

IMPACT OF DIABETES ON EARLY COMPLICATIONS IN ACUTE CORONARY SYNDROME PATIENTS

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Contribution

MA conceived idea, designed study and drafted final manuscript. UMB, ZA helped with data acquisition and critically reviewed. MAQ helped with statistical analysis. All authors contributed significantly to the submitted manuscript.

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ABSTRACT

Objective: To compare in-hospital complications among diabetics and non-diabetics presenting with acute coronary syndrome.

Methodology: This cross-sectional survey was conducted at Department of Cardiology, Jinnah Hospital, Lahore from January 2014 to July 2014. Patients with ACS were enrolled in the study through, non probability, purposive sampling technique. Patients were followed over the period of their hospital stay. ACS included unstable angina, ST elevation and non ST elevation myocardial infarction while in-hospital complications included left ventricular failure, cardiogenic shock and death. The frequency of diabetes in patients with ACS was determined and complications were compared in diabetics and non-diabetics. Chi-square test was used for analysis. $P < 0.05$ was considered statistically significant.

Results: A total of 200 patients with mean age of 54.6 ± 9.5 years were included. Of them 146 (73%) were males. Diabetic patients were 97 (48.5%), 32 (16%) patients developed left ventricular failure, 16 (8%) patients developed cardiogenic shock, 18 (9%) patients died during the stay in the hospital among the sampled population. Cardiogenic shock was found equally in diabetics and non-diabetics while frequency of left ventricular failure and mortality was significantly higher in diabetics ($p < 0.05$).

Conclusion: Development of left ventricular failure and mortality is higher in diabetic patients but development of cardiogenic shock is equally distributed among diabetic and non-diabetics presenting with acute coronary syndrome.

Key Words: Non ST Elevation Myocardial Infarction, ST Elevation Myocardial Infarction, Acute Coronary Syndrome, Diabetes

INTRODUCTION

Cardiovascular disease (CVD) continues to be the greatest epidemic in human history. It is the leading cause of mortality accounting for about 30% of the total deaths worldwide.¹ Major risk factors for the development of CVD are age, male gender, obesity, smoking, diabetes mellitus (DM), high serum levels of total cholesterol, low-density lipoproteins (LDL) and triglycerides, low serum levels of high density lipoproteins (HDL).² Among these DM is a very strong risk factor for development of coronary artery disease (CAD). Diabetics have a two to fourfold increase in the risk of CAD.³ Generally women experience relative protection from myocardial infarction and usually develop CAD approximately 10 years later than men. But diabetes blunts the cardiovascular benefit of female gender. Certain inflammatory markers which are raised in diabetic patients are also associated with an increased cardiovascular risk in type II diabetics.⁴ In a study in patients with acute coronary syndrome (ACS) with or without DM, had the diagnosis of ST elevation myocardial infarction (STEMI) (51%), non ST elevation myocardial infarction (NSTEMI) (6%) or unstable angina (UA) (43%). Prevalence of type 2 diabetes was 31.5% in the overall population; in particular, a higher prevalence was found among STEMI affected patients (37% of the diabetic patients). The average number of days of in-hospital stay was of 10.4 ± 3.1 for diabetic patients without complications ($n=602$) and of 15.9 ± 4.4 for diabetic patients with clinical complications ($n=421$) as compared with non-diabetic patients non complicated ($n=1821$) or complicated ($n=398$), with an average in-hospital stay of 7.4 ± 1 and 12.8 ± 3.2 days respectively.⁷ The study concluded that diabetic patients with ACS had more clinical complications (41.1% vs. 17.9%, $p=0.0001$) and a longer in-hospital stay period, resulting in an increased management costs, in comparison with non-diabetic patients.⁵

Diabetes not only a potent risk for the development of CAD it is also associated with high mortality and morbidity after cardiovascular events.⁶ For risk stratification after ACS, DM is one of the strongest factor that is associated with a high rate of cardiovascular complications.⁴ In diabetics and even among non-diabetics, elevated glucose levels at presentation predict higher mortality after acute myocardial infarction (AMI).^{6,7} In a study done by Nijjar AP et al, showed that diabetic patients with ACS had more cardiogenic shock (2.5% vs 1.6%) in comparison to non-diabetic patients in South Asian population.⁸ Studies have supported the fact that in patients with diabetes, acute and long-term adverse cardiovascular events increase substantially.³ During the last decade, clinical studies have tried to explore the clinical course and the risk of unfavorable outcomes of DM in setting of MI. Most of this work represents studies in the Western population. There are scarce studies in our population on the

impact of DM on in-hospital complications in patients with ACS. Genetic and racial factors contribute significantly how the metabolic and lipid abnormalities behave. So the excess risk conferred by DM varies on ethnic origin as well. Much needs to be done in our part of the world, as our population is different from the Western world. In a recent study done in one of the Asian population in-hospital mortality was 23.4% in diabetic and 7.6% in non-diabetic patients.⁹ In a study done by FerrerHita et al, on influence of DM on the management and prognosis of NSTEMI found that, heart failure during admission among diabetic was 16 (17%) as compared to non-diabetic 13 (7%) ($p < .001$).¹⁰ Another study showed that diabetic patients with STEMI had more cardiogenic shock (17.1% vs 9.8%) and LVF (34.2% vs 17.1%) in comparison to non-diabetics.¹¹

The aim of this study is to compare in-hospital complications among diabetics and non-diabetics presenting with acute coronary syndrome.

METHODOLOGY

This cross-sectional study was conducted from 1st January 2014 to 31st July 2014. Patients admitted via emergency department, fulfilling the inclusion criteria were studied at the Department of Cardiology, Allama Iqbal Medical College, Jinnah Hospital Lahore, after obtaining informed consent. A performa was filled for each patient designed to mention the patients' demographics (name, age, gender, and admission number), presence of DM, STEMI, NSTEMI and Unstable Angina. Patients were followed over the period of their hospital stay. Hospital complications including left ventricular failure, cardiogenic shock and Mortality during the hospital stay was recorded in diabetics and non-diabetics. Data analysis was done on software SPSS version 17.0. Numerical variables like age and duration of symptoms were presented by mean and standard deviation. Categorical Variables like gender and presence or absence of DM; In-hospital complications (Left ventricular failure, cardiogenic shock and Mortality) were presented as frequency and percentage. The complications were compared among diabetics and non-diabetics. Chi-square test was used to assess the difference in complication between two groups. A P value of < 0.05 was considered statistically significant.

RESULTS

A total of 200 patients with ACS were enrolled with a mean age of 54.6 ± 9.5 years ranging from 14 to 75 years. About 146 (73%) were males. Diabetics were 97 (48.5%) while 103 (51.9%) were non-diabetic patients. Among all, 32 (16%) patients developed left ventricular failure and 16 (8%) patients developed cardiogenic shock while 18 (9%) patients died during the stay in the hospital among the sampled population (Table 1).

Table 1: Demographic Characteristics and Hospital Complications in ACS Patients

Characters	Number n (%)
Age (years) mean \pm SD	54.6 \pm 9.5
Gender	
Male	146 (73%)
Female	54 (27%)
Diabetics	97 (48.5%)
Non-Diabetics	103 (51.9%)
LVF	32 (16%)
Cardiogenic Shock	16 (8%)
Mortality	18 (9%)

Diabetes was significantly associated with the development of left ventricular failure in our sampled population ($p=0.02$). Diabetes had no association with presence of cardiogenic shock in our sampled population. But it was significantly associated with mortality i.e. diabetics are more prone to death presenting with acute coronary syndrome ($p=0.009$) as shown in Table 2.

DISCUSSION

Diabetes is quite common in patients presenting with acute coronary syndrome. Mean age of the included patients was 55 years ranging from 40 to 75 years. In developed nations the mean age for presentation with acute coronary syndrome is above 60 years. So, preventive strategies are needed in the field to reduce the complications of ACS.

In our study half of the patients with ACS were Diabetics, it's quite alarming that the projected prevalence of diabetes is in general population is from 9 to 12% but in ACS patients 48.5% were diabetic. Similarly, Khalid et al, in a survey conducted on patients enrolled in the Saudi Project for Assessment of Acute Coronary Syndrome (SPACE), concluded that 57.9% of acute coronary syndrome patients were diabetics.¹² The Gulf Registry of Acute Coronary Events (Gulf RACE) has identified a prevalence of approximately 40%.¹³ But in European study as compared to our study, as 20-30% of European coronary syndrome patients had diabetes and 35% were diagnosed as prediabetes.¹⁴⁻¹⁵ An Egyptian study found that 24.5% of patients with acute coronary syndrome were diabetics.¹⁶

We have revealed that diabetic patients with ACS have several exceptional features compared with non-diabetic patients. A 16% patients developed LVF while 8% patients

Table 2: Diabetes and in Hospital Complications in ACS Patients

Variables	Total n	Diabetic n	Non-Diabetic n	P-value
Male	146	59	87	<0.001
Female	54	38	16	
LVF	32	24	08	0.02
Cardiogenic Shock	16	9	7	0.51
Mortality	18	14	4	0.009

developed cardiogenic shock. Mortality is still quite high despite all the advancement in the coronary interventions and early treatment regimens 9% of the patients died. Diabetes was more predominant in female population as compare to male in our study. This may be secondary to increased BMI associated with pregnancy and sedentary life style with lesser outdoor activities. This was similar to a study conducted in Saudi Arabia by Khalid M. et al.¹²

Development of left ventricular failure and mortality was higher in diabetics than non-diabetics patients with ACS. These findings are in conjunction with Indian ACS registry.¹⁷ A study conducted by Pitsavos C et al, showed higher rates of LVF and mortality in ACS patients with diabetes mellitus and may reflect the diffuse nature of coronary atherosclerosis in diabetic patients and a higher burden of ischemia.¹⁸ These findings are in accordance with the findings of the Global Registry of Acute Coronary Events (GRACE) as well as the Greek study of ACS(GREECS).^{19,20}

However in our study cardiogenic shock was non-significantly associated with presence of diabetes in contrary to other studies. This may be due to limited sample size. However study by Nijjar AP et al showed that diabetic patients with ACS had more cardiogenic shock in comparison to non-diabetic patients in South Asian population.⁸

The overall significant relationship between diabetes mellitus and hospital complications in acute coronary syndrome patients as revealed by our study as well other research work demands much larger studies for the assessment the actual scale of this problem as diabetes is quite prevalent in our part of the world so that we could make standardized strategies to overcome this problem.

CONCLUSION

Diabetes Mellitus is associated with increased risk of ACS complications like LVF and mortality however cardiogenic shock was not significant.

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