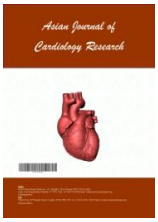

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Outcome of Patients Presenting with ST Elevation Myocardial Infarction among Diabetics and Non-diabetics

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: ST elevation myocardial infarction (STEMI) is a condition characterized by typical ischemic symptoms resulting from a total occlusion of a coronary artery. STEMI is specifically diagnosed on the electrocardiography. Diabetic patients reveal a more complicated anatomy of the coronary vessels in comparison to patients who are not diabetic. Furthermore, the diabetic patients more likely develop early post-infarction angina, stent thrombosis, and recurrent MI.
Materials and methods: This cohort study conducted at adult cardiology department in a tertiary care hospital, Karachi for Six months. From August, 29, 2017 to March, 1,2018. The patients were divided into two groups. Group-A were consisted of diabetic patients and Group-B were consisted of non-diabetic patients and their in-hospital outcome was monitored.
Results: 282 patients with 141 patients with diabetes and 141 non-diabetic patients were included. Mean age was 58.44±12.9 years in exposure group and 64.68±12.2 years in non-exposed group. In-hospital outcomes in diabetic and non-diabetic group was as followed; arrhythmias[64(78%) vs.50(60.9%);RR= 2.08]. recurrent angina [9(10.9%) vs.6(7.3%);RR=1.56]. cardiogenic shock [10(12.2%) vs. 5(6.1%); RR=2.14] , In-hospital mortality. [15(18.3%) vs. 7(8.5%); RR=2.39] and

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congestive heart failure [15(18.3%) vs. 8(9.8%); RR= 2.24].
Conclusion: Outcome of patients with diabetes presenting with acute myocardial infarction have a poor prognosis as having higher mortality and morbidity.

Keywords: In hospital outcomes; ST elevation myocardial infarction; diabetes mellitus.

1. INTRODUCTION

ST elevation myocardial infarction (STEMI) is a condition characterized by typical ischemic symptoms resulting from a total occlusion of a coronary artery. STEMI is specifically diagnosed on the electrocardiography [1]. Cardiovascular disease remains the most likely cause of death worldwide [2]. ST-elevation myocardial infarction is more fatal among acute coronary syndrome patients in the acute phase.

High blood glucose is a predictor of high morbidity and mortality in previously diagnosed diabetic patients and also in the newly diagnosed patients, who presents with an acute myocardial infarction (AMI). The studies showed that continuously raised blood glucose in the hospital have adverse effects on patient's outcomes [3]. There are numerous studies revealing the advantages of strict blood control in acute MI patients. However, clinical data is scarce in this context and resulting in poor management of patients [4]. Revascularization procedures and a good control of blood sugar in acute MI patients can improve the prognosis. Despite that, diabetic patients carry a high risk for cardiovascular events after primary percutaneous coronary intervention (PCI) [5]. Diabetic patients reveals a more complicated anatomy of the coronary vessels in comparison to patients without having diabetes. Furthermore, the diabetic patients were more likely develop early post-infarction angina, stent thrombosis, and recurrent MI [6].

Diabetic patients with STEMI are prone to develop serious complications such as cardiogenic shock, heart failure, arrhythmias and recurrent angina which ultimately results in poor outcome. The aim of this study is to detect a predictor for in hospital outcomes in patients with diabetes and without diabetes with STEMI in the local population, which may be helpful in the management of these patients and to prevent further complications.

2. MATERIALS AND METHODS

This was an Cohort study, in which the patients who meet the criteria of STEMI and underwent primary percutaneous coronary intervention were considered at the National Institute of Cardiovascular Disease, Karachi, Pakistan, during August, 29, 2017 to March, 1,2018 after getting approval from CPSP ((REU NO: 20550).

The patients were initially consented and afterwards, who meet the inclusion criteria were included consecutively. The Inclusion criteria were Patients between 30 years to 80 years of age. Either gender, and onset of chest pain within 12 hours along with ST segment elevation. Both diabetic with ST elevation MI (as exposed group) and non-diabetic with ST elevation MI (as non-exposed group), signed informed consent. The exclusion criteria were Severe aorta valve regurgitation/stenosis (confirmed by Echocardiography), Renal insufficiency (creatinine clearance <30 ml/min/1.73m²), Pregnant women, assessed by history, clinical examination & raised level Beta HCG and not given informed consent.

Patients who were on drugs for diabetes and hypertension for a minimum of 6 months were considered as diabetic and hypertensive. Diagnosis of STEMI was straightforward with the typical symptoms of chest pain and ST segment elevation on electrocardiography. Baseline characteristics, such as age as well as gender and history of diabetes, hypertension, and smoking, were documented for all the patients.

The patients were categorized into two groups. Group-A were consisted of the diabetic patients and Group-B were consisted of the diabetic patients. In-hospital outcome including mortality, cardiogenic shock, heart failure, arrhythmias, and recurrent angina was determined.

Statistical parameters such as frequency (percentages) or quantitative measures, such as mean ± variance were documented for the qualitative and quantitative measures. Baseline features including age, gender hypertension, diabetes, and smoking were recorded. Procedure related characteristics and odds ratios along with 95% confidence interval (CI) were computed and the chi-square test was applied. Data analysis was performed through IBM SPSS Version 19 and the level of significance was set at 0.5%.

3. RESULTS

In this study, 282 patients were included, 68.4% (193) patients were males and the mean age was 56.4 ± 9.1 years. 141 patients with diabetes and 141 non-diabetic patients. Mean age of the patients was 58.44±12.9 years in exposure group and 64.68±12.2 years in non-exposed group. 13 (15.9%) patients were diagnosed as hyperlipidemia in exposed group, 36 (43.9%) had dyslipidemia in non-exposed group, 26 (31.7%) patients were hypertensive in exposed group, 57 (69.5%) were hypertensive in non-exposed group. 29(35.4%) diabetic patients were smokers and 14 (17.1%) non-diabetic patients were smokers (Table 1).

There were 20(24.4%) diabetic patients had arrhythmias and 11(13.4%) having arrhythmias in the non-diabetics. The estimated risk of having recurrent angina was higher in diabetic patients (10.9%) then non-diabetic patients (7.3%). There were 10 (12.2%) diabetic patients had cardiogenic shock and 5 (6.1%) had in non-diabetic group difference was found to be non significant. Overall, complications were more pronounced in the diabetic patients as compared to non-diabetic patients.

4. DISCUSSION

Diabetes is found to be a poor prognostic factor in patients with STEMI. In this study, we determined the prognostic significance in patients with diabetes and without diabetes and correlate the diabetes with STEMI.

Additionally, the risk factors such as hypertension, hyperlipidemia (obesity) were significant in the diabetic patients in our study. Subsequently, mortality and complications were higher in the diabetic patients. As mentioned, risk factors for coronary artery disease were also prevalent in the diabetic patients [7-9]. These factors may be responsible for the poor prognosis in diabetics [9].

Despite this, Diabetes was not a hindrance to prevent the beneficial effects of reperfusion by using the criteria of successful reperfusion including settlement of chest pain,

Table 1. Descriptive Statistics Of Demographic Characteristics Of Patients (n=164)

	Diabetics	**Non-diabetics**	***p* value**
	***N* = 141**	***N* = 141**	
Age	58.44 ± 12.9	61.68 ± 12.2	0.03
Hospital stay	7.56± 3.4	9.5 ± 4.2	0.01
Duration of STEMI	10.4 ± 5.9	13.6 ± 3.2	0.01
Sex (male)	64 (78%)	50 (60.9%)	0.018
Family history	4 (4.9%)	12 (14.6%)	0.03
Hyperlipidemia	13 (15.9%)	36 (43.9%)	0.001
Hypertension	26 (31.7%)	57 (69.5%)	0.001
Smoker	29 (35.4%)	14 (17.1%)	0.008

Table 2. Distribution and association of In-hospital outcomes in diabetic and non-diabetic patients according to Duration of STEMI (>/=10 hours) (n=66)

In-hospital outcomes	**Diabetics**	**Non-diabetics**	***p* value and RR**
	***N* = 43**	***N* = 23**	
Arrhythmias	12 (27.9%)	6 (26.1%)	0.87 & 1.09
Recurrent angina	6 (14%)	4(17.4%)	0.71 & 0.77
Cardiogenic shock	5 (11.6%)	4 (17.4%)	0.65 & 0.63
In-hospital mortality	11(25%)	5(21.7%)	0.77 & 1.20
Congestive Heart failure	11 (25%)	5(21.7%)	0.77 & 1.20

idioventricular rhythm and electrocardiographic criteria of ST segment resolution at 90 min after treatment with thrombolytics such as streptokinase. The coronary artery disease pattern in diabetics with myocardial infarction is demonstrated by higher prevalence of multi vessel coronary artery disease [10]. In this study, mortality associated with diabetics after fibrinolytic therapy was found to be about 3.8%.

GUSTO-I trial sub-analysis revealed that the sequelae such as frequency of re-occlusion, left ventricular ejection fraction were almost similar in diabetic and non-diabetics in which fibrinolytics were administered. However, compensatory hyperkinesia was noted in the non culprit part of the myocardium especially in diabetics [10]. Previous studies illustrate that diabetes was independently associated with long-term adverse outcomes [8].

In one study, in-hospital mortality rate was 23.4% vs. 7.6% in diabetics and non-diabetic patients respectively [11]. The insignificant difference was reported in patients who developed cardiogenic shock in almost equal number of patients (7.1% in case group and 8% in control group) irrespective of their diabetic status. The rate of heart failure and proportion of arrhythmias were higher in diabetic patients then patients without diabetes (19% vs. 13.6% and 23.8% vs. 13.6%) respectively. Additionally, recurrent angina was also significant in the diabetic cases. In-hospital mortality was higher in the diabetic cases (7.1%) than the opposite group (5.7%) with a minor difference [12]. This study has few limitations due to small sample size and inadequate and irregular follow-up after discharge of the patient.

5. CONCLUSION

Diabetes Mellitus is a potential predictor for in-hospital adverse outcomes in patients with STEMI. This study reveals that overall prognosis was poor in the diabetic patients who presented with STEMI. The strict control of blood glucose in the diabetic patients with acute STEMI would be beneficial. Similarly, high blood glucose at admission has the same consequences. In diabetic patients, admission blood glucose level has a good predictive strength for in-hospital outcome.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The study got approval from the College of Physicians and Surgeons Pakistan (CPSP) (REU NO: 20550).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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