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## INTRODUCTION

Patients with Diabetes mellitus (DM) generally shows a higher risk for the development of cardiovascular related diseases including myocardial infarction and stroke when comparing it with normal health individuals.<sup>1</sup> DM plays an important role in the pathogenesis of coronary artery disease (CAD) by promoting the process of atherosclerosis<sup>2</sup> thus patients with DM comparatively at higher risk of cardiovascular events such as myocardial infarction as compare with non-diabetics therefore, increasing the morbidity and mortality rates among diabetics.<sup>3</sup>

With the advancement in the treatment strategies such as after the introduction of reperfusion therapy, the overall rates of hospitalization and related complications are greatly reduced.<sup>4</sup> Diabetes mellitus accelerates the natural course of atherosclerosis involve greater number of coronary vessels with more diffuse atherosclerotic lesion.<sup>5</sup> Coronary angiography has shown abnormal

# ACUTE MYOCARDIAL INFARCTION; A COMPARATIVE STUDY TO ASSESS THE ANGIOGRAPHIC CHANGES IN DIABETIC AND NON DIABETIC PATIENTS

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**ABSTRACT... Objective:** To compare the angiographic findings in patients with acute myocardial infarction (AMI) and compare it with diabetic and non-diabetic patients admitted in the cardiology department of LUHMS. **Study Design:** Descriptive analytical study. **Setting:** Department of cardiology at Liaquat University of Medical and Health Sciences (LUMHS) Hospital, Hyderabad. **Period:** Periods of 1<sup>st</sup> June 2012 to 31<sup>st</sup> July 2013. **Patients & methods:** All patients with AMI and had diabetes mellitus and age eighteen or more than eighteen years both male and female were included after taking informed consent. **Results:** Out of 297 patients diagnosed as AMI, 195 (65.65%) patients had acute ST elevation Myocardial Infarction and 102 (34.35%) patients had acute non ST elevation myocardial infarction. Among 297 patients, 190 (64%) patients were non-diabetic and 107 (36%) patients were diabetic. Diabetic patients were older, more often males, but prevalence of smoking was less marked. Coronary angiographic findings among patients with AMI and diabetics revealed three vessels disease. **Conclusion:** Older patients with male predominance presented with AMI and had diabetes mellitus were found to have three vessels disease in coronary angiography.

**Key words:** Acute myocardial infarction, Diabetes, Angiography, Three vessels disease.

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coronary arteries ( $\geq 50\%$  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.<sup>6</sup>

This study was aimed to assess the comparison of angiographic changes in patients with acute myocardial infarction admitted in Cardiology Department of LUHMS and compare its association with diabetics and non-diabetics.

## PATIENTS AND METHODS

A cross sectional study between the periods of 30<sup>th</sup> June 2012 to 31<sup>st</sup> July was conducted at Liaquat University of Medical & Health Sciences Hospital (LUMHS), section of Cardiology, Hyderabad by consecutively included the patients with acute myocardial infarction (AMI) after their admission into coronary care unit (CCU) of both sexes and age  $\geq 18$  years. All study protocols and relevant

information were delivered to patients regarding this study after that we took consent from them. This study was approved by ethical committee.

On arrival, the diagnosis of AMI was made with 12 lead ECG. Initial management of AMI were commenced in the CCU then after recovery from acute condition they were shifted to cardiology ward. Diagnosis of diabetes mellitus was made if patient already taking anti-diabetic medications or the patient had fasting blood sugar  $\geq 126$ mg/dl or random  $\geq 200$ mg/dl on two different readings.

### CORONARY ANGIOGRAPHIC DATA

Among hospitalized patients with AMI, the procedure was performed on average 3rd day after admission. Before coronary angiography, informed consent was taken from the patient and his/her family members after explaining about all the risks and complications of the procedure. All the cases were performed on General Electrical (GE) (Innova 2000 U.S.A) through the femoral artery (unless patient has severe peripheral vascular disease (PVD) or aortic dissection, in such cases the radial or subclavian artery was used). During the procedure ECG and pressure tracings were constantly monitored.

Two interventional cardiologists, blinded to all patient data, visually assessed the coronary angiography. Coronary artery lesions were categorized as severe lesion when the occlusion  $\geq 50\%$  for left main coronary artery and  $\geq 70\%$  for all other vessels. In addition, lesions  $< 50\%$  were also analyzed and divided as follows: Plaques up to 10%, 11-30% and 31-50%. These changes were considered only if at least two-thirds of the length of the studied vessel was involved. Lesions  $\geq 70\%$  was classified by consensus of two interventionists, according to the classification described by the American Heart Association / American College of Cardiology.<sup>7,8</sup>

### STATISTICAL ANALYSIS

We used statistical package for social sciences (SPSS) version 16 for data entry and analysis. Continuous variable such as age was calculated for mean  $\pm$  SD. Quantitative variables such as

gender, presence or absence of DM. underlying risk factors were calculated for frequency and percentage and Chi-square test was performed for comparison between them. Differences were considered statistically significant at  $p < 0.05$ .

### RESULTS

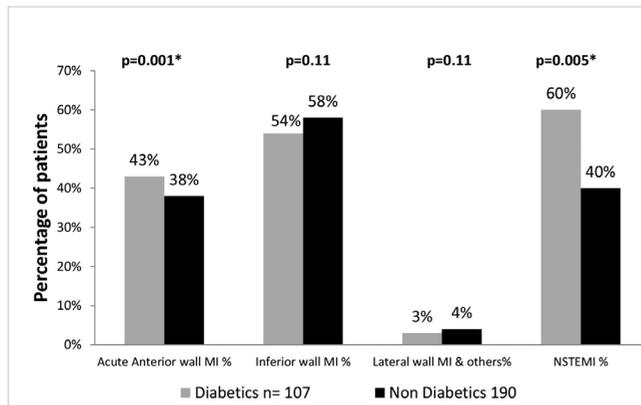
Out of total 297 patients, great proportion of study population were non-diabetic ( $n=190$ ) as compare to diabetics ( $n=107$ ). The mean age of the patients with diabetes ( $61.0 \pm 10.6$ ) was significantly differing from patients with non-diabetics, ( $58.1 \pm 11.14$ ) years,  $p$ -value 0.001. Male predominance with current smokers were observed significantly in our conducted study ( $p$ -value 0.049 and  $< 0.001$ , respectively). Rest of the basic study profile shown in **Table-I**.

Variables	Diabetics (n=107)	Non Diabetics (n=190)	P Value
Age (years)	61.0 $\pm$ 10.6	58.1 $\pm$ 11.4	0.001*
Male	67 (63%)	150 (79%)	0.049*
Female	40 (37%)	40 (21%)	$< 0.001$ *
Hypertensive	91 (85%)	154 (81%)	0.5
Current smoking status	20.3 (19%)	66.3 (35%)	$< 0.001$ *
Family history of CAD	42.9 (40%)	87 (46%)	$< 0.5$
Previous AMI	28.9 (27%)	40 (21%)	0.11
Previous PTCA	3.53 (3.3%)	6.5 (3.4%)	0.5
Previous CABG	3.53 (3.3%)	4 (2.1%)	0.11
Dyslipidaemia	43.9 (41%)	71.2 (37.5%)	0.06
Sedentary life	39.6 (37%)	68.59 (36.9%)	0.5

**Table-I. Base line characteristics**

\* $P$ -value  $< 0.05$  is significant  
 CAD = Coronary artery disease, AMI = Acute myocardial infarction,  
 PTCA = Percutaneous transluminal coronary angioplasty,  
 CABG = Coronary artery bypass grafting

195 (65.65%) patients had acute ST elevation Myocardial Infarction and 102 (34.35%) patients had acute non ST elevation Myocardial Infarction. A significant number of patients with diabetes mellitus had acute anterior wall MI 43% ( $p$ -value  $< 0.001$ ) and NSTEMI 60% ( $p$ -value 0.005), respectively. **Figure 1**.

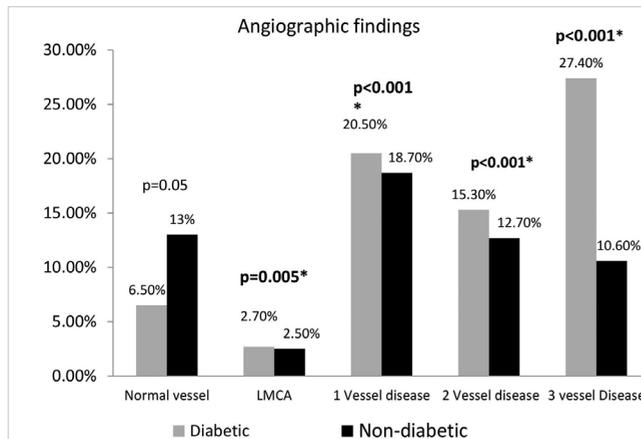


**Figure-1. Type of AMI in diabetic vs. non-diabetic**

\*P-value <0.05 is significant

AMI = Acute myocardial infarction, NSTEMI = non-ST elevation myocardial infarction

Coronary angiography was normal in 7 (6.5%) diabetic and 24.7 (13%), in non-diabetic, (p <0.05). LMCA was 2.7% in Diabetic and 2.5% in Non-diabetic. One vessel disease was 21.94 (20.5%) in Diabetic patient 35.53 (18.7%) in non-diabetic patient. Two vessel disease were 16.38 (15.3%) in Diabetic patient and 24.13 (12.7%) in non-diabetic patient. Severe three-vessel disease was significantly more frequent in Diabetic patients 29.43 (27.5%) than non-Diabetics 19.95 (10.5%) p<0.001 (Figure 2).



**Figure-2. Comparison of angiographic changes among diabetics and non-diabetics**

\*P-value <0.05 is significant LMCA = Left main circumflex artery

According to atherosclerotic lesions, morphology type “A” lesion was 12.7% in Diabetic and 7.9% in

Non-diabetic. Type “B1” lesion was seen in 53.7% of Diabetics and 46.1% in Non-diabetics. Type “B2” lesion was seen in 51.5.7% of Diabetics and 42.1% in Non-diabetics. Type “C” lesion was seen in 48.5% of Diabetics and 49.3% in Non-diabetics (Table-II).

Type of lesion	Diabetics	Non Diabetics	P Value
A	12.7	7.9	NS
B1	53.7	46.1	NS
B2	51.5.7	42.1	NS
C	48.5	49.3	NS

**Table-II. Morphology of atherosclerotic lesion, by angiography, according to aha in both groups**

NS = Not significant

### DISCUSSIONS

In present study we observed a strong independent association between Diabetes Mellitus and development of atherosclerotic coronary artery disease, Current results shows that Diabetic patients who had acute myocardial infarction undergoing coronary angiography, is associated with multivessel disease. The findings of this study are well supported by the study conducted by Sean M. Donahoe, et al. 2007. In their study authors observed patients with acute coronary syndrome (ACS) for nine years in which they have included more than 62,000 patients among them around 46,000 were of ST-segment elevation Myocardial Infarction (STEMI) and nearly 15,000 were of unstable angina/non-STEMI (UA/NSTEMI), the prevalence of diabetes mellitus were observed with relatively a quite high percentage (17.1%) and there were significant association observed when data compared in relation to angiographic evidence of multivessel coronary artery disease with diabetics and non-diabetics<sup>9</sup> presented with UA/NSTEMI (65.9% vs. 50.8%, P=.001) or STEMI (56.5% vs. 45.4%, P=.001).<sup>9</sup>

Natali A. and his colleagues had investigated angiographic and follow-up data of 2253 consecutive patients undergoing coronary angiography over the decade and found a higher prevalence of three vessel disease among patients with diabetes as compare to non-diabetics (36 vs.

17%,  $p < 0.001$ ).<sup>10</sup>

A recent data from study conducted by Khashayar P et al. 2010 evaluated the association between the presence of diabetes mellitus and the findings of coronary angiography in patients of acute coronary syndromes has shown that, patients with diabetes had a significantly greater number of diseased vessels with diffuse aspect of coronary artery disease compared with non-diabetics.<sup>11</sup>

G.D. Fallow and Jaipaul Sing conducted a study in which they compared angiographically determined cardiovascular disease in 79 patients with diabetes mellitus and an equal number of matched controls without diabetes under the age of 55 years. Diabetic patients have more extensive coronary artery disease than non-diabetic patients and a poorer prognosis.<sup>12</sup>

Abdel-Rauf Zeina, Majed Odeh, et al. conducted a study on 328 individuals with only inclusion of patients having at least one risk factor of coronary artery disease or stress-test suggestive of underlying coronary artery disease, among them 42 were had diabetes mellitus and rest of them were non-diabetics. Multivessel lesions were more significantly observed in patients with diabetes mellitus than patients without having diabetic mellitus (29 vs. 6.6%, respectively;  $P < 0.001$ ).<sup>13</sup>

With regard to risk factors, in our study there is no difference in the prevalence of hypertension, dyslipidaemia, sedentary lifestyle, as well as history of AMI, and PTCA or CABG in diabetics and non-Diabetics. But above said data differ from previously published data that shows hypertension and dyslipidaemia are more common in diabetic patients.<sup>14</sup>

In this study there was no significant difference in the history of previous Myocardial Infarction between two groups. Patients were older with more multivessel coronary artery disease. However, findings of our study are also different from those observed by angiography performed in diabetic and non-diabetic patients in a previously conducted study.<sup>15</sup>

Diabetes mellitus with acute AMI carries a poor prognosis and remained an independent determinant of poor prognosis even after correction for clinical and angiographic variables. Number of vessels affected is also one of the major risk factors responsible for poor prognosis in Diabetic patients who have acute Myocardial Infarctions.

## CONCLUSIONS

Diabetic patients were older and mainly comprises of male participants. Insignificant difference observed in patients with diabetes and non-diabetics in the prevalence of hypertension, Previous AMI, Previous CABG, Previous PTCA, sedentary lifestyle, and dyslipidaemia. Three-vessels disease was significantly more frequent in diabetics 27.4% than non-Diabetics 10.6% ( $p$ -value  $< 0.001$ ).

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### PREVIOUS RELATED STUDY

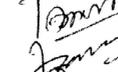
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