# FREQUENCY OF DIABETES IN NON ST ELEVATION MYOCARDIAL INFARCTION

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## ABSTRACT

***Objective:*** To determine the frequency of diabetes mellitus in non ST segment elevation myocardial infarction.
***Study Design***: Cross-sectional.
***Place and Duration of Study:*** The study was carried out at the Armed Forces Institute of Cardiology (AFIC) Rawalpindi, from Apr 2010 to Oct 2010.
***Material and Methods:*** In this study three hundred fifty two patients with non ST elevation myocardial infarction (NSTEMI) who fulfilled the inclusion criteria were studied while they were admitted to the hospital. They were divided into diabetic and non diabetic groups. Frequency of age, gender, rising levels of cardiac biochemical markers, plasma glucose and HbA1c were seen in both diabetic and non diabetic patients. Results were obtained by using chi-square method and independent t-test.
***Results:*** Out of 352 patients of NSTEMI 193 were diabetics. The study population was categorized in three groups according to age as; 30-45, 46-60, and 61-75 years respectively. It was found that 46-60 years group was most frequently affected with frequency of 46.1%, $p<0.001$ with male predominance as 67.9% and females as 32.1%. Cardiac biochemical markers were raised with mean for CK 528.51 U / L SD ± 275.82 and CK MB 79.39 U / L SD ± 32.5, $p<0.001$ respectively. Raised fasting plasma glucose was found in 189 patients mean 8.74 mmol / L SD ± 1.52, $p<0.001$ and elevated HbA1c seen in 187 patients mean 7.94% SD ± 0.83, $p<0.001$.
***Conclusion:*** Despite modern therapies for unstable angina (UA) / NSTEMI diabetes is an independent cardiovascular risk factor, therefore we need aggressive strategies to manage the high risk group of patients.

**Keywords:** Diabetes mellitus, Frequency, Non ST segment elevation myocardial infarction.



## INTRODUCTION

Diabetes mellitus accounts for about 25 percent of patients with acute myocardial infarction and global rates are estimated to double in the next two decades[1]. It is considered to be an important independent predictor for the adverse outcomes among patients with unstable angina or non ST segment elevation myocardial infarction.

According to the worldwide Interheart study of patients from 52 countries, diabetes constitutes, about 10 percent of the population with increased risk for first episode of myocardial infarction[2]. According to the Framingham Heart Study presence of diabetes doubled the risk for cardiovascular disease in men and tripled in women. Multiple risk factor intervention trial (MRFIT) considered diabetes as a major independent cardiovascular risk factor. According to American College of Cardiology / American Heart Association (ACC / AHA) guidelines diabetes is associated with intermediate likelihood of Acute Coronary syndrome (ACS) in association with other risk factors as age >70 years, male gender, known peripheral arterial disease and cerebrovascular disease, and old ECG abnormalities[3]. Patients with diabetes mellitus are at more risk of developing adverse outcomes secondary to myocardial infarction[4]. It has been suggested that South Asian population is prone to develop cardiovascular complication at younger age group. The increased number of cardiovascular complications highlights the importance of aggressive strategies to manage the high risk population with unstable ischemic heart disease[5]. According to the international statistics, mortality

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was significantly higher among patients with diabetes mellitus as compared to patients without diabetes mellitus presenting with unstable angina or non ST segment elevation myocardial infarction (2.1%, $p<0.001$)[5].

Despite the gratifying success of medical therapy, several observations indicate considerable room for improvement particularly in relation with diabetes[6].

Patients with documented UA/NSTEMI exhibit a high risk of early (30 days) death, ranging from 1 to 10%, and of new or recurrent infarction of 3 to 10%[7].

On coronary angiography, patients with diabetes and UA have a greater proportion of ulcerated plaques (94% vs. 60%, $p=0.01$) and intracoronary thrombi (94% vs. 55%, $p=0.004$) than in nondiabetics[8].

"Global risk" can be accomplished by clinical risk scoring systems such as thrombolysis in Myocardial Infarction (TIMI) trials, which includes seven independent risk factors as age >65 years, three or more risk factors for coronary artery disease (CAD) including diabetes mellitus, and others[9].

## MATERIAL AND METHODS

This was a cross-sectional study carried out at Armed Forces Institute of Cardiology, Rawalpindi from Apr 2010 to Sep 2010. Three hundred and fifty two indoor patients, 30-75 years of age of either gender were sequentially enrolled by convenient non-probability sampling. Three age groups were categorized as 30-45 years, 46-60 years, 61-75 years. All were diagnosed cases of non insulin dependent diabetes mellitus type 2 either on oral hypoglycemic, or insulin therapy or both. Individuals who presented to emergency room or admitted to coronary care units at AFIC/NIHD Rwp with history of typical chest pain i.e. occurs at rest or with minimal exertion and lasts for >10mins along with ECG changes as ST segment depression of 0.5mv or more and T wave inversion of 0.3mv or raised cardiac biochemical markers as CK >190 U/L and CK MB >24 U/L, with raised fasting plasma glucose (FPG) >7.0mmol/L, random plasma glucose (RPG) >11.1mmol/L (analyzed by glucokinase method at AFIP, Rwp), and HbA1c >7.0% were included. Patients who fulfilled the diagnostic criteria of ST segment elevation MI were excluded.

Proformas including hospital registration number, demographic profile as name, age, gender and diagnostic profile were entered simultaneously.

The numeric data were analyzed by using statistical package for social sciences (SPSS) Version 10.0 and *p*-values were obtained. Independent t-test applied for quantitative variables i.e. fasting, random plasma glucose, serum CK & CK MB. Chi square test was applied for qualitative variable i.e. HbA1c. A *p*-value <0.05 was considered to be significant. Frequency was calculated for age and gender.

**Table: Description of age and gender in diabetic and non-diabetic patients.**

| Age in years / Gender | Diabetics (n=193) | Non diabetics (n=159) |
|---|---|---|
| 30–45 | 21 (10.9%) | 33 (20.8%) |
| 46–60 | 89 (46.1%) | 94 (59.1%) |
| 61–75 | 83 (43%) | 32 (20.1%) |
| Male | 131 (67.9%) | 136 (85.5%) |
| Female | 62 (32.1%) | 23 (14.5%) |

$p<0.001$

## RESULTS

A total of 352 patients of NSTEMI met our inclusion criteria and were studied at AFIC/NIHD Rawalpindi from Apr 2010 to Sep 2010. Out of them 193 were diabetics, with 131 males and 62 females. The remaining 159 patients were non diabetics including 136 males and 23 females.

The mean study population was categorized in three groups according to age, i.e. 30-45 years, 46-60 years and 61-75 years (table). Predominant category of diabetic patients was 46-60 years (46.1%), followed by 61-75 years (43%) and 35-45 years (10%) $p<0.001$. However the frequency of non diabetics were 46-60 years (59.1%), 30-45 years (20.8%), 61-75 years (21.1%) $p<0.001$ respectively. Age and gender distribution is mentioned in table and fig 1 & 2.

It was noticed that the age group between 46-60 years were most commonly affected in both diabetic and non diabetic patients. However age groups with 61-75 years and 30-45 years were affected in diabetics and age groups with 30-45 years and 61-75 years were affected descending order of frequency. In our study there were more males 131 (67.9%) as compared to females 62 (32.1%) in diabetics. In non diabetics there were 136 males (85.5%) and 23 females (14.5%). This is interestingly in contrary to what we have noticed in different studies worldwide.

Serum CK, CK MB, FPG, RPG and HbA1c were raised in all of diabetic patients with mean for each variable in diabetic is 528.51 U/L SD ± 275.82, 79.39 U/L SD ± 32.51, 8.74 U/L SD ± 1.5, 12.79 U/L SD ± 1.95, 7.94 U/L SD ± 0.83. Mean for each variable as mentioned above in non diabetic is 372.75 U/L SD ± 200, 64.99 U/L SD ± 31.54, 5.95 U/L SD ± 1.48, 10.18 U/L SD ± 1.65, 8.02 U/L SD ± 1.06. $p<0.001$ for all except HbA1c is 0.79.

## DISCUSSION

The prevalence of ischemic heart disease among diabetic patients is rising tremendously for last two decades that it is currently defined as cardiovascular disease equivalent[10]. South East Asians are prone to develop common metabolic abnormalities.

In the current study the primary end point was to evaluate the frequency of diabetes mellitus type 2 in non ST elevation myocardial infarction. The results of our study enumerate the previous literature several ways and confirmed the higher prevalence of diabetes in NSTEMI.

Women who once develop an acute myocardial infarction have a higher mortality than men. A high prevalence of anxiety depressive disorders is seen among diabetic women[11]. Despite the intense research focus on MI in women in the past 10 to 15 years, the vulnerability of women toward adverse

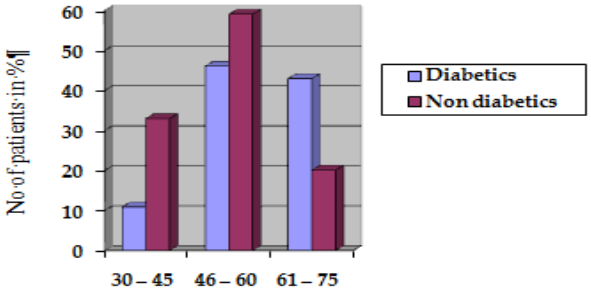


**Figure-1: Description of age in diabetic and non-diabetic patients.**

outcomes after MI remains only partially explained by age, CHD risk factors, and clinical characteristics.

Raised cardiac biochemical markers including CK & CK MB are of utmost importance as it signifies the amount of myocardial necrosis and have a direct impact on mortality of patients[12]. In UA/NSTEMI, a different pattern of presenting biomarkers were noticed as men were

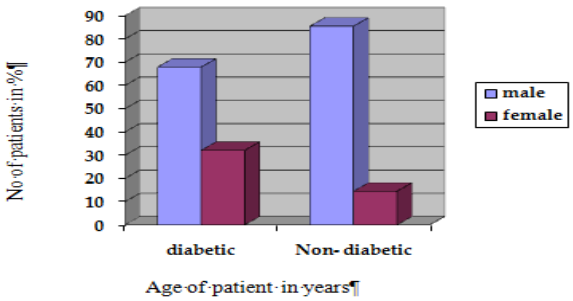


**Figure-2: Description of gender in diabetic and non-diabetic patients.**

more likely to have elevated CK-MB and troponins, whereas women were more likely to have elevated C-reactive protein and brain natriuretic peptide[12].

Similarly, raised fasting and random blood sugar revealed increased short and long term mortality across the spectrum of acute coronary

syndromes[13]. Another study conducted regarding antithrombotic therapy in patients with coronary artery disease with type 2 diabetes mellitus showed prasugral as highest efficacious oral anti platelet agent[14].

Our last variable was HbA1c which found to be elevated in 177 out of 193 patients with a direct impact on long term complications. According to American Diabetic Association, persistent elevation in HbA1c increases the risk for long term macrovascular complications of diabetes such as coronary heart disease, cerebrovascular accidents, heart failure & microvascular complications as nephropathy, retinopathy, neuropathy, gangrene and gastroparesis[15].

A study conducted in Spain showed higher mortality up to 12.8% in diabetic patients as compared to 6.3% in non diabetics. Other investigations reported that stress hyperglycemia was associated with an increased risk of mortality in diabetic patients who had myocardial infarction[16]. Moreover, persistent hyperglycemia can determine more accurate prognosis in acute coronary syndrome than admission glycemia[17].

Globally increasing burden of cardiovascular diseases accounts for about two third of all deaths. We as a nation must realize to establish more emergency and preventive cardiac centers especially near rural vicinities to provide optimal care to poor and deserving patients.

## CONCLUSION

Despite modern therapies for UA/NSTEMI diabetes is an independent cardiovascular risk factor, therefore we need aggressive strategies to manage the high risk group of patients.

## CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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