

A clinical Study of Comparative Angiographic Profile among Diabetic and Non diabetic Patients with Acute Coronary Syndrome

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ABSTRACT

Background

Cardiac involvement in diabetes commonly manifests as coronary artery disease. The current study's objective is to evaluate, via coronary angiography, the association between diabetes mellitus and coronary artery disease.

Methods : The coronary angiography of 100 patients with significant coronary obstruction, between the age group from 30 years to 75 years of age, who were admitted with acute coronary syndrome from July 2023 to December 2023 at our centre were analysed. The coronary vessels involvement among patients with diabetes mellitus and without diabetes were compared.

Results :

Total 100 patients data was analysed, 50 with diabetes and 50 without diabetes with significant coronary vessel disease. In our study we found that the incidence of Triple vessel disease in diabetic patients was much higher (50%) compared to non-diabetics (18%). The incidence of double vessel disease in diabetic patients was also higher (26%) compared to non-diabetics (22%). And single vessel disease was much higher in non-diabetics (60%) than in nondiabetic patients.

Conclusion :

In comparison to non-diabetics with acute coronary syndrome, our study demonstrated that the incidence of multivessel disease, severity and diffuse involvement of the

coronary vessels, and earlier onset of coronary vessel involvement were all significantly greater in diabetic patients

Keywords: Diabetes mellitus, Acute coronary syndrome, coronary angiography, Multivessel disease

INTRODUCTION

Diabetes mellitus is one of the most common metabolic disorder characterized by variable degree of hyperglycemia, insulin resistance, impaired insulin secretion and decreased glucose utilization. It is estimated that, around 463 million people rising to 578 million by 2030 and 700 million by 2045 populations will be affected with diabetes worldwide [1]. India shares a significant burden of diabetics, 74.9 million in 2021 to 124.9 million by 2045[2]. Its estimated that 101 million people in India-11.4% of country's population are living with diabetes[3].

Diabetes is a disease of complications, Cardiac is by far the commonest cause of mortality in patients with diabetes [4]. Type 2 diabetes is an established and powerful predictor of CAD that has evolved into a major public health concern in recent years. Diabetic patients have more triple-vessel and less single-vessel CAD than nondiabetics[5]. Dyslipidemia is observed in practically all patients of type-2 diabetes mellitus and every high level of cholesterol in diabetics has 2-3 times higher CAD risk than non-diabetic individuals. It has been shown that diabetic patients have more plaques, which appeared to have characteristics of plaque vulnerability and a different composition of plaques than nondiabetic patients for those presenting with acute coronary syndrome (ACS)[6]. Coronary angiography is the 'Gold-standard' technique for diagnosing and evaluating coronary artery disease.

Hence, this study for assessment of angiographic profile in diabetics and non-diabetic patients presenting with acute coronary syndrome, was designed to find, how ACS in diabetics differ from that of non-diabetics in their vessel involvement on angiographic profile.

METHODS & MATERIALS

The present study was retrospective study. We enrolled 100 patients presenting with ACS among which 50 patients were diabetic and 50 were nondiabetics admitted in CCU at J K Hospital, attached to L N Medical College, Bhopal, India.

All the patients between the age group from 30 years to 75 years of age, who underwent coronary angiography (CAG) from July 2023 to December 2023 at our center. CAG was done both from femoral and radial arteries access site. Written informed consent was obtained in all cases.

An occlusion of $\geq 70\%$ was considered as significant obstructive lesion (significant stenosis). If there was $\geq 70\%$ stenosis in a single vessel, it was considered single vessel disease (SVD), if in two vessels it was considered double vessel disease (DVD), and if

there was significant stenosis involving all three vessels then it was termed triple vessel disease (TVD).

Both DVD and TVD were collectively termed as multivessel disease. Vessel stenosis of <70% was considered non-critical CAD. Patients with normal coronaries and non-critical CAD were excluded from the study.

Inclusion criteria & Exclusion criteria

Patients were randomly selected who matched inclusion and exclusion criteria.

Inclusion criteria

The patients were classified into two categories,

A: American Diabetes Association (ADA) criteria was used to detect those with recent onset type 2 diabetes and previously diagnosed diabetic patients, presenting with ACS were included in the study.

B: Patients without diabetes.

Exclusion criteria

Patients with Gestational Diabetes Mellitus.

Patient with normal coronary angiogram with either group.

A comprehensive data was collected from every patient recruited for the study. The patients presenting with complaints of acute onset chest pain, perspiration and breathlessness were provisionally diagnosed to have ACS based on clinical symptoms, ECG changes, ECHO and cardiac enzymes levels.

All the patients presenting with ACS of both categories, diabetics and non-diabetics were managed on lines of ACS and once they were stabilized and were taken up for coronary angiography which was performed after adequate preparation.

The following investigations were done for the patients:

Complete haemogram, Random blood sugar (RBS), Fasting blood sugar (FBS), Postprandial blood sugar (PPBS), HbA1c in diabetic and newly detected diabetes mellitus patients, Lipid profile, Blood urea and Serum creatinine, Cardiac enzymes-TROP I, CPK-MB, ECG, 2D ECHO, Treadmill Test (TMT) and Coronary Angiography (CAG).

The diabetic patients with their HbA1c levels were classified as per ADA criteria. HbA1c levels were done in all the diabetics patients and in recently detected patients of T2DM patients. HbA1c level target of <7 % as good control, the HbA1c level in the range of 7 – 8 % as Inadequate control and >8 % as poor glycemic control were categorized as per ADA guidelines.

The patients presenting with ACS were listed for performing coronary angiography (Angina, NSTEMI and STEMI).

Depending on the extent of coronary vessel involvement on angiographic findings, further treatment was planned whether the patient requires conservative medical line of management, PTCA or CABG. Angiographic parameters and further treatment

required were compared between diabetic patients and non-diabetic patients with ACS. The Coronary artery narrowing of Grade 3 more than or equal to 70% were considered as significant obstructive lesion causing significant stenosis.

RESULTS

A total of 100 patients had undergone CAG during the period of study. Patient age range from 30 years to 85 years were subsequently analyzed in the present study. Among the 100 patients who were included in the study, 50 were diabetic and rest 50 were nondiabetic. The peak incidence of ACS among diabetic patients was from third and fourth decade where as fifth and sixth decade in non-diabetics. Diabetic patients presented much earlier with ACS as early as third decade of life compared to non-diabetics.

Among diabetics 30 % of the cases were in their third decade and 40% of the cases were in the fourth decade as compared to 10% and 30% of non-diabetics of similar age group.

In our study the incidence of ACS was more common in males and higher in diabetics as compared with nondiabetics for both in males and females.

In our study the majority of patients (50%) had a relatively shorter duration of diabetes between <10 years,10% of the patients were newly detected and diagnosed as T2DM and 40% had longer duration of diabetes of >10 years. This signifies lack of patient adherence and treatment in initial course of diabetic treatment leading to early complications.

Table no.1 :- Type of vessel disease coronary angiography

1	Type of vessel involvement	Diabetics	Percentage of Diabetics	Non-Diabetics	Percentage of Non Diabetics
2	Single Vessel Disease	12	24%	30	60%
3	Double Vessel Disease	13	26%	11	22%
4	Triple vessel disease	25	50%	09	18%
5	Total	50	100%	50	100%

In our study we found that the incidence of Triple vessel disease in diabetic patients was much higher (50%) compared to non-diabetics (18%).The incidence of double vessel disease in diabetic patients was also higher (26%) compared to non-diabetics (22%). And single vessel disease was much higher in non-diabetics (60%) than in nondiabetic patients.

On angiography it was observed that total occlusion was significantly high in diabetic patients as compared to non-diabetics and patients with longer duration > 10 years presented with severe and multi vessel disease. While among non-diabetic patients SVD was more common.

HbA1c levels Control correlated with Number of Vessels Involved in patients with HbA1c of <7 (good control), 80% had single vessel involvement, whereas patients with HbA1c >8.0 developed of multiple vessel disease in 76%. Hence suggesting with good glycemic control of HbA1c there is decrease in severity and incidence of multivessel disease.

DISCUSSION

In the present study we enrolled total 100 patients, out of which 50 were diabetic and 50 non-diabetic patients presented with CAD were analyzed with the coronary angiographic findings in acute coronary syndrome (ACS). Our results were compared with similar studies done earlier at various centers. Type 2 diabetes results in multiple complications and commonly associated with an increased risk of cardiovascular disease and manifests much earlier and more severely in life as compared to those without diabetes. The present study focused on angiographic characteristics of coronary atherosclerosis. We found that the prevalence of multivessel disease is higher among patients with type 2 diabetes than in those without diabetes.

Several previous studies have reported that the multivessel/triple-vessel disease is more frequent in patients with type 2 diabetes, (7-11). With longer duration diabetic patients have a higher risk of complications and a poor prognosis than nondiabetics. As there is higher prevalence of multivessel disease and the more severe and extensive coronary vessel lesions and poor collateral circulation among diabetic patients reported in earlier studies are the culprit to the less favorable clinical outcomes of diabetic patients (12-13).

The underlying mechanism for the enhanced severity of CAD in type 2 diabetics patients than in nondiabetics in the study is still unclear and needs further research. Among type 2 diabetic patients increased Insulin resistance in leads to hyperinsulinemia, which causes a variety of metabolic abnormalities, such as dyslipidemia in the form of elevated triglyceride levels, low levels of high density lipoprotein cholesterol, enhanced secretion of low density lipoprotein, and this low density lipoprotein is small and dense which is more atherogenic, hypertension, disorders of coagulation, increased vascular resistance (14,15). The consequence is cardiac involvement in diabetes is development of atherosclerosis and CAD and diabetes has become predominantly disease of cardiovascular system and hence Cardio-diabetology(16).

In our study it was seen that the peak incidence of ACS in diabetic patients with poor glycemic control was in the third and fourth decade as compared to fifth and sixth

decade in non-diabetics. These findings were in coherence with DiabCare Asia--India Study: diabetes care in India--current status [17].

In our study the incidence of ACS in males was 62% in diabetics and 76% in non-diabetics while in females the incidence of ACS was 38% in diabetics and 24% in non-diabetics[18].

The severity of CAD varies with the duration of diabetes. In our study, 40% of diabetic patient had a relatively shorter duration of diabetes between <10 years and rest 60% % had longer duration of diabetes of >10 years. Incidence of multi vessel disease was significantly higher with the duration of diabetes >10 years. These findings correlates with the other study by Fox CS et al.[19].

In our study, diabetic patients with poor glycemic control, i.e. HbA1c >8.0, 74.0% of them had triple vessel disease and 20.0% had double vessel disease suggesting poor glycemic control with higher HbA1c levels having more number of coronary vessels and more severe disease. In our study, diabetic patients with higher HbA1c levels had more severe and complicated multivessel disease 60% of them undergone CABG as treatment. These findings correlates with the study conducted by Tahir Saleem et al., showed higher level of HbA1C , explaining higher degree of hyperglycemia and longer duration of DM has more severe and extensive coronary artery disease[20].

In our study, coronary angiography revealed that the incidence of multivessel disease in diabetics was much higher 76% compared to non-diabetics which was only 40%. Of which 50% patients of diabetic group had triple vessel disease while in nondiabetic group it was 18%. This finding correlates with the other study done by S.krishnaswami et al., showed that MVD was more common in diabetics (87.5% Vs 79.6%) in two separate groups of 516 diabetic and non-diabetic patients[21] . Our study is also consistent with the study conducted by Sousa JM et al., showed severe triple-vessel disease was significantly more frequent in diabetic patients than nondiabetics.

So we conclude that the severity of coronary artery disease was significantly higher in diabetic patients with acute coronary syndrome when compared to nondiabetics with acute coronary syndrome.

These findings were similar to other studies done earlier like Baris N et al.,[23], Mahdi Mossavi et al.,[24],Uddin SN et al., where they found the angiographic severity and extensive involvement of coronary artery disease was higher in diabetic patients with acute coronary syndromes.

Conclusion

Compared to non-diabetics, people with type 2 diabetes have a higher risk of early onset and more severe coronary artery disease linked to multivascular disease. Extended periods and high levels of hypoglycemia increase the risk of developing a diffuse pattern of atherosclerosis, severe stenosis, and complete blockage of coronary arteries. The high rate of diabetes mellitus and its widespread coronary involvement

as multivascular illness account for the poor prognosis of coronary artery disease in these individuals. Thus, routine testing of the HbA1c level and interventions such as dietary changes, lifestyle adjustments, and medication to achieve a euglycemic condition reduce cardiovascular morbidity and enhance the prognosis of diabetic patients.

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