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Coronary Angiographic Findings of Acute ST Elevation Myocardial Infarction in Diabetic and Non-Diabetic Patients

Farzana Tazin[1*], Md. Shahabuddin[2], Rajib Das[3], Kaushik Majumdar[4], Md. Abdul Mukid[5], Md. Suhail Alam[6], Partha Sarathi Roy Chowdhury[7], Mohammad Azizur Rahman[8], Md. Shuaib Ahmed[9]

[1]Senior Consultant (Cardiology), Clinical and Intervention Cardiologist, National Heart Foundation Hospital, Sylhet, Bangladesh
[2]Ex-Professor and Departmental Head (Cardiology), MAG Osmani Medical College, Sylhet & Vice Principal and Departmental Head (Cardiology), Parkview Medical College, Sylhet, Bangladesh
[3]Senior Consultant (Cardiology), Clinical and Intervention Cardiologist, National Heart Foundation Hospital, Sylhet, Bangladesh
[4]Senior Consultant (Cardiology), Clinical and Intervention Cardiologist, National Heart Foundation Hospital, Sylhet, Bangladesh
[5]Assistant Professor (Cardiology), Parkview Medical College, Sylhet, Bangladesh
[6]Assistant Professor, Department of Cardiology, Jalalabad Ragib Rabeya Medical College, Sylhet, Bangladesh
[7]Junior Consultant (Cardiology), 250 Bed Adhunic Sadar Hospital, Hobiganj, Bangladesh
[8]Assistant Professor (Cardiology), Sylhet MAG Osmani Medical College, Sylhet, Bangladesh
8Associate Professor (Cardiology), Sylhet MAG Osmani Medical College, Sylhet, Bangladesh

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***Corresponding author:** Farzana Tazin
Senior Consultant (Cardiology), Clinical and Intervention Cardiologist, National Heart Foundation Hospital, Sylhet, Bangladesh

Abstract **Original Research Article**

Background: Diabetes mellitus plays an important role in the pathogenesis of coronary artery disease (CAD) by promoting the process of atherosclerosis thus patients with diabetes are comparatively at higher risk of cardiovascular events such as myocardial infarction and is often associated with complex coronary artery disease. ***Aims and Objectives:*** To compare coronary angiographic findings of acute ST elevation myocardial infarction in diabetic and non-diabetic patients. ***Materials and Methods:*** This cross-sectional observational study was conducted in the Department of Cardiology, Sylhet M.A.G. Osmani Medical College Hospital, Sylhet during the period from January 2017 to June 2017. Fifty acute ST elevation myocardial infarction patients with diabetes and 50 acute ST elevation myocardial infarction patients without diabetes fulfilling the inclusion and exclusion criteria were selected. Diagnostic coronary angiography was performed via the trans-femoral approach using standard techniques. Cine angiographic films were analyzed independently by two experienced operators who had no knowledge of the patient's clinical information. ***Results:*** The age of the diabetic and non-diabetic patients were similar (51.82 ± 9.19 years versus 52.66 ± 10.22 years; p=0.667), sex [45 (90.0%) male and 5 (10.0%) versus 42 (84.0%) male and 8 (16.0%) female; p=0.372] and common risk factors such as smoking [26 (52.0%) versus 31 (62.0%); p=0.313], hypertension [27 (54.0%) versus 36 (72.0%); p=0.062] dyslipidaemia [45 (90.0%) versus 39 (78.0%); p=0.102] and family history of CAD [14 (28.0%) versus 16 (32.0%); p=0.663]. No vessel disease was [0 (0.0%) versus 7 (14.0%); p<0.05] was significantly fewer in diabetic than in non-diabetic but single vessel disease [13 (26.0%) versus 18 (36.0%); p>0.05], double vessel disease [19 (38.0%) versus 10 (20.0%); p>0.05], triple vessel disease [16 (32.0%) versus 14 (28.0%); p>0.05] and left main coronary artery involvement [2 (4.0%) versus 1 (2.0%); p>0.05] did not differ significantly between diabetic and non-diabetic. Multi-vessels coronary artery disease was more frequent in diabetic than in non-diabetic [37 (74.0%) versus 25 (50.0%); OR=6.112; 95% CI=2.846-6.597; p=0.013]. The mean Gensini score was significantly higher in diabetic than that of non-diabetic patients with acute ST elevation MI (45.45 ± 32.27 versus 22.70 ± 20.08; p<0.001). Type-A morphologic of atherosclerotic lesion was significantly fewer in diabetic than in non-diabetic (8 versus 18, p=0.05); type-B lesion did not differ significantly between diabetic and non-diabetic (39 versus 36, p=0.729); while type-C lesion was significantly more frequent in diabetic than in non-diabetic (63 versus 32, p=0.001). ***Conclusion:*** The angiographic extent, severity and complexity of lesion morphology in diabetics are more compared to non-diabetics in patients with STEMI.

Keywords: Coronary Angiographic, Acute ST Elevation Myocardial Infarction, Diabetic and Non-Diabetic Patients.

INTRODUCTION

Ischemic heart disease (IHD) is estimated to be the most important cause of mortality by the end of 2020 worldwide despite tremendous improvement in healthcare. The emergence of cardiovascular disease (CVD) epidemic in south Asian countries during the last three decades has been an alarming concern. Significant differences in the prevalence of coronary artery disease exist with respect to gender, age, geography and ethnicity

[1]. Acute myocardial infarction (MI) as the first manifestation of ischemic heart disease is very high in approximately 50% to 70% of patients and is a common cause for hospital admission [1]. Myocardial infarction results from prolonged myocardial ischemia precipitated in most cases by an occlusive coronary thrombus at the site of a pre-existing atherosclerotic plaque. More rarely, infarction may result from prolonged vasospasm, inadequate myocardial blood flow or excessive myocardial demand. Very rarely myocardial infarction may be caused by embolic coronary occlusion, vasculitis, coronary artery dissection or aortitis [2]. ST elevation myocardial infarction (STEMI) is a clinical syndrome defined by characteristic symptoms of myocardial ischemia in association with persistent electrocardiographic (ECG) ST elevation and subsequent release of biomarkers of myocardial necrosis. Community incidence rates for STEMI have declined over the past decade, whereas those for non–ST-elevation acute coronary syndrome (ACS) have increased. At present, STEMI comprises approximately 25% to 40% of MI presentations [3]. The direct and indirect effects on the human vascular tree are the major sources of morbidity and mortality in both type-1 and type-2 diabetes. Generally, the long-term complications of hyperglycemia are separated into macrovascular and microvascular complications. The central pathological mechanism in macrovascular disease is the process of atherosclerosis, which leads to narrowing of arterial walls throughout the body. Atherosclerosis is thought to result from chronic inflammation and injury to the arterial wall in the peripheral or coronary vascular system [4]. Coronary angiography has shown abnormal coronary arteries (>50% stenosis), more severe proximal and distal CAD, higher prevalence of three-vessel disease, total occluded vessel and more diffused coronary disease attributing to more segments of the vessel being affected in diabetic patients than non-diabetic patients [5-7]. But some studies like Cariou et al., [8]. did not find at any time statistical difference for multivessel, distal or diffuse CAD between diabetic and non-diabetic group So, this study is designed to find out the angiographic findings of acute ST elevation myocardial infarction in diabetic versus non-diabetic.

MATERIALS AND METHODS

Study design: This was a cross-sectional observational study.

Place of study: This study was conducted in the Department of Cardiology, Sylhet M.A.G. Osmani Medical College Hospital, Sylhet, Bangladesh.

Study period: This study was conducted during the period from January 2017 to June 2017.

Study population: All patients with acute myocardial infarction admitted in CCU of Sylhet MAG Osmani Medical College Hospital during the study period fulfilling the inclusion and exclusion criteria were recruited as the study sample.

Sample size: Sample was calculated by using Guilford and Frucher's formula [$n = \frac{Z^2pq}{d^2}$] considering 5% level of significance, 5% precision level (marginal error) and prevalence of coronary artery disease in Bangladesh is 3.4% [9].
Calculated sample size was 50 diabetic and 50 non-diabetic patients with acute ST elevation myocardial infarction fulfilling the inclusion and exclusion criteria.

Inclusion Criteria:

- All patients with acute ST elevation myocardial infarction who presented within 24 hours of symptom onset and received streptokinase and underwent pre-discharge coronary angiography (CAG).
- Age above 18 years, irrespective of gender.
- Willing to enroll in this study

Exclusion Criteria:

- Patients with Non-ST elevation myocardial infarction
- AMI patients admitted after 24 hours of symptom onset.
- Age below 18 years
- Prior myocardial infarction.
- Cardiomyopathy.
- Valvular heart disease.
- Previous MI with revascularization.
- IGT (impaired glucose tolerance).
- Those who were not willing to enroll in this study.

Assessment of the patients: After admission of a patient with acute myocardial infarction a detailed history, general and physical examinations were performed.

A 12 lead ECG was taken on admission by placing the leads in proper position. The diagnosis STEMI was based on 12 lead ECG showing New ST elevation at the J point in two contiguous leads with the cut-points: ≥0.1 mV in all leads other than leads V2–V3 where the following cut points apply: ≥0.2 mV in men ≥40 years; ≥0.25 mV in men <40 years, or ≥0.15 mV in women and serum troponin I (higher than the upper limit of reference range). All those who had documented history of diabetes in past (treated with either insulin, oral hypoglycaemic agents or not treated) or those who had random blood glucose level ≥11.1 mmol/liter (200 mg/dl) or fasting blood glucose level ≥7 mmol/liter (≥126 mg/dl) and HbA_1C ≥ 6.5%, was documented as diabetes mellitus. Those who have no history of diabetes mellitus in past or random blood glucose level less than 200 mg/dl or fasting blood glucose level less than 126 mg/dl and HbA1c below 6.5% was documented as non-diabetic. IGT patients were excluded. Patients were asked about the major modifiable risk factor profile of

coronary artery disease such as hypertension, diabetes mellitus, hyperlipidaemia, smoking status. Previous medical records were also checked for these risk factors.

Enrollment of the sample: Those who met the inclusion criteria from history clinical examination and necessary investigations were taken as sample and those met the exclusion criteria were excluded. In this way 50 acute ST elevation MI patients with diabetes mellitus and 50 acute ST elevation MI patients without diabetes mellitus were selected.

Grouping of the sample: 50 acute ST elevation MI patients with diabetes mellitus fulfilling the inclusion and exclusion criteria were enrolled in group-A and 50 acute ST elevation MI patients without diabetes mellitus fulfilling the inclusion and exclusion criteria were enrolled in group-B.

Treatment: Patients were treated according to 2013 ACCF/AHA Guideline for the Management of ST elevation myocardial infarction. In-hospital treatment with special attention to use of Streptokinase were recorded.

Procedure of data analysis and interpretation: Data were processed manually and analyzed with the help of SPSS (Statistical package for social sciences) Version 22.0. Quantitative data were expressed as mean and standard deviation; and comparison were done by unpaired "t" test. Qualitative were expressed as frequency and percentage and comparison was carried by Chi-square (χ^2) Test. A probability value (p) of less than 0.05 ($p<0.05$) was considered statistical significance.

RESULTS

Distribution of patients according to baseline characteristics: The age of the diabetic patients (Group A) ranged from 28 to 70 years with the mean age of 51.82 ± 9.19 years; whereas the age of the non-diabetic patients (Group B) ranged from 25 to 70 years with the mean age of 52.66 ± 10.22 years; difference between two groups was not statistically significant (t=-0.432; p=0.667). In Group A 45 (90.0%) patients were male and 5 (10.0%) patients were female; whereas 42 (84.0%) patients were male and 8 (16.0%) patients were female in Group B; difference was not significant (χ^2=0.796; p=0.372). In group-A, 26 (52.0%) patients were smoker whereas in Group-B, 31 (62.0%) patients were smoker; difference was not significant (χ^2=1.020; p=0.313). In group-A 27 (54.0%) patients were hypertensive; whereas in Group-B 36 (72.0%) patients were hypertensive and 14 (28.0%) patients were normotensive; difference was not significant (X^2=3.457; p=0.062). Dyslipidaemia was found in 45 (90.0%) patients in group-A and 39 (78.0%) patients in Group-B; difference was not significant (χ^2=2.679; p=0.102). Family history of CAD was present in 14 (28.0%) patients of group-A and 16 (32.0%) patients of Group-B; difference was not significant (X^2=0.190; p=0.663). Types of STEMI was anteroseptal in 29 (58.0%) and inferolateral in 21 (42.0%) patients in group-A; whereas anteroseptal in 26 (52.0%) and inferolateral in 24 (48.0%) patients in Group-B; difference was not significant (X^2=0.364; p=0.546). Successful thrombolysis was done in 33 (66.0%) patients in group A and 39 (78.0%) patients in Group-B; difference was not significant (X^2=1.786; p=0.181).

Table-1: Distribution of Patients according to baseline characteristics (N=100)

Baseline characteristics	Group-A (n=50)	Group-B (n=50)	p-value
Age			
≤ 40 years	5 (10.0)	8 (26.0)	*p=0.118
41 to 50 years	21 (42.0)	12 (24.0)	
51 to 60 years	14 (28.0)	23 (46.0)	
61 to 70 years	10 (20.0)	7 (14.0)	
Mean ± SD	51.82 ± 9.19	52.66 ± 10.22	†p=0.667
Sex			
Male	45 (90.0)	42 (84.0)	*p=0.372
Female	5 (10.0)	8 (16.0)	
Smoker	26 (52.0)	31 (62.0)	*p=0.313
Hypertension	27 (54.0)	36 (72.0)	*p=0.062
Dyslipidaemia	45 (90.0)	39 (78.0)	*p=0.102
Family history of CAD	14 (28.0)	16 (32.0)	*p=0.663
Types of STEMI			
Anteroseptal	29 (58.0)	26 (52.0)	*p=0.546
Inferolateral	21 (42.0)	24 (48.0)	
Successful thrombolysis	33 (66.0)	39 (78.0)	*p=0.181

*Chi-square (χ^2) Test and unpaired t test were employed to analyze the data. Figures in the parenthesis denote corresponding percentage. Group A=STEMI with diabetes, Group B=STEMI without diabetes.

Distribution of patients by extent of coronary artery involvement: No vessel disease was 0 (0.0%) in group-A and 7 (14.0%) in Group-B. No vessel disease was significantly fewer in group-A than that of Group-B (χ^2=7.143, p<0.05]. Single vessel disease [13 (26.0%) versus 18 (36.0%); χ^2=0.806; p>0.05], double vessel disease [19 (38.0%) versus 10 (20.0%); χ^2=2.793; p>0.05], triple vessel disease [16 (32.0%) versus 14 (28.0%); χ^2=0.133; p>0.05] and left main involvement [10 (20.0%) versus 7 (14.0%); χ^2=0.529; p>0.05] did not differ significantly between group-A and Group-B. Distribution of patients by coronary artery involvement was shown in table-2.

Table-2 Distribution of patients by coronary artery involvement (N=100)

Coronary artery involvement	Study subjects		*p-value
	Group-A (n=50)	Group-B (n=50)	
No vessel	0 (0.0)	7 (14.0)	p<0.05
Single vessel	13 (26.0)	18 (36.0)	p>0.05
Double vessels	19 (38.0)	10 (20.0)	p>0.05
Triple vessels	16 (32.0)	14 (28.0)	p>0.05
Left main	2 (4.0)	1 (2.0)	p>0.05

Distribution of patients by multi-vessels coronary artery disease: Multi-vessels coronary artery disease was 37 (74.0%) in group-A and 25 (50.0%) in Group-B. Multi-vessels coronary artery disease was more frequent in group-A than that of Group-B [χ^2=6112; OR=6.112; 95% CI=2.846-6.597; p=0.013]. Distribution of patients by multi-vessels coronary artery disease was shown in table-3.

Table-3: Distribution of patients by multi-vessels coronary artery disease (N=100)

Muti-vessels coronary artery disease	Study Subjects		Odd Ratio (95% CI)	*p-value
	Group-A (n=50)	Group-B (n=50)		
Yes	37 (74.0)	25 (50.0)	6.112 2.846-6.597	p=0.013
No	13 (26.0)	25 (50.0)		
Total	50 (100.0)	50 (100.0)		

Distribution of patients according to Gensini score: The Gensini score of the diabetic patients ranged from 6 to 142 with the mean of 45.45 ± 32.27; whereas the Gensini score of the non-diabetic patients ranged from 0 to 94 with the mean 22.70 ± 20.08. The mean Gensini score was significantly higher in diabetic than that of non-diabetic patients with acute ST elevation MI (t=4.232; p<0.001). Distribution of patients according to Gensini score was shown in table-4.

Table-4: Distribution of patients according to Gensini score (N=100)

Gensini score	Study Subjects		*p-value
	Group-A (n=50)	Group-B (n=50)	
Mean ± SD	45.45 ± 32.27	22.70 ± 20.08	p<0.001
Range	6 - 142	0 - 94	

Distribution of patients according to morphology of atherosclerotic lesion by angiography: Type-A morphologic of atherosclerotic lesion was significantly fewer in diabetic group than that of non-diabetic group (8 versus 18, χ^2=3.846, p=0.05); Type-B morphologic of atherosclerotic lesion did not differ significantly between diabetic group and non-diabetic group (39 versus 36, χ^2=0.120, p=0.729). While Type-C morphologic of atherosclerotic lesion was significantly more frequent in diabetic group than that of non-diabetic group (63 versus 32, χ^2=10.116, p=0.001). Distribution of patients according to morphology of atherosclerotic lesion by angiography was shown in Figure 1.

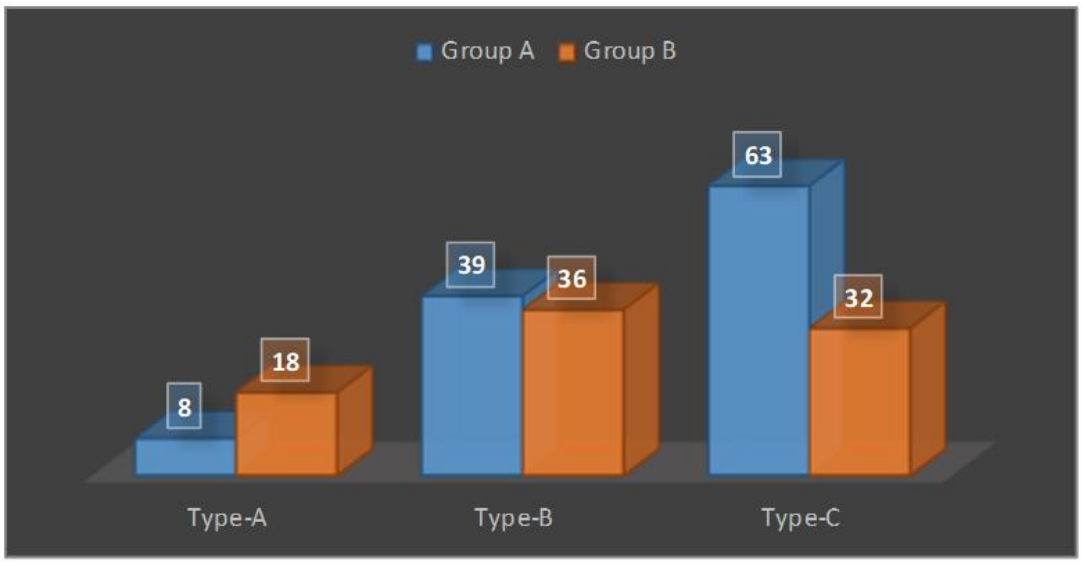

Figure 1: Distribution of patients according to morphology of atherosclerotic lesion by angiography

DISCUSSION

In this study the age of the diabetic patients ranged from 28 to 70 years with the mean age of 51.82 ± 9.19 years; whereas the age of the non-diabetic patients ranged from 25 to 70 years with the mean age of 52.66 ± 10.22 years. The mean age of the patients did not differ significantly between diabetic and non-diabetic patients with acute ST elevation MI (p=0.667). This result correlated with the study of Dubey et al., [10]. That the mean age of their patients with CAD was 55 ± 6 years in diabetic and 58 ± 7 years in non-diabetic; the difference was not significant (p>0.05). But the result was different from the study of Ahmed et al., [7] that the mean age of their patients with CAD was 61.0 ± 10.6 years in diabetic and 58.1 ± 11.4 years in non-diabetic; the difference was significant (p<0.001). This study showed that 90.0% patients were male and 10.0% patients were female in diabetic group; whereas 84.0% patients were male and 16.0% patients were female in non-diabetic group. In both, males were more commonly affected than females with a higher percentage of females in diabetic than in the non-diabetic but there was no significant difference of sex between the groups (p=0.372). This result was consistent with the study of Dubey et al., [10] that 74.1% of patients were male and 25.9% were female in diabetic group; whereas 76.1% of patients were male and 23.9% were female in diabetic group; the difference was not significant (p>0.05). This result was also supported by Parvin et al., [11] 83% of patients were male and 17% were female in diabetic group; whereas 95% of patients were male and 5% were female in diabetic group; the difference was not significant (p=0.086). But this result was different from the study of Ahmed et al., [7] that 63% of CAD patients were male and 37% were female in diabetic group; while 79% of CAD patients were male and 21% were female in non-diabetic group different was significant (p<0.001). In the present study 52.0% of patients were smoker and 48.0% patients were non-smoker in diabetic group; whereas 62.0% patients were smoker and 38.0% patients was non-smoker in non-diabetic group. There was no significant difference of smoking status between the groups (p=0.313). Hsu et al., [12] found current smoker did not differ significantly between diabetic and no-diabetic (p=0.07). Sanidas et al., [13] reported that smoker did not differ significantly between diabetic and no-diabetic (p=0.11). But Ahmed et al., [7] found that current smoking status was significantly less frequent in diabetic than that of non-diabetic (p<0.001). In this study 54.0% patients were hypertensive; whereas 72.0% patients were hypertensive in non-diabetic group. There was no significant difference of status of hypertension between the groups (p=0.062). This result was supported by Ahmed et al., [7] that there was no difference in the hypertension in diabetics and non-Diabetics (p=0.5). But above said data differ from previously published data showed that hypertension was more common in diabetic patients [14]. This study revealed dyslipidaemia in 90.0% patients in diabetic and 78.0% patients in non-diabetic patients of CAD. There was no significant difference of dyslipidaemia between the groups (p=0.102). This result was supported by Ahmed et al., [7] that there was no difference in the dyslipidaemia in diabetics and non-Diabetics (p=0.06). This result also correlated with the study of Farooq et al., [15] that dyslipidaemia did not differ significantly between diabetic and no-diabetic (p=0.239). Parvin et al., [11] reported that dyslipidaemia did not differ significantly between diabetic and no-diabetic (p=0.229). But above said data differ from previously published data showed that dyslipidaemia was more common in diabetic patients [14]. In this study 28.0% patients had family history of CAD in diabetic group; whereas in non-diabetic 32.0% patients had family history of CAD. Parvin et al., [11] also reported that family history of CAD did not differ significantly between diabetic and no-diabetic (p=0.147). Sanidas et al., [13] reported that family history of premature CAD did not differ significantly between diabetic and no-

diabetic (p=0.27). But Ahmed et al., [7] found that family history of CAD was more frequent diabetic than that of no-diabetic (p<0.5). In the present study types of STEMI was anteroseptal in 58.0% patients and inferolateral in 42.0% patients in diabetic; whereas anteroseptal in 52.0% patients and inferolateral in 48.0% patients in non-diabetic. There was no significant difference of types of STEMI between the groups (p=0.546). Other available study did not show the types of STEMI in diabetic and non-diabetic. In this study successful thrombolysis was done in 66.0% patients in diabetic and 78.0% patients in non-diabetic groups. There was no significant difference of successful thrombolysis between the groups (p=0.181). Pourmousavi et al., [16] while frequency of single vessel disease was higher in non-diabetic but did not reach the level of significance (p>0.05], frequency of double vessel disease and triple vessel disease was non-significantly higher in diabetic than non-diabetic (p>0.05). Left main coronary artery involvement (p>0.05) also did not differ significantly between diabetic and non-diabetic. This result was almost similar to the study of Parvin et al., [11] that single vessel disease (p=0.242), double vessel disease (p=0.777) and triple-vessel disease (p=0.094) did not differ significantly between Diabetic and non-Diabetics; but left main stem involvement was significantly more frequent in Diabetic patients than non-Diabetics (p=0.031). Uddin et al., [17] found that diabetic patients had significantly higher number of triple vessel disease patients had a higher total number of diseased vessels (p<0.01). Ahmed et al., [7] found That Normal Coronary Artery On Coronary Angiography Was Fewer in Diabetic compared to non-diabetic (p<0.05). Which was comparable to the present study but the result of the present study was differed from Ahmed et al., [7] that LMCA (p=0.005), one vessel disease (p<0.001), two vessel disease (p<0.001) and three-vessel disease was significantly more frequent in Diabetic patients than non-Diabetics (p=0.001). Farooq et al., [15] found that single vessel disease was significantly fewer in diabetic than that of non-diabetic (p=0.001); two vessel disease was non-significantly higher in diabetic than that of non-diabetic (p=0.359); whereas three vessel disease significantly higher in diabetic than that of non-diabetic (p=0.001). Melidonis et al., [18] reported that the diabetics had three-vessel disease more frequently (p<0.001) and one-vessel disease less frequently (p<0.001). Hegde et al., [19] in acute coronary syndrome, found significant association of similar diseased vessels in diabetics in comparison to non-diabetics. Javidi et al., [20] that showed that diabetic patients had a higher incidence of three-vessel coronary disease but regarding left main coronary artery disease, no difference was found between the two groups. Hoque et al., [21] however, found higher prevalence of SVD and TVD and low prevalence of DVD in diabetics than in non-diabetics. Sanidas et al., [13] found that number of diseased vessels did not differ significantly between diabetics and non-diabetics groups (p=0.25). In this study multi-vessels coronary artery disease was 74.0% in diabetic patients with STEMI and 50.0% in non-diabetic patients with STEMI; multi-vessels coronary artery disease was more frequent in diabetic compared to diabetic non-diabetics (p=0.013). This result was consistent with Dubey et al., [10] that the prevalence of multivessel disease was significantly higher in patients with type 2 diabetes than in those without diabetes (p<0.05). Zeina et al., [22] also found that multivessel lesions were more significantly observed in patients with diabetes mellitus than patients without having diabetic mellitus (p<0.001). Wu and Wang [23], reported the incidence of multivessel in diabetic patients was higher than that in nondiabetic patients (P<0.01). Hegde et al., [19] reported that that the incidence of multivessel disease in diabetics was much higher (50%) compared to non-diabetics which was only 16%. Uddin et al., [17] found that multivessel disease were more prevalent in both the groups but difference was not significant (p>0.05) The Gensini score of the diabetic patients ranged from 6 to 142 with the mean of 45.45 ± 32.27; whereas the Gensini score of the non-diabetic patients ranged from 0 to 94 with the mean of 22.70 ± 20.08. The mean Gensini score was significantly higher in diabetic than that of non-diabetic patients with acute ST elevation MI (p<0.001). This result correlated with the study of parvin et al., [11] that severe coronary artery disease was significantly more in diabetics than in non-diabetics (Gensini stenosis score 50.9 ± 29.9 versus 32.6 ± 21.9; p=0.001). Peppes et al., [24] also Found that the patients with DM had significantly higher Gensini scores (42.09 ± 8.39 versus 35.4 ± 3.069, p=0.036). This finding is consistent with Mahadeva et al., [25] who found significant association of severe coronary artery disease in patients with diabetes mellitus in comparison to non-diabetes patients. In the present study type-A morphologic of atherosclerotic lesion was significantly fewer in diabetic group than that of non-diabetic group (p=0.05); type-B morphologic of atherosclerotic lesion did not differ significantly between diabetic group and non-diabetic group (p=0.729). While type-C morphologic of atherosclerotic lesion was significantly more frequent in diabetic group than that of non-diabetic group (p=0.001). This result was consistent with the Dubey et al., [10] found that type A and B lesion were fewer in diabetic patients compared to non-diabetic patients with CAD (p<0.01); whereas complex Type C lesion was significantly higher in type 2 diabetes patients than in non-diabetes patients (p<0.05). But Ahmed et al., [7] found that type "B1" lesion was seen in Diabetics and Non-diabetics; type "B2" lesion in Diabetics and Non-diabetics and type "C" lesion in Diabetics and Non-diabetics did not differ significantly. The mechanism of the increased severity of CAD in type 2 diabetics than in nondiabetics in the study is unclear. Insulin resistance in patients with type 2 diabetes often leads to hyperinsulinemia, which in turn causes a variety of other abnormalities, including elevated triglyceride levels, low levels of high density lipoprotein cholesterol, enhanced secretion of very low density lipoprotein, disorders of coagulation, increased vascular resistance and

hypertension [23, 26]. All of these consequences contribute to the development of atherosclerosis and CAD.

CONCLUSION

This study revealed normal coronary arteries were significantly fewer in diabetic than that of non-diabetic ($p<0.05$]. But single, double, triple vessel disease and left main coronary artery involvement did not differ significantly between diabetic and non-diabetic ($p>0.05$). Multi-vessels coronary artery disease was more frequent in diabetic compared to non-diabetics ($p=0.013$). The mean Gensini score was significantly higher in diabetic than that of non-diabetic patients with acute ST elevation MI ($p<0.001$). Type-A morphologic of atherosclerotic lesion was significantly fewer in diabetic compared to non-diabetic ($p=0.05$); type-B did not differ significantly between diabetic and non-diabetic group ($p=0.729$); while type-C was significantly more frequent in diabetic group than that of non-diabetic group ($p=0.001$). In conclusion the angiographic extent, severity and complex morphology of lesion in diabetics are more compared to non-diabetics in patients with STEMI.

Limitations of the study

This study was not without limitations. Limitations of the study were

- This study was conducted in one tertiary level hospital in Sylhet.
- Systematic random sampling was not performed.

RECOMMENDATIONS

The present study revealed diabetic and STEMI are more likely to have severe and extensive coronary artery involvement with complex lesion morphology. So following recommendation can be made:

- It is better to maintain aggressive strategy for performing non-invasive and sometimes invasive studies for the detection of coronary artery disease in diabetics with STEMI.

REFERENCES

1. Mishra, T. K., & Das, B. (2016). ST-Segment Elevated Acute Myocardial Infarction: Changing Profile Over Last 24 Years. The Journal of the Association of Physicians of India, 64(6), 28-34.
2. Naqvi, M. A., Ali, M., Hakeem, F., Masood, A., & Akram, Z. (2008). Correlation of severity of ST segment elevation in acute inferior wall myocardial infarction with the proximity of right coronary artery disease. J Ayub Med Coll Abbottabad, 20(4), 82-85.
3. O'Gara, P. T., Kushner, F. G., Ascheim, D. D., Casey, D. E., Chung, M. K., De Lemos, J. A., ... & Zhao, D. X. (2013). 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Journal of the American college of cardiology, 61(4), e78-e140.
4. Beckman, J. A., Creager, M. A., & Libby, P. (2002). Diabetes and atherosclerosis: epidemiology, pathophysiology, and management. Jama, 287(19), 2570-2581.
5. Lindvall, B., Brorsson, B., Herlitz, J., Albertsson, P., & Werkö, L. (1999). Comparison of diabetic and non-diabetic patients referred for coronary angiography. International journal of cardiology, 70(1), 33-42.
6. Rana, J. S., Dunning, A., Achenbach, S., Al-Mallah, M., Budoff, M. J., Cademartiri, F., ... & Min, J. K. (2012). Differences in prevalence, extent, severity, and prognosis of coronary artery disease among patients with and without diabetes undergoing coronary computed tomography angiography: results from 10,110 individuals from the CONFIRM (COronary CT Angiography Evaluation for Clinical Outcomes): An International Multicenter Registry. Diabetes care, 35(8), 1787-1794.
7. Ahmed, J., Rathi, N., Alam, M. T., Baloch, Z., Munaf, A., Maheshwari, B., ... & Memon, F. (2015). Acute Myocardial Infarction: A Comparative Study To Assess The Angiographic Changes In Diabetic And Non Diabetic Patients. The Professional Medical Journal, 22(08), 996-1000.
8. Cariou, B., Bonnevie, L., Mayaudon, H., Dupuy, O., Ceccaldi, B., & Bauduceau, B. (2000). Angiographic characteristics of coronary artery disease in diabetic patients compared with matched non-diabetic subjects. Diabetes, nutrition & metabolism, 13(3), 134-141.
9. Zaman, M. M., Ahmed, J., Choudhury, S. R., Numan, S. M., Parvin, K., & Islam, M. S. (2007). Prevalence of ischemic heart disease in a rural population of Bangladesh. Indian heart journal, 59(3), 239-241.
10. Dubey, L., Guruprasad, S., & Subramanyam, G. (2013). Relationship between type 2 diabetes mellitus and coronary artery lesion characteristics: a single center study. Nepalese heart journal, 10(1), 20-22.
11. Parvin, T., Haque, K. S., Siddique, M. A., Habib, S. A., Rahman, M., Rahman, M. H., ... & Hoque, M. H. (2014). Angiographic severity of coronary artery disease in diabetic and non-diabetic patients in a tertiary care centre. University Heart Journal, 10(1), 13-17.
12. Hsu, H. P., Jou, Y. L., Lin, S. J., Charng, M. J., Chen, Y. H., Lee, W. S., ... & Wu, T. C. (2011). Comparison of in-hospital outcome of acute ST elevation myocardial infarction in patients with versus without diabetes mellitus. Acta Cardiologica Sinica, 27(3), 145-151.
13. Sanidas, E. A., Brener, S. J., Maehara, A., Généreux, P., Witzenbichler, B., El-Omar, M., ... & Stone, G. W. (2014). Outcomes in diabetic patients

undergoing primary percutaneous coronary intervention for acute anterior myocardial infarction: Results from the INFUSE-AMI study. Catheterization and Cardiovascular Interventions, 83(5), 704-710.
14. Shaw, L. J., Raggi, P., Callister, T. Q., & Berman, D. S. (2006). Prognostic value of coronary artery calcium screening in asymptomatic smokers and non-smokers. European heart journal, 27(8), 968-975.
15. Farooq, G., Ullah, I., Saghir, T., & Shah, S. T. (2015). Angiographic comparison of extent and severity of coronary artery disease between diabetic and non-diabetic patients. Pakistan Heart Journal, 48(2).
16. Pourmousavi, M. M., Tajlil, A., Darabad, B. R., Pourmousavi, L., Pourafkari, L., & Ghaffari, S. (2016). The impact of diabetes on electrocardiographic ST resolution and clinical outcome of acute ST elevation myocardial infarction following fibrinolytic therapy. Cor et Vasa, 58(6), e584-e590.
17. Uddin, S. N., Malik, F., Bari, M. A., Siddiqui, N. I., Khan, G. K., Rahman, S., & Sadequzzaman, M. (2005). Angiographic severity and extent of coronary artery disease in patients with type 2 diabetes mellitus. Mymensingh medical journal: MMJ, 14(1), 32-37.
18. Melidonis, A., Dimopoulos, V., Lempidakis, E., Hatzissavas, J., Kouvaras, G., Stefanidis, A., ... & Foussas, S. (1999). Angiographic study of coronary artery disease in diabetic patients in comparison with nondiabetic patients. Angiology, 50(12), 997-1006.
19. Hegde, S. S., Mallesh, P., Yeli, S. M., & Gadad, V. M. (2014). Comparitive angiographic profile in diabetic and non-diabetic patients with acute coronary syndrome. Journal of clinical and diagnostic research: JCDR, 8(9), MC07.
20. Javidi D, Gharaei B, Fateh S. Cardiovasvular Journal of Southern Africa 2005;1015:9657-62.
21. Hoque, M. H., Sufia, R., Siddique, M. A., Ahsan, S. A., Ahmed, C. M., Zaman, S. M., ... & Sulltan, M. A. U. (2010). Coronary Stenting in Diabetic Patients: Evaluation of Immediate Procedural Success & Adverse Outcomes. University Heart Journal, 6(1), 3-8.
22. Zeina, A. R., Barmeir, E., Zaid, G., & Odeh, M. (2009). Coronary artery disease among hypertensive patients undergoing coronary computed tomography angiography. Journal of Cardiovascular Medicine, 10(3), 252-256.
23. Wu, T. G., & Wang, L. (2002). Angiographic characteristics of the coronary artery in patients with type 2 diabetes. Experimental & Clinical Cardiology, 7(4), 199.
24. Peppes, V., Panoutsopoulos, A., Rammos, G., & Zakopoulos, N. (2011). The association of diabetes mellitus with the severity of angiographic findings in patients with newly-diagnosed coronary artery disease. Arch Hellen Med, 28(2), 245-250.
25. Mahadeva, S., D'Souza, S. C., & Padmanabha, K. (2014). Comparison of severity of coronary artery disease in diabetic and non-diabetic subjects using Gensini score in Indian subjects. J Diabetes Metab, 5(12), 469.
26. Saltiel, A. R. (2000). Series introduction: the molecular and physiological basis of insulin resistance: emerging implications for metabolic and cardiovascular diseases. The Journal of clinical investigation, 106(2), 163-164.