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Demographic and Clinical Profile of Acute Coronary Syndromes in Diabetic and Non-Diabetic Patients

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Abstract

Diabetes is a significant risk factor for ACS and adds to the overall burden of cardiovascular disease. This study was done to compare clinical and demographic features and signs and symptoms of ACS, diagnosed by history, ECG, Cardiac enzymes markers among Type 2 diabetic patients and non-diabetic patients. This cross-sectional study was conducted at jubilee memorial hospital and Dr SM CSI medical college, trivandum. The study population included 93 patients with DM and 107 subjects without DM as controls from the department of General medicine. Detailed history, anthropometry and clinical examination were recorded from all patients and Profile of ACS was compared between the two groups. Out of 93 diabetic patients, 67.7% (n63) had STEMI while compared to nondiabetic (51.4%, n55) patients and 32.2% (n30) had NSTEMI/UA compared to non-diabetic (48.6%, n52) patients. There is statistically significant association between STEMI and diabetes mellitus. (P value is 0.019). In our study smoking increased the mortality in diabetic patients (p value .013). There was no significant association between dyslipidemia and diabetes mellitus (p value .077) even though higher proportion of patients with diabetes mellitus had dyslipidemia. It was concluded that incidence of STEMI is significantly more in diabetic patients compared to non-diabetic patient in our study. High prevalence of diabetes mellitus among ACS patients were observed and this study also shown that smoking increased the mortality in diabetic patients. Dyslipidemia in diabetic patient is more when compared to non-diabetic patients even though statistically not significant in this study group.

Keywords: *STEMI, NSTEMI, ACS, DM, ECG.*

Introduction

Acute coronary syndrome (ACS) is a major cause of morbidity and mortality in India and worldwide. Diabetes is a significant risk factor for ACS and adds to the overall burden of cardiovascular. disease. In many countries the incidence of myocardial infarction (MI) and the mortality from CAD is decreasing[3,8]. Furthermore, the severity of ACS has changed due to effective preventive measures together with improvements in management and treatment[3]. The presence of diabetes mellitus increases the risk of developing coronary artery disease (CAD) two- to four-fold[5].In spite of these positive trends ACS continues to be associated with considerable morbidity and mortality.

Diabetes mellitus is rapidly emerging as a global health care problem that threatens to reach pandemic levels by 2030. Diabetes, and its predominant form, type 2 diabetes mellitus (T2DM), has a distinctive association with CHD. Those with diabetes have two- to four-fold higher risk of developing coronary disease than people without diabetes[10], and CVD accounts for an overwhelming 65-75 per cent of deaths in people with diabetes[20,6]. More significantly however, the age- and sex-adjusted mortality risk in diabetic patients without pre-existing coronary artery disease was found to be equal to that of non-diabetic individuals with prior myocardial infarction (MI)[7.]

Diabetes mellitus is characterized by vascular endothelial dysfunction and the accelerated development of atherosclerosis. Hyperglycemia inhibits the activity of endothelial nitric oxide synthase (eNOS), reducing the production of nitric oxide (NO) and causing impairment of endothelium-dependent vasodilation. This study was done to compare clinical and demographic features and signs and symptoms of ACS among Type 2 diabetic patients and non-diabetic patients.

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Aim

Purpose of this study was to compare clinical and demographic features and signs and symptoms of ACS, diagnosed by history, ECG, Cardiac enzymes markers among Type 2 diabetic patients and non-diabetic patients.

Material and methods

Type of Study: Hospital based cross sectional study. The study was undertaken in the Department of General Medicine and cardiology, Jubilee memorial Hospital and Dr SM CSI medical college, Trivandrum, Kerala.

Duration of study: 6 months

Inclusion criteria: Patients diagnosed with ACS and willing to participate in study.

Exclusion criteria:

1.Patient with Acute pulmonary oedema
2.Those with congestive cardiac failure
3.Those with diabetic ketoacidosis
4.CKD on Hemodialysis
5.Those with Type 1 DM

Maneuver

Subjects were selected for the study based on the inclusion, exclusion criteria criteria. Patiets with ACS with DM were considered as cases and those with ACS without DM were considered as controls. Patient who diagnosed to have ACS from Department of Medicine and Cardiology will be explained about the study and consent forms will be given. If they are will to participate in study, they will be recruited for the study. Recruitment will be continued till we get total of 200 ACS patients with Type II Diabetes and non-Diabetic mellitus. All the needed information will be collected using a pre-tested semi structured questionnaire.

A detailed history, anthropometry, vital signs, clinical examination and laboratory parameters were recorded for both the study group.

1. Height: Height was measured with the help of a metric scale attached to a vertical board.
2. Weight: Dial type bathroom scale weighing machine was used for weight measurement. Weight was measured in kilogram.
3. Body mass index: Calculated using Quetelet index BMI= 2 Underweight <18Normal 18-24.9Grade I (over weight) 25-29.9 Grade II (obese) 30-39.9 Grade III (very obese) >40
4. Waist circumference, hip circumference and waist hip ratio: Waist and hip circumferences were measured in centimeters using a measuring tape. Waist circumference • 88 cm in females and • 102 cm in males and WHR • 0.85 in females and • 0.90 in males were considered obese
5. Blood pressure recording: Sphygmomanometer is used to record the BP. BP is recorded in the sitting posture in the right upper limb using a proper sized cuff.
6. Acute coronary syndrome. Cases are said to have Acute coronary syndrome with any one of the following.

i) cardiac enzymes like TROP T, TROP I,CPK MB

ii) ECG changes of present myocardial infarction confirmed by an echocardiography by an experienced cardiologist.

1. Diabetes: Participant is diagnosed to be diabetic if any one of the followingis present: FBS>126 mg/dl, PPBS>200 mg/dl and Patient already on anti-diabetic drugs

Detailed history regarding patient's education, occupation, family income, daily physical activities, smoking, alcohol intake and family history of hypertension were asked.

Investigations included complete blood count, Renal function test (RFT), serum cardiac enzymes, fasting blood sugar, post prandial blood sugar and lipid profile. Study was undertaken after Institutional ethics committee approval and informed written consent from the subjects.

Statistical analysis

Collected information will be entered in Excel Spread Sheet in Computer and appropriate statistical package will be used for analysis. Result will be obtained as means, proportions and percentages and statistical tests like chi square test and t test will be used for testing differences.

Results and Discussions.

Differences in the clinical and demographic characteristics

Between diabetics and non-diabetic patients

There were 93 patients in the sample who were diabetic, making up nearly half of the sample (46.5%). The sample characteristics and differences in demographic and clinical variables between diabetics and non-diabetics are shown in Table 1. Mean age of presentation of acute coronary syndrome in both diabetic and non-diabetic patients are 58.69 and 58.70 respectively.

Incidence of STEMI (67.7%) is more in diabetic patients while compared to non-diabetic patients (51.4%) and p value is .019. There are no significant differences between the diabetic and non-diabetic groups on other demographic characteristics, with the majority in both groups being males (64.5% vs. 71. %)

In terms of cardiovascular risk factors, the diabetic group was more likely to be hypertensive (69.9%) while compared to non-diabetic (60.7%) even though p value is 0.176. Dyslipidemia in diabetic patients (52.2%) is more when compared to non-diabetic patients (40.2%) even though statistically not significant (p value 0.077) in the study group. There is no significant difference existed between the two groups in the body mass index and current smoking. Mortality of ACS is increased in diabetic (15%) while compared to non-diabetic patients (6%) even though statistically not significant (p value .053%).

Table 1. Differences in the clinical and demographic characteristics between diabetics and non-diabetic patients

	Diabetic Patients (Total No-93)	**Non-Diabetic Patients (Total No-107)**	**P Value**
Mean age	58.69	58.70	
BMI	28.05	28.10	
Male	60(64.5%)	76(71%)	.325
Female	33(35.5%)	31(29%)	.325
Hypertension	65(69.9%)	65(60.7%)	.176
Dyslipidemia	49(52.7%)	43(40.2%)	.077
Smoking(M)	29(48.3%)	39(51.3%)	.433
Stemi	63(67.7%)	55(51.4%)	.019
Nstemi/UA	30(32.3%)	52(48.6%)	.019
Mortality	14(15%)	7(6%)	.053

Prevalence of diabetes mellitus among ACS patients

India stands out as an anomaly with 30-39% of CAD patients reporting known diabetes in national and international prospective registries[22,28]. The risk for CAD is two to four times higher in diabetic subjects, and in Indians, CAD occurs prematurely, i.e., one to two decades earlier than in the West[19].

The prevalence of diabetes for all age groups worldwide was estimated to be 3% in 2000 and is projected to be 4% in 2030. The prevalence of diabetes has reached nearly 20% in South India[19,9]. Kerala is the diabetes capital of India with a prevalence of diabetes as high as 20% ─ double the national average of 8%[18,25].In a large multi-center study involving nearly 20,000 subjects, the prevalence of diabetes in Thiruvananthapuram was 17% compared to 15% in Hyderabad and New Delhi, 4% in Nagpur and 3% in Dibrugar[18,25].

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In our study, 93 patients were diabetic among 200 ACS patients and prevalence of diabetes mellitus among ACS patients is 46.5% which is slightly higher than national prevalence (39%). While compared to general population with diabetes mellitus in India (8%), it is significantly higher and when compared to general population with diabetes mellitus in Kerala (17-20%), it is more than two-fold. High prevalence of diabetes mellitus among ACS patients were observed in our study.

Mean age

Indians develop diabetes at a younger age and those younger than 45 years accounts for 36% of all diabetics in India[23].In developing countries, the majority of people with diabetes are in the 45- to 64-year age range, similar to the finding reported previously[12]. In contrast, the majority of people with diabetes in developed countries are 64 years of age prevalence of diabetes increases with age and so diabetic patients with CAD are older than those without diabetes mellitus.

Out of 93 diabetic patients in our study, 3.2% (n3), 15.1%(n14), 41.9% (n39) and 39.8% (n37) were from age groups 30- 40 years, 41-50 years,51-60 years and above 60 years respectively. Among 107 non diabetic patients, 7.5% (8), 18.7% (n20),33.6%(n36) and 40.2% (n43) were from age groups 30-40 years, 41-50 years,51-60 years and above 60 years respectively. Higher proportion of patients with diabetes mellitus (41.9%) while compared to non-diabetes mellitus (33.6%) in the age group 51-60 years is seen though statistically not significant. Mean age of ACS with or without diabetes mellitus was almost similar (58.69 vs 58.70) and is comparable to another study[4].

Gender

There was total of 200 acute coronary syndrome (ACS) patients, of that 136 were male and 64 were females. Among ACS patients, 93 (46.5%) were diabetic and 107 (53.5%) were non-diabetic patients. Out of ACS with diabetic patients, 60 (64.5%) were males and 33 (35.5%) were females. Among ACS with non-diabetic patients, 76 (71%) were male and 31 (29%) were females. In both groups, higher proportion of males is seen. Among 33 female patients with diabetes mellitus, 54.5% (n18) had NSTEMI/UA while compared to 67.7% (n21) in non-diabetic patients. Among 60 males with diabetes mellitus, 80% (n48) had STEMI while compared to non-diabetic (59.2%, n45, p value .010)

Body mass index

Obesity is perhaps the foremost risk factor for diabetes with a prevalence of just 3% for whites with normal weight, body mass index (BMI) < 25 kg/m2, but higher for the minority ethnic groups.

In our study, out of 200 ACS patients, 5 were normal BMI, 182 were overweight and 13 were obese. Out 93 diabetic patients, 1.1% (n1), 90.3% (n84) and 8% (n8.6) were from BMI categories 18-24.99 m2/kg, 25-29.99 m2/kg and 30 and above m2/kg respectively. Among 107 non diabetic patients, 3.7% (n4), 91.6% (n98) and 4.7% (n5) were from BMI categories 18.5-24.99m2/kg, 25-29.99 m2/kg and 30 and above m2/kg respectively. Our results are not comparable to another study[17,16].

Smoking

Cigarettes kill one in two smokers prematurely, half of these deaths occurring during middle age (35-69 years)[21]. The World Health Organization (WHO), which provides these estimates, also predicts that India will have the fastest rate of rise in deaths attributable to tobacco in the first two decades of the twenty first century[24]. A smoker dies 10 to 15 years earlier than a nonsmoker and often spends the final years ravaged by dyspnea and pain[26]. Smoking is a risk factor for chronic CAD and also known to strongly predict a poorer long-term outcome after ACS. A paradoxical survival advantage to current or prior cigarette smoking in patients admitted with ACS has been observed. The frequency of smoking in diabetic patients is not appreciably different from that in the general population. As in non-diabetic subjects, smoking is a major cardiovascular risk factor in diabetic patients.

Out of 136 ACS patients, 68 were smokers and 68 were non-smokers in our study. Among 93 diabetic patients, 48.3% (n29) were smokers while compared to non-diabetic (51.3%, n39) patients. There was no significant association between smoking and diabetes mellitus and p value is .433 and results are comparable to other studies.

Hypertension

Hypertension co-exists in a significant proportion of people with diabetes[11]. Lowering blood pressure (BP) produces dramatic benefits in these subjects and BP targets have been modified specifically to avert disabling and fatal complications in the form of nephropathy, retinopathy, and vascular events[2]. Hypertension is about twice as frequent in individuals with diabetes as in those without diabetes.

Out of 200 ACS patients, 130 were hypertensive and 70 were non-hypertensive patients. Among 93 diabetic patients, 69.9% (n65) were hypertensive while compared to non-diabetic patients (60.7%, n65). There was no significant association between hypertension and diabetes mellitus and p value is .176 and not comparable with other study[11]

Dyslipidemia

Among diabetics, Asian Indians have higher risk of heart attacks than whites, but blacks have only half the risk, which in turn is attributed to more favorable dyslipidemia[2]. Diabetic dyslipidemia is a significant predictor of CVD events and mortality and consists of elevated levels of triglyceride, low HDL-C (high-density lipoprotein cholesterol), and an increased proportion of small dense LDL. CVD risk is reduced to a greater extent by lowering the LDL-C and blood pressure than lowering blood sugar. Although management of LDL-C (low-density lipoprotein cholesterol), HDL-C, non-HDL cholesterol, and triglyceride are important, only HMG-CoA reductase inhibitors (statins) has indisputable proven efficacy[27]. Diabetes dyslipidemia is due to abnormal lipoprotein metabolism and abnormalities in the insulin action.

Out of 200 ACS patients, 92 had dyslipidemia and 108 had no dyslipidemia in our study. Among 93 diabetic patients, 52.7% (n49) were dyslipidemia while compared to non-diabetic patients (40.2%, n43). There was no significant association between dyslipidemia and diabetes mellitus (p value .077) even though higher proportion of patients with diabetes mellitus had dyslipidemia.

Medical diagnosis

Subjects with diabetes have been shown to have more advanced atherosclerosis. High blood glucose is a greater risk factor for CAD and stroke than smoking.

Compared to people without diabetes the risk of a heart attack is increased 3-fold in men and 10-fold in women <65 years of age. The risk is markedly increased in women who have both diabetes and MS- a particularly deadly but common combination among Indian women[15].Incidence rate of myocardial infarction was increased in diabetic patients including those with or with prior myocardial infarction.

Out of 200 ACS patients,118 had ST elevation myocardial infarction, 21 had non-ST elevation myocardial infarction (nstemi), 61 had unstable angina (UA). Among 93 diabetic patients, 67.7% (n63) had STEMI while compared to non-diabetes mellitus (51.4%, n55). There was statistically significant association between STEMI and diabetes mellitus (p value .019). Among 107 non diabetic patients, 48.6% (52) had NSTEMI/UA while compared to diabetic patients (32.3%, n30, p value .019).

Mortality

Cigarettes kill one in two smokers prematurely, half of these deaths occurring during middle age (35-69 years)[21]. The World Health Organization (WHO), which provides these estimates, also predicts that India will have the fastest rate of rise in deaths attributable to tobacco in the first two decades of the twenty first century[24].A smoker dies 10 to 15 years earlier than a nonsmoker and often spends the final years ravaged by dyspnea and pain[26].

Dyslipidaemia is a significant predictor of CVD events and mortality in diabetes patient[27,28]. In the United Kingdom, hypertension is more common and associated with greater morbidity and mortality in Asian Indians than Whites but less than in Blacks.

Out of 93 ACS with diabetic patients, 15%(n14) had died of ACS while compared to non-diabetic patients (6%, n7). There is no statistically significant association between mortality and ACS with diabetes mellitus. Higher proportion of mortality was seen in diabetic patients. In our study smoking

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increased the mortality in diabetic patients (p value .013). Dyslipidemia and hypertension did not show any effect on mortality. This is because of small sample size.

Conclusions

Recent studies in Kerala shown a higher prevalence of type 2 diabetes mellitus compared to other states. Cardiovascular morbidity and mortality also shown an increase in trend in Kerala. Age of onset of Cardiovascular mortality and Type 2 diabetes mellitus shifted to younger age groups.

Incidence of STEMI is significantly more in diabetic patients compared to non-diabetic patient in our study. Mortality of ACS is increased in diabetic compared to non-diabetic patients even though statistically not significant due to small sample size. Dyslipidemia in diabetic patient is more when compared to non-diabetic patients even though statistically not significant in the study group. High prevalence of diabetes mellitus among ACS patients were observed in our study. In our study smoking increased the mortality in diabetic patients.

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