ORIGINAL RESEARCH PAPER

Cardiology

COMPARATIVE ANGIOGRAPHIC PROFILE WITH ACUTE CORONARY SYNDROME IN DIABETIC AND NON-DIABETIC PATIENTS

KEY WORDS:

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ABSTRACT

Background: Cardiac adverse events are the most common cause of mortality in patients with diabetes. Cardiac involvement in diabetes commonly manifests as coronary artery disease (CAD). Definitive diagnosis,precise assessment, and anatomic severity of CAD require invasive diagnostic modalities such as coronary angiography. **Aims And Objectives:** To study the angiographic extent, type, number, and severity of vessels involved in the coronary artery and its branches in patients with acute coronary syndrome(ACS). The same was compared in diabetics and non-diabetics with ACS. **Materials And Methods:** A total of 272 patients with ACS,132 diabetics and 140 nondiabetics were admitted to the MDM Hospital CCU attached to Dr. S. N. The study group was formed by randomly selecting patients from the Medical College during a period of approximately one and half years. RBS and FBS were performed in all 272 patients, and HbA1c was performed in all diabetic patients. All patients with ACS underwent coronary angiography. **Statistical Analysis:** Chi-square test was used to determine any significant differences between the two groups. A p-value of less than 0.05 was considered significant. **Results:** In our study, 58 (44%) of 132 patients with DM had triple or multivessel disease compared with 21 (15%) of 140 non diabetics. 272 patients with ACS, number of vessels involved were 578, of which 58.82% in diabetics and 41.17% in non diabetics, 76 (57.57%) of 132 diabetic patients required CABG as treatment outcome. HbA1c levels of >8.5%, 24.24% had triple/multi-vessel disease, and 30 (39.47%) of 76 patients who had to undergo CABG had HbA1c levels >8.5%. **Conclusion:** This study showed that ACS in diabetic patients presented much earlier in life, and the severity and extent of CAD and incidence of triple/multi vessel disease were significantly higher in diabetics than in non-diabetics with ACS. Diabetics with high HbA1c had more coronary vessel involvement, and the mode of treatment required was CABG.

INTRODUCTION

Coronary heart disease (CHD) due to atherosclerosis is a major cause of death worldwide and is the most common form of heart disease. Diabetes mellitus is associated with various complications, of which cardiac affliction is the major cause of mortality in these patients [1]. Cardiac involvement in diabetes commonly manifests as coronary artery disease (CAD) and, less commonly, as diabetic cardiomyopathy and cardiac autonomic neuropathy [2]. Patients with diabetes have a higher incidence of triple-vessel CAD and lower incidence of single-vessel CAD than those without diabetes [3]. The association of more extensive CAD with DM has been described in postmortem, angiographic, and IVUS-based studies and in studies with multi-slice coronary computed angiography [4]. Coronary atherosclerosis is not only more prevalent in patients with diabetes but also more severe. The reported prevalence of coronary artery disease in patients with diabetes ranges from 9.5% to 55% [5,6]. It is also well proven that patients with diabetes and CAD have higher Gensini scores on angiography. When diabetic and non-diabetic subjects were compared, more diabetic subjects (95%) had abnormal Gensini scores than non-diabetic subjects (83%) [7].The burden of diabetes is substantial and steadily increasing worldwide, with developing economies like India witnessing a significant surge, primarily driven by the rising prevalence of overweight/obesity and unhealthy lifestyle choices. In 2019, an estimated 77 million individuals in India had diabetes, a figure projected to exceed 134 million by 2045. Alarmingly, approximately 57% of these cases remain undiagnosed.[8]. Hence, this study titled Comparative angiographic profile in diabetic and non-diabetic patients with acute coronary syndrome was undertaken, and an attempt was made to determine how ACS in diabetic patients differs from that in non-diabetic patients, with special interest in their angiographic profile.

MATERIALS AND METHODS

This was a cross-sectional study. This study included 272 patients with ACS, of whom 132 were diabetic and 140 were non-diabetic, admitted to the MDM Hospital CCU, attached to Dr SN Medical College, Jodhpur, Rajasthan, India. Patients who matched the inclusion and exclusion criteria were selected randomly over a period of approximately one and a half years formed the study group.

Inclusion Criteria

- Group 1(Diabetic): Previously known diabetic or first-time detected diabetic by American Diabetes Association (ADA) criteria presenting with ACS.
- Group 2(non-diabetic): Cases presenting with acute coronary syndrome that are non-diabetic or do not fulfill the ADA criteria.

Exclusion Criteria

Patients having impaired fasting glucose presenting with ACS
Patients with previous revascularization
Patients with valvular heart disease
Cardiomyopathy.

The following investigations were performed after selection: fasting blood glucose levels by collection method, random blood glucose levels, HbA1c in patients with diabetes and newly diagnosed diabetes mellitus, complete hemogram, blood urea, serum creatinine, lipid profile, cardiac enzymes-CPK-MB/LDH/SGOT, ECG, 2D ECHO, Treadmill Test (TMT), and Coronary Angiogram.

Patients with complaints of acute chest pain and breathlessness were diagnosed with ACS based on ECG and cardiac enzymes. RBS and FBS were performed for all patients. HbA1c was sent in patients whose RBS or FBS was in a higher range to confirm newly detected diabetes and in all diabetic patients to determine glycemic control.

Patients with ACS, both diabetics and non-diabetics, were treated, and once they were stabilized, they were taken up for coronary angiography, which was performed using the standard angiographic technique after adequate preparation.

Unstable angina, NSTEMI, STEMI, or post-infarction angina were the reasons for doing coronary angiography.

According to angiography, the severity of the lesions was ranked as follows:
Grade 0: Illness-free
Grade 1: Less than 50% stenosis in the intima
Grade
2: Grade of 50–69% stenosis
3. Grade of 70-95% stenosis
4: Grade of 96-99% stenosis
5. Complete blockage. A coronary artery narrowing of 70% or more was deemed to be severe stenosis.

All patients with diabetes and those just diagnosed with type 2 diabetes had their HbA1c measured. Based on their HbA1c control, we categorised the diabetic patients as follows: <7, good control; 7–8.5, acceptable control; and >8.5, poor control. Additional treatment was planned based on the angiographic results, determining if the patient needed CABG, PTCA, or medical management. Diabetic and non-diabetic individuals with ACS were compared in terms of angiographic characteristics and further treatment needed.

Analytical Statistics

Numbers and percentages were used to represent categorical data. To ascertain whether there were any noteworthy variations between the two groups, the chi-square test was employed. P-values below 0.05 were regarded as statistically significant.

OUTCOMES

Distribution of ACS in different age groups among diabetics and non-diabetics Compared to the fifth and sixth decades for non-diabetics, the third and fourth decades saw the highest prevalence of ACS in diabetics. Compared to non-diabetics, patients with diabetes showed up with ACS substantially sooner, as early as the third decade of life. Compared to 9% and 16% of non-diabetics in comparable age groups, 21% of cases among diabetics occurred in their third decade, and 37% occurred in their fourth.

Sex Incidence

Male ACS incidence in our study was 80% in non-diabetics and 60.60% in diabetics. The incidence of ACS in females was 20% in non-diabetics and 39.40% in diabetics. As a result, women with diabetes had a greater chance of acquiring ACS than women without diabetes.

Diabetes's Duration

Most of the patients in our study (45.45%) had diabetes for a comparatively shorter period of time-between 5 and 10 years-while 54.55% had diabetes for more than 10 years.

Table -1 No. Of Vessels Involved By Angiography, The X2 =39.83 And p-value is 0.0000. Significant at p < 0.01.

	Diabetic (n=132)	Non Diabetic (n=140)
Svd	33 (25%)	84 (60%)
Dvd	41 (31%)	35 (25%)
Tvd/Multi vessel disease	58 (44%)	21(15%)

Triple/multi-vessel disease was significantly more common in diabetics (44%) than in non-diabetics (15%). Patients with diabetes had a somewhat greater incidence of double vascular disease (31%) than those without the condition (25%). Among non-diabetics, single-vessel disease was significantly more prevalent (60%) [Table 1].

[Table-2]: Type Of Vessel Involved

Condition	Total vessels	Lmca	Lad	Lcx	Rca
Diabetic (n=132)	340	14 (4.11%)	85 (25%)	102 (30%)	139 (40.88%)
Non Diabetic (n=140)	238	1 (0.42%)	88 (36.97%)	70 (29.41%)	72 (30.25%)

There are 578 total vessels implicated in the 272 individuals with ACS, both diabetics and non-diabetics. Of these, 58.82% are involved in diabetics and 41.18% are in non-diabetics. This is noteworthy since it suggests that patients with diabetes have more vessels engaged. The participation of LMCA in diabetes (4.11%) was significantly different from that in non-diabetics (0.42%). The RCA was the most often implicated vessel in the diabetic group (40.88% in diabetics and LAD-36.97% in non-diabetic diabetics) [Table 2].

[Table-3]: Severity Of Lesions X2 = 166.71, p=0.05

Grade	Diabetic Patients (132)	Non-Diabetic Patients (140)
Grade 1	14 (10.60%)	42 (30%)
Grade 2	12 (9.09%)	38 (28.78%)
Grade 3	16 (12.12%)	21 (15%)
Grade 4	58 (43.93%)	21 (15%)
Grade 5	32 (24.24%)	18 (13.63%)

Significant 68.18% of diabetics had stenosis severity ranging from grade 4-5, whereas non-diabetics had a rate of 28.63% [Table 3].

Patients with diabetes had a considerably higher rate of total occlusion or grade 5 stenosis than patients without the disease.

[Table-4]: Duration Of Diabetes With No. Of Vessels Involved Fisher's Exact Probability Test p=0.0000, HS

Type	5-10 years (60)	>10 years (72)
Svd	28 (46.67%)	5 (6.94%)
Dvd	27 (45%)	14 (19.44%)
Tvd	5 (8.33%)	53 (73.61%)

Patients with diabetes who had had the condition for five to ten years had a significantly greater incidence of SVD and DVD. Those who had diabetes for more than ten years had a considerably greater incidence of triple/multi-vessel disease (73.61%) [Table 4].

[Table-5]: Treatment Options

Management	Diabetic	Non Diabetic
Medical Management	16 (12.12%)	80 (57.14%)
PTCA	40 (30.30%)	31 (22.14%)
CABG	76 (57.57%)	29 (20.71%)

Compared to 20.71% of patients without diabetes, the majority of patients with diabetes (57.57%) needed CABG as a therapy option. Additionally, non-diabetics had lower PTCA (22.14%) than diabetics (30.30%). 12.12% of diabetics and 57.14% of non-diabetics needed medical care [Table 5].

[Table-6]: Significance Of Hba1c Control With Number Of Vessels Involved

Hba1c	svd (patients, %)	dvd (patients, %)	tvd (patients, %)
<7	9 (6.82%)	10 (7.58%)	8 (6.06%)
7-8.5	11 (8.33%)	16 (12.12%)	18 (13.64%)
>8.5	13 (9.85%)	15 (11.36%)	32 (24.24%)

Single artery involvement and no triple vascular disease were present in 66.66% of patients with HbA1c levels less than 7 (excellent control). 53.33% of patients with triple/multiple vascular disease and 21.66% of patients with single vessel involvement had a HbA1c >8.5 (poor control) [Table 6].

The number of patients and arteries implicated decreases when HbA1c is well controlled. In our study, PTCA was performed on patients with poor HbA1c control (> 8.5, 63.33%) and those with good control (<7, 62.96%).

DISCUSSION

With a focus on the coronary angiographic findings in acute coronary syndrome (ACS), the current study comprised 140 CAD patients without diabetes and 132 CAD patients with diabetes. Our findings were contrasted with those of related

research. According to the current study, the third and fourth decades saw the highest incidence of ACS in diabetics with inadequate glycaemic control, whereas the fifth and sixth decades saw the highest incidence in non-diabetics. This result is in line with the DiabCare Asia--India Study: Current Status of Diabetes Care in India [9].Sexual Incidence Male ACS incidence in our study was 80% in non-diabetics and 60.60% in diabetics. The incidence of ACS in females was 20% in non-diabetics and 3239.40% in diabetics. Diabetics were more likely than non-diabetics to develop ACS in females [10]. When the female patients exhibited symptoms of condition X, this risk was doubled. CAD Severity by Diabetes Duration In our study, 54.54% of diabetic patients had diabetes for more than ten years, whereas 45.45% had the disease for comparatively shorter periods of five to ten years. Those who had diabetes for more than ten years had a considerably greater incidence of triple/multi-vessel disease (73.61%). This result is consistent with a research by Fox et al. [11], which found that for every 10 years that the duration of diabetes increased, the risk of CHD increased by 1.38 times (95% CI, 0.99 – 1.92). Importance Levels of HbA1c In this study, we found that among diabetic patients with poor glycaemic control (HbA1c >8.5%), 53.33% had triple vessel disease and 25% had double vessel disease. These findings show that greater HbA1c levels, more coronary vessels, and more severe stenosis are associated with poor glycaemic control. This result is in accordance with a study by Saleem et al. that found a positive linear association between the Gensini score and HbA1C (r=0.427, p=0.001) and the length of DM (r=0.362, p=0.004). HbA1C was an independent factor that affected the Gensini score (p=0.021), according to multiple regression analysis [12]. 63.33% of the patients in our study who had diabetes mellitus and elevated HbA1c levels underwent CABG as a result of their treatment. indicating that individuals having coronary artery bypass surgery frequently have high levels of glycosylated haemoglobin. This result is consistent with another study by Engoren et al. that demonstrated that patients undergoing coronary artery bypass surgery have a high prevalence of elevated haemoglobin levels. Routine measurements should be made in order to enable the implementation of medication and lifestyle changes that reduce complications and death from diabetes mellitus [13]. The Angiographic Profile Coronary angiography in our investigation showed that patients with diabetes had a significantly greater frequency of multivessel disease (44%) compared to those without the condition (15%). This result is consistent with another Singh et al. study [14], which found that diabetics had a greater incidence of MVD (57.3%) compared to non-diabetics (41.3%). Another study at CMC Vellore found that in two different groups of 516 patients with and without diabetes, MVD was more prevalent among diabetics (87.5% vs. 79.6%) [15]. According to Henry et al., the prevalence of moderate (50% to 75% constriction) stenosis was significantly higher in diabetic patients than in non-diabetic individuals (50.6 versus 30.3%, $p < 0.001$). Furthermore, diabetes mellitus was a risk factor for mild stenosis on its own. In addition to having a tendency towards more diffuse disease, the lesions were more commonly found on the distal arteries and more often exhibited a three-vessel disease pattern [16]. According to Sousa JM et al., patients with diabetes had a considerably higher prevalence of severe three-vessel disease (28% x 10%) and completely occluded arteries (51 (23%) x 54 (14.3%), $p < 0.005$). Furthermore, individuals with DM were more likely to have an ejection fraction of less than 50%, which supports the diffuse pattern of atherosclerotic disease in DM patients [17]. The RCA in the diabetes group (40.88%) and the LAD in the non-diabetic group (36.77%) were the commonest vessels in our study. This result is consistent with prior research. In our study, 24.24% of diabetes patients and 13.63% of non-diabetic individuals had total blockage. ($p<0.01$) This result is statistically significant. Therefore, compared to patients without diabetes who also had acute coronary syndrome, diabetic patients had a considerably higher degree and severity of coronary artery disease. Other investigations, such as Mahdi Mossavi et al. [18], Uddin SN et al. [19], Nichoils et al. [20], Jamal S. Rana et al. [21], and Srinidhi S. Hegde et al. [22] indicated that diabetic individuals with acute coronary syndromes had high angiographic extent and severity of coronary artery disease.

CONCLUSION

Compared to people without diabetes, diabetics had more severe and extensive CAD. Although LMCA involvement was not statistically significant, diabetes patients were more likely to have severe stenosis and complete occlusion of their arteries. Those who had diabetes for more than ten years had a significantly increased incidence of triple vessel or multivessel illness. The primary treatment for the majority of diabetic people with ACS is CABG. High HbA1c levels were associated with patients receiving CABG, and patients with poor glycaemic control and elevated HbA1c levels displayed a heterogeneous pattern of atherosclerotic disease. Thus, it is necessary to regularly test HbA1c levels and implement lifestyle modifications and medication to reduce cardiovascular problems and morbidity from diabetes mellitus.

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