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Original Research Article

Association of diabetes mellitus and acute myocardial infarction: a study in a semi urban centre

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ABSTRACT

Background: Acute myocardial infarction is one of the very common ailments, that quite often ends in mortality. The risk factors for AMI has been identified as smoking, alcoholism, high cholesterol, obesity, left ventricular hypertrophy, high triglyceride levels and diabetes mellitus. This study was done to evaluate diabetes as a risk factor for the incidence of acute myocardial infarction in our area.
Methods: Demographic details such as age, sex, height, weight, BMI, blood pressure, details of alcoholism or smoking were taken. Physical examination was conducted for all the patients. Previous clinical and medical history was taken for all the patients. The predictors for calculation of 10 years risk factor for SCORE were age, sex, smoking, cholesterol and triglyceride levels and blood pressure.
Results: The mean age of the males was 66.1±2.7 and women was 68.8±4.9. 27.3% of the males and 29.4% of the females were obese while 34.6% of males and 32.4% of females were overweight. The mean random blood sugar among the diabetic patients was around 143.5 mg/dL, and in the non-diabetics it was 84.4mg/dL. Out of the 48 diabetic patients, 32 of them (66.7%) had a previous history of MI while in non-diabetes, 53.7% had a previous MI attack.
Conclusions: It is essential for the early detection of diabetes and control of the sugar levels, so as to reduce the risk of cardiovascular ailments, since diabetes is one of the independent risk factors.

Keywords: Association, Diabetes mellitus, Myocardial infarction

INTRODUCTION

Acute myocardial infarction is one of the very common ailments, that quite often ends in mortality. It was reported by WHO in 2006 that around 7.2 million people died of ischemic heart disease, with most of them due to acute myocardial infarction.[1,2] Since MI may occur in prime life, it causes a heavy burden to the person as well as his / her family.

The risk factors for AMI has been identified as smoking, alcoholism, high cholesterol, obesity, left ventricular hypertrophy, high triglyceride levels and diabetes mellitus. Diabetes mellitus was first reported to be a risk factor for a first myocardial infarction in 1998. Since then, it was identified that the risk factor of MI in people with type 2 diabetes was as high as MI in people with a prior MI.[3] It is estimated that persons with diabetes are 2 to 4 folds at risk to AMI than non-diabetic persons. Some authors have reported hyperglycemia to be a metabolic consequence of severe MI, rather than a cause and it is well known that insulin therapy to reduce the blood glucose levels improve the prognosis of MI in patients with diabetes.[4-7] However, in spite of all this, diabetes still doubles the patient fatality rate. Mortality in AMI in

diabetic patients has been reported to be 40%, which was double than the non-diabetic patients.[8]

This study was done to evaluate diabetes as a risk factor for the incidence of acute myocardial infarction in our area.

METHODS

This study was done by the Department of Medicine at Bhaskara Medical College from March 2015 to July 2017. 89 patients who had come with acute myocardial infarction for the first time were included in the study. This study was conducted following the clearance from the institutional ethical committee. Before the inclusion into the study, informed consent was taken from all the patients or their relatives after they fulfilled the criteria for AMI.

Exclusion criteria

Patients with subdural hematoma, sub arachnoid hemorrhage, anemia, epilepsy, or other neurological functions which have the capacity to alter the HbA1c values were excluded from the study.

Demographic details such as age, sex, height, weight, BMI, blood pressure, details of alcoholism or smoking were taken. Physical examination was conducted for all the patients. Previous clinical and medical history was taken for all the patients. Blood was collected in plain tubes for the detection of random blood glucose levels, cholesterol and triglyceride levels as well as for glycated haemoglobin (HbA1c) levels. Fasting blood sugar levels were also analysed on the 2nd and 5th day of admission. If the patients were known diabetic or had a fasting glucose levels of >126 mg/dL and post parandial glucose of >200mg/dL or random Blood sugar of > 200mg/dL were considered to be diabetic. However, if on the 5th day of RBS examination, if the levels were <126 mg/dl, they were said to be non-diabetic. But patients who were newly diagnosed as non-diabetics, i.e. were non-diabetic before treatment but had elevated sugar levels throughout the hospital stay, were further confirmed after 3 months of follow up.

Systemic coronary risk evaluation (SCORE) model was used for the assessment of patients without diabetes as per the European society of cardiology (ESC).[9] It was also suggested that SCORE could be used for a rough assessment of cardiovascular risk among the diabetic patients, with the values being multiplied by 5 for women and 3 for men.[10]

The predictors for calculation of 10 years risk factor for SCORE were age, sex, smoking, cholesterol and triglyceride levels and blood pressure.[10] The upper age limit for this study was limited to 65 years as above this age.

Statistical analysis

The statistical analysis was performed using SPSS version 12 software. The data was analyzed as percentages and mean and the comparisons were done by student t test, Mann- Whitney test.

RESULTS

Of the 89 patients, 55(61.8%) were males and 34(38.2%) were females (Figure 1).

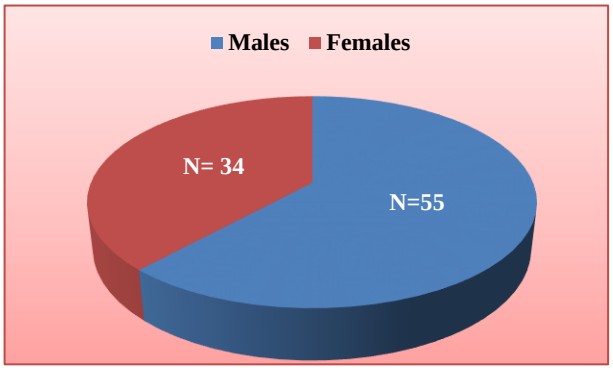

Figure 1: Sex wise distribution of patients.

Table 1: Demographic details.

Details	Men (55)	Women (34)
Mean age of patients	66.1±2.7	68.8±4.9
BMI		
Normal	21 (38.1%)	13 (38.2%)
Overweight	19 (34.6%)	11 (32.4%)
Obese	15 (27.3%)	10 (29.4%)
Drinking alcohol		
Never	29 (52.7%)	28 (82.3%)
Occasional	12 (21.8%)	4 (11.8%)
Regular	14 (25.5%)	2 (5.9%)
Smoking		
Never	31 (56.4%)	27 (79.4%)
Occasional	16 (29.1%)	5 (14.7%)
Regular	8 (14.5%)	2 (5.9%)

The mean age of the males was 66.1±2.7 and women was 68.8±4.9. 27.3% of the males and 29.4% of the females were obese while 34.6% of males and 32.4% of females were overweight. Majority of the patients were teetotalers, with never having consumed alcohol or having smoked either cigarettes or local beedis. However, 25.5% of the males and 5.9% of the females were regular alcohol drinkers (Table 1).

The mean random blood sugar among the diabetic patients was around 143.5 mg/dL, and in the non-diabetics it was 84.4mg/dL. The level of total cholesterol was 221.2±6.9 among the diabetic patients with HDL being 41.7±1.9 and LDL 129.3±4.7. Among the non-

diabetic patients, the total cholesterol was 136.3±3.3, HDL 39.6±2.4 and LDL 112.5±4.1. 1 (Table 2).

Table 2: Biochemical details.

Details	Diabetic patients	Non-diabetic patientss
Blood pressure (mean)	138/96	136/91
Random blood glucose (mg/dL)	143.5±6.3	84.4±7.2
HDL- cholesterol (mg/dL)	41.7 1.9	39.6 2.4
LDL-cholesterol (mg/dL)	129.3±4.7	112.5±4.1
Total Cholesterol (mg/dL)	221.2±6.9	136.3 3.3
Triglycerides (mg/dL)	193.8±4.7	111.4±7.2
Hb (g%)	14.1 1.4	12.2±2.3
Glycated hemoglobin	7.79±2.1	4.7±0.4
Mortality	19	3

Out of the 48 diabetic patients, 32 of them (66.7%) had a previous history of MI while in non-diabetes, 53.7% had a previous MI attack (Table: 3).

Table 3: Previous MI in diabetic and non-diabetic patients.

Status	Diabetics (n=48)	Non-diabetics (n=41)
Previous MI	32 (66.7%)	22 (53.7%)
No MI	16 (33.3%)	19 (46.3%)

DISCUSSION

It has been reported that acute myocardial infarction accelerates the development of diabetes in patients.[9,10] Presence of inflammation also is said to predict the development of diabetes. Other predisposing factors which are associated with diabetes as well as MI are obesity, hypertension and hs-CRP.[11-14]

The presence of diabetes is said to increase the chance of MI by 4 or more folds. In a Finnish study, the presence of diabetes increases the risk of MI by 7 folds.[3] However, the recent studies suggest that though diabetes increases the risk of MI, it may not be responsible for the adverse cardiovascular outcomes. In a Danish study, the prevalence of adverse outcomes was far lesser in persons with diabetes than with people who had a history of a prior MI.[15,16]

In the present study, the number of males affected were more than that of the females. This was corroborated by a study by Gao et al where the number of men were more than that of females. However, in most of the studies, women were twice at risk of death following an MI than males.[17] The mean age of the patients was a round 67 years of age.

In the present study, the number of diabetics among the people with myocardial infarction was 48 (53.9%). A study by Tenerz et al stated that every 4th person with AMI was diabetic.[18] Even in developed countries such as USA, the main cause of death is coronary heart disease especially if it is associated with diabetes.[19]

Around 62-65% of the patients were either overweight or obese in the present study. Obesity was single handedly considered to be one of risk factors for AMI in a study by Schargrodsky et al.[20] Obesity is reported to increase the risk of cardiovascular diseases by 2 folds and 1.5 folds in all-cause mortality.[21] In a study by Yatsuya et al, it was reported that both overweight and obesity increased the risk of ceebral hemorrhage and infarction in both males and females. It yet another study by Strazzullo et al these conditions was associated with increased risk of ischemic stroke.[22-25] In contrast, in studies by Park et al, it was reported that low BMI was associate with cardiovascular disorders and death. The all cause long term mortality in these patients was also less than the normal patients. In the elderly population, overweight seemed to be of protective nature.[26,27]

The metabolic effect of diabetes in case of cardiovascular disease is very complex.[28-31] It is associated with the activation of renin-angiotensin-aldosterone system, wherein, the major mechanism is the collagen cross linkage thereby diminishing the vascular and cardiac compliance. This results in diabetic cardiomyopathy.[28-31] Diabetes is also associated with accelerated atherosclerosis.[32] Vascular inflammation and endothelial dysfunction is also observed with hyperglycaemia, insulin resistance, and advanced glycation end-products. Elevated levels of insulin-like growth factor-binding protein-1 are seen in diabetes which is associated with risk of cardiovascular morbidity and mortality.[33]

CONCLUSION

Hyperglycemia is one of the independent risk factors for the development of acute myocardial infarction. Therefore, it is essential for the early detection of diabetes and control of the sugar levels, so as to reduce the risk of cardiovascular ailments.

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