patients (54 diabetic and 54 non-diabetic). Out of 108 patients, males were 60 and females were 48. The mean age was 52.95 ± 12.50 and 55.02 ± 12.97 years in diabetic and non-diabetic patients, respectively, with a p value >0.05. Statistically, no significant difference was seen between the two groups (p > 0.05).

Table I: Gender wise distribution of patients

Parameters		**Group I (n=54)**	**Group II(n=54)**	**P value**
Gender	Male	22	38	0.83
	Female	32	16	
Mean age (years)		52.95 ± 12.50	55.02 ± 12.97	0.56

Table I shows that out of 54 patients, males were 60 and females were 48.

Table II: Assessment of risk factors

Risk factors	**Group I**(n=54)	**Group II**(n=54)	**P value**
Hypertension	19	28	0.52
Dyslipidaemia	12	13	
Smoking	9	12	
Family history of CVD	4	7	

Table II, graph I shows that common risk factors were hypertension seen in 19 (35.18%) in group I and 29 (53.07%)in group II. Dyslipidaemia in 12 in group I and 13 in group II(almost similar in both group), smoking in 9 in group I and 12 in group II and family history of CVD in 4 in group I and 7 in group II. The difference was non- significant (P>0.05).

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Figure 1: Assesment of risk factors

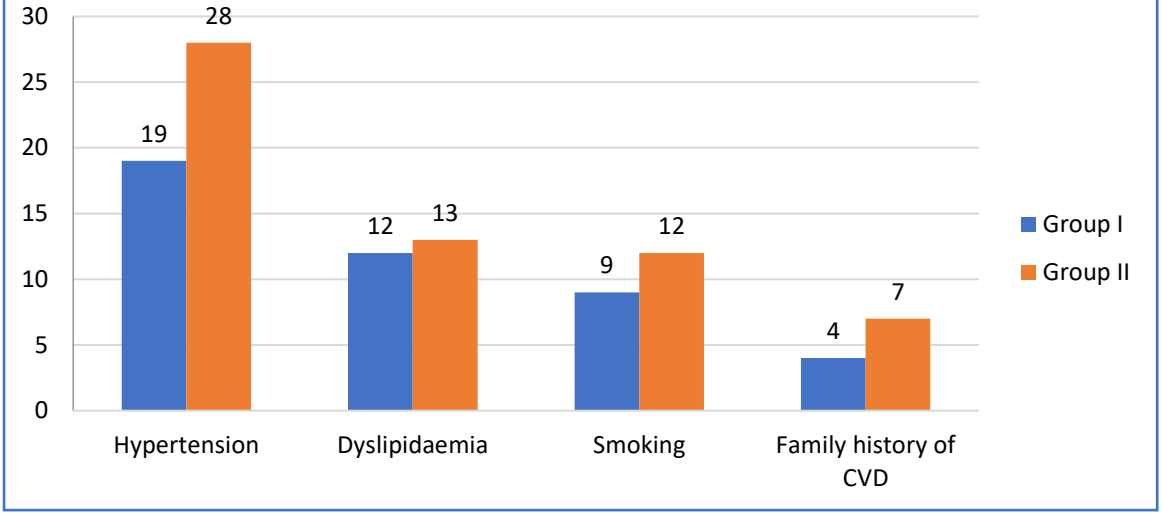

Table III: Laboratory parameters

Laboratory parameters	**Group I**(n=54)	**Group II**(n=54)	**P value**
HbA1C (%)	8.5±1.46	5.4±0.83	0.02
TC (mg/dl)	228.5±30.62	225.4±34.50	0.75
TG (mg/dl)	236.1±60.20	246.3±62.98	0.90
LDL (mg/dl)	141.8± 32.07	143.7±28.91	0.84
Serum creatinine (mg/dl)	0.82±0.21	0.67±0.18	0.01
LV Ejection (%)	42.9	53.1	0.01

Table III, shows that HbA1C (%) was 8.5 and 5.4, TC (mg/dl) was 228.5 and 225.4, TG (mg/dl) was 236.1 and 246.3, LDL (mg/dl) was 141.8 and 143.7, serum creatinine (mg/dl) was 0.82 and 0.67 and LV ejection (%) was 42.9 and 53.1 in group I and II respectively. The difference was significant (P<0.05).

Table IV: Outcome in both groups

Outcome	**Group I**(n=54)	**Group II**(n=54)	**P value**
Discharge	40 (74.07%)	48(88.89%)	0.82
Death	14(25.93%)	6(11.11%)	0.04

Table IV shows that 40 (74.07%) patients in group I (Diabetics) discharged and 14(25.93%) died and 48(88.89%) in group II (non- diabetics) discharged and 6 (11.11%) died. The difference was significant (P<0.05).

Discussion

Acute myocardial infarction remains a major source of morbidity and mortality in diabetic patients, despite notable advancements in the treatment of many extrapancreatic symptoms of the disease.[8] Myocardial infarction often has a convoluted clinical course and a greater death risk in patients with diabetes than in those without the disease. People with diabetes have a different pathophysiology of myocardial infarction than people without diabetes.[9]The present study was conducted to evaluate outcome of acute anterior myocardial infarction in diabetic and non-diabetic patients.

We found that out of 108 patients, males were 60 and females were 48. We found that common risk factors were hypertension seen in 29 in group I and 22in group II, dyslipidaemia in 12 in group I and 13 in group II, smoking in 9 in group I and 21 in group II and family history of CVD in 4 in group I and 7 in group II. Hypertension was found more among non-diabetic patients. Smoking and family history were more commonly associated with nondiabetic patients.

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Killip Class III[10] was more in the diabetic [24 (48%) versus 9 (18%); p<0.01] and Killip Class I was more in the non-diabetic group [18 (36%) versus 3 (6%); p<0.01] according to Killip classification of HF which was statistically significant between the two groups. Atrial Fibrillation was more in diabetics [6 (12%) versus 1 (2%); p<0.05] while sinus tachycardia was more among non-diabetics [20 (40%) versus 5 (10%); p<0.05] which are statistically significant. The diabetic group had more acute MR [2 (4%) versus 0 (0%); p>0.05] but was not significant. Death was more pronounced in the diabetic group than in the non-diabetic group [7 (14%) versus 3 (6%); p>0.05] but it was statistically not significant.

We found that HbA1C (%) was 8.5 and 5.4, TC (mg/dl) was 228.5 and 225.4, TG (mg/dl) was 236.1 and 246.3, LDL (mg/dl) was 141.8 and 143.7, serum creatinine (mg/dl) was 0.82 and 0.67 and LV ejection (%) was 42.9 and 53.1 in group I and II respectively. Iqbal et al.[11] in their study 240 patients (76 diabetic and 164 non-diabetic) suffering from ST-segment Elevation acute myocardial infarction were included. Complications of Acute Myocardial Infarction (AMI) and the outcome were compared between diabetics and non-diabetic patients. Different complications studied varied significantly (P0.5) in diabetic and non-diabetic patients. The abnormalities including Cardiogenic shock (OR= 1.9; 95%CI = 0.85-4.22), left ventricular failure (OR = 2.5), re-infarction (OR= 2.2), arrhythmia (OR= 2.04) and ventricular septal defect (OR= 2.17) were 4.2, 4.7, 21.3, 4.2 and 85.24 times higher in diabetics, respectively. However, occurrence of post myocardial angina (OR=0.38) was low in diabetics than non-diabetics. Odds of having diastolic dysfunction were 1.8 times higher in diabetic patients. The moderate and severe LV-dysfunction was 3.3 and 2.5 times higher diabetics, while mild LV-dysfunction in was 2.1 times higher in non-diabetics. Mortality due to STEMI in diabetics was 2.3 times higher than in non-diabetics. Mortality varied significantly between different age groups in non-diabetics and in overall after controlling for diabetes. In non-diabetic group, mortality was 8.4 times higher in patients those were not given streptokinase than those were given streptokinase, while in diabetic group it was 2.5 times higher in patients were not given streptokinase than those were given streptokinase. The results indicate that the diabetics have higher risk of mortality. Inferior infarction is more serious in diabetics than non-diabetics and chances of survival in streptokinase treated patients is five times in non-diabetic while it about two times in diabetics. The results suggest the importance of streptokinase treatment in patients having ST-segment Elevation Acute Myocardial Infarction.

We found that 40 (74.07%) patients in group I (Diabetics) discharged and 14(25.93%) died and 48(88.89%) in group II (non- diabetics) discharged and 6 (11.11%) died.

Zuanetti G et al.[12] Post-MI angina was 9.57% in non-diabetic patients and 10.35% in diabetic patients, but in this study, post-MI angina was found to be higher in diabetic than non-diabetic patients. 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 .[13] In-hospital mortality in non-diabetic patients was 5.8% (men) and 13.9% (women), and in diabetic patients it was 10.1% (men) and 24.0% (women).[12] Death was found in 7.1% and 1.9% of cases in the diabetic and non-diabetic groups, respectively.[14]

Study limitations: Data is taken from a single tertiary care centre. The fact that the study sample was collected consecutively—as compared to at random—may have had an impact on the study's outcomes. It wasn't considered that the duration of the DM could have had significant effects on the result.

Limitations of the study: The shortcoming of the study is small sample size. Data are obtained from a single tertiary care hospital in Bihar.

Conclusion

Authors found that diabetic patients have poor in-hospital outcomes after acute anterior MI. In-hospital outcomes of acute anterior myocardial infarction are worse in diabetic patients than in nondiabetic patients.

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Acknowledgement

I am immensely grateful to all faculties and co-workers of the Department of Cardiology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, for their support and valuable suggestions. I am especially thankful to Dr. (Prof.) B. P. Singh, Head of Department, Department of Cardiology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, for their support and valuable suggestions.

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