DOI: https://doi.org/10.53350/pjmhs2115123343

ORIGINAL ARTICLE

Impact of Diabetes Mellitus on in Hospital Adverse Outcomes after First Episode of Acute Coronary Syndrome: A Comparative Cohort Study

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ABSTRACT

Objective: To determine the impact of diabetes on adverse outcomes amongst patients presenting for the first time with acute coronary syndrome.

Study design: Cohort Study

Methodology: A total of 340 patients were enrolled in this study. At presentation patients were divided in two equal age and gender matched groups with 170 patients in Group-A having diabetes and another 170 being non-diabetics in Group-B. Patients were followed up for period of index hospitalization and all adverse outcomes were noted in both groups as per operational definition.

Results: Mean age in Group-A with diabetes was 54±12.7 years whereas in non diabetics it was56±13.12 years. In both groups there was male predominance with approximately 60% males and 40% females. In diabetic group, 38% patients had typical chest pain, 62% patients had dyspnea, 20% patients had cardiogenic shock while in non diabetic group, 20% patients had typical chest pain, 40% patients had dyspnea, 10% patients had cardiogenic shock. In diabetic group, 38% patients had heart failure, 10% patients died while in non diabetics 20% had heart failure and 5% patients died.

Conclusion: This study concluded that in hospital adverse outcomes after first episode of acute coronary syndrome were more frequent in diabetic patients as compare to non diabetic patients.

Keywords: Acute coronary syndrome, Adverse outcomes, First attack

INTRODUCTION

Acute coronary syndrome includes unstable angina, non-ST elevated myocardial infarction and ST-elevated myocardial infarction. This categorization is based mainly on clinical presentation, ECG changes and presence/absence of cardiac specific biomarkers, mainly Troponins.[1]During the past several decades, progressive decline has been observed in the rates of hospitalization for STEMI and its associated mortality. This can be attributed to many factors but at the same times there has been a relative increase in NSTEMI.[2,3] Study by Islam MN and his associates revealed that diabetic had more atypical chest pain, dyspnea, cardiogenic shock and heart failure as compared to non diabetics.[4] Hong-Pin Hsu Et al found in their study that there is a significant difference in patient mortality in patients with diabetes even at their first presentation.[5]Despite improvements in medical care and survival , ACS continues to have significant impact on mortality and morbidity; placing lot of burden on the entire health care system. This study is an attempt to determine the impact of diabetes on adverse outcomes amongst patients presenting for the first time with acute coronary syndrome.

Acute coronary syndrome: It was defined as if any three of following condition present

- Chest or other suggestive ischemic pain of typical characteristics lasting for more than 20 minutes without any alternative explanation, not relieved with rest or sublingual nitrates.
- Significant ST-segment elevation as defined by AHA criteria(>1 mm in limb leads & precordial leads except V1-2/3 where pre-defined criteria by AHA needs to be fulfilled (ECG changes need to be present in at least two contiguous leads)
- ST-segment depression of > 1mm magnitude (either horizontal or down-sloping) in precordial or limb leads, present in at least two contiguous leads
- Troponin T levels >0.1mg/dl by standard assays.

Diabetics: It was defined as per ADA criteria using any of the following criterion:

Fasting blood glucose: ≥ 126 mg/dl, HbA1C: ≥ 6.5%, Random blood glucose of ≥ 200mg/dl with symptoms of hyperglycemia, Patients already diagnosed will be confirmed from their medical record, including review of anti-diabetic treatment.

Received on 11-06-2021
Accepted on 17-11-2021

Presentations: It was in terms of…

Typical chest pain: It was defined as squeezing or pressure like sensation/pain (VAS score > 3) in the chest that is felt generally when patient does any strenuous activity.

Dyspnea: It was defined as patient with difficult and uncomfortable breathing.

Cardiogenic shock: It was defined as tissue hypo perfusion with persistent hypotension resulting from primary cardiac dysfunction in presence of adequate intravascular volume and LV filling pressures. Hemodynamically a systolic blood pressure of<90 mm Hg for ≥30 min or a drop of 30mmHgfrom patient's baseline or requiring support and a reduced cardiac index (<1.8 without support or <2-2.2 L/min/$m^2$with support) in the presence of normal or elevated pulmonary capillary wedge pressure (>18 mmHg measured non-invasively by echocardiography using Nagueh formula).

Adverse outcomes were measured in terms of heart failure(It was defined as any symptoms or signs of heart failure and/or LVEF < 40% on echocardiography during index hospitalization) and mortality (death within 7 days after admission).

MATERIAL AND METHODS

Study design: Cohort Study

Sample size: Sample size was calculated with 95% confidence interval with 5% margin of error. Estimated total sample size was n= 340 having equal sample size distribution of n= 170 each in Group-A with diabetes and Group-B without diabetes.

Sampling technique: Non-Probability Consecutive Sampling

Sample Selection: Patient aged 30-65 years irrespective of gender having acute coronary syndrome as per operational definition < 24 hours. Patients with diabetes as per operational definition were included in diabetic group or exposed group. Patients that were not having diabetes as per operational definition were included in non diabetic group or unexposed group.

Exclusion Criteria: Previous history of revascularization (PCI, CABG), Previous history of acute coronary syndrome on medical record, Serum creatinine>1.7mg/dl on laboratory test, refused to consent

Data Collection Procedure: Patients admitted in cardiology department with acute coronary syndrome as per operational definition were included in the study. Only those patients were enrolled who fulfilled the inclusion criteria. Once written and

informed consent was taken from the enrolled patients and/or guardians, their baseline demographic information (age, gender etc.) was then recorded. At the time of admission, a total number of 340 patients were divided into 2 equal groups with one being diabetic and other being a non diabetic group. Data regarding presentation of ACS (Atypical chest pain, dyspnea, cardiac shock) was noted as per operational definition. Patients were followed up and adverse outcome (Heart failure, mortality) was noted as per operational definition. All data was noted using a designed proforma.

Data Analysis: Statistical analysis program (IBM-SPSS V-22) was used for data analysis. Relative proportions of outcomes amongst these two groups were the basis for this analysis. All qualitative variables including age, gender, typical chest pain, dyspnea, cardiogenic shock, heart failure and mortality were analyzed for their frequency and percentage. Mean±SD was presented for quantitative variables. Stratification was done with regard to age, gender, duration of complaints, duration of diabetes and BMI to see the effect of these on adverse outcome Chi-square test was thenapplied to compare presentation and adverse outcome in both groups.A p-value of≤0.05 was taken as significant..

RESULTS

The results obtained after analysis of the data were as under:

Table. 01: Socio-demographics Profile

	Diabetics (n=170)	Non Diabetics (n=170)
Age in years (mean±SD) 30-40 years 41-50 years 51-65 years	54±12.77 20(12%) 55(32%) 95(56%)	56±13.12 26(15%) 56(33%) 88(52%)
Gender Male Female	 105(62%) 65(38%)	 102(60%) 68(40%)
BMI in kg/m^2 (mean±SD) ≤ 25 kg/m^2 >25 kg/m^2	25±4.12 51(30%) 119(70%)	26±3.04 54(32%) 116(68%)
Duration of symptoms	<24hs 94(55%) >24hrs 76(45%)	<24hrs 99(58%) >24hrs 71(58%)

DISCUSSION

Despite recent advances in prevention and treatment modalities, morbidity and mortality from cardiovascular diseases is continuously on the rise; probably due to the rise in prevalence of diabetes, increase distress and yet many other factors. Acute coronary syndrome (ACS) is a complex clinical entity in which plaque rupture with superimposed thrombus formation is the basic underlying pathophysiological mechanism in almost all sub-types.[5]

Table.2: Presentation and outcome.

	Diabetics (n=170)	Non-Diabetics (n=170)	P value
Presentation Chest pain Dyspnea Cardiogenic shock	 65(38%) 105(62%) 34(20%)	 34(20%) 68(40%) 17(10%)	 0.002 0.001 0.009
Outcome Heart failure Mortality	 65(38%) 17(10%)	 34(20%) 09(5%)	 0.0002 0.1025

In this study mean age was 54±12.77 years in group A while it was 56±13.12 years in group B. Gender distribution revealed that 62% were males & 38 % were females in group A while in group B had 60% males and 40% females. In Group A, 38% patients had typical chest pain, 62% had dyspnea and cardiogenicshock was present in 20 %. At the same time, in Group B (Non diabetic group), 20% patients had typical chest pain, 40% patients had dyspnea and 10% patients had cardiogenic shock. In Group A, 38% patients had heart failure, whereas 10% of patients died while in group-B, 20% patients had heart failure while 5% of patients died.

Study conducted by Islam MN[6] showed similar results which revealed that diabetic patients presented at a younger age with acute coronary syndrome (p=053). Diabetic patients were overweight with higher body mass index like in our study. Dyspnea was reported higher in diabetics (53.3 vs. 36.7%, p=0.0315) which was also the case in our study as well (62% vs 40% with a p-value of 0.0001). Typical chest pain (40% vs. 24.4%, p=0.03) was more in our study as was the prolonged symptom duration before presentation (31.1±42.5 hours vs. 19.44 ± 30.3 hours, p=0.04). Similarly, cardiogenic shock (17.33 vs. 6.7%, p=0.03) was also observed more frequently in diabetics.

Not only this but also, cardiac failure, recurrent ischemic symptoms and duration of indexed hospitalization, were all way more frequent amongst diabetics. Similarly, diabetics had a higher frequency of atypical symptoms and cardiac failure.

Butt UM et al[7]included 200 patients with a mean age of 54.6±9.5 years in their study which showed almost similar results. In another study,[8] there was an overall males predominance. Surprisingly in that study, cardiogenic shock was found equally in diabetics and non-diabetics whereas the frequency of left ventricular failure and mortality was significantly higher in diabetics ($p < 0.05$).Similar results were also observed in study conducted by Hong-Pin Hsu et al[9] in which inpatients mortality after admission was more in diabetics (23.4%) as compare to non-diabetics (7.6%) in patients with acute coronary syndrome.

CONCLUSION

This study concludes that the adverse outcomes after first episode of acute coronary syndrome were more frequent in diabetic patients as compared to non diabetics.

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