International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Presentation, Risk Factors and Angiographic Profile of Diabetic and Non-Diabetic Patients with Acute Coronary Syndrome: A Single Centred Observational Study from Central India

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Abstract: ***Introduction: "Diabetes mellitus" (DM) has garnered global concern for being an epidemic. Asian Indians are at greater risk of acute coronary events and that too at an earlier age. Hence this study was conducted in a tertiary care teaching hospital of central India to explore the differences in the presentation, risk factors and angiographic profile of cases of acute coronary syndrome with and without diabetes mellitus type 2. Methods: The present study is a single-centred observational study undertaken in the department of cardiology at a tertiary care teaching hospital in Nagpur, India. The study included 152 patients both diabetic as well as non-diabetic who were diagnosed with acute coronary syndrome. Frequency and percentages were calculated for quantitative data. Mean and standard deviations were calculated for continuous data and the student's t-test was used to compare means of two groups. The chi square test was used for categorical data. A p value less than 0.05 was considered to be statistically significant. Results: Out of 152, 71(46.71%) had ST segment elevated myocardial infarction, 61(40.13 %) had Non-ST segment elevated myocardial infarction, and 20 (13.15%) had unstable angina. Diabetic cases of ACS were significantly younger (49±5.2 years) as compared to non-diabetic cases. Females were more common in the diabetic group and gender was significantly associated with the diabetic status of ACS study subjects. Average BMI was significantly higher and obesity was more prevalent in diabetic group. Smoking, hypertension and dyslipidaemia were also more common among diabetic cases of ACS. Double/ triple vessel disease were significantly more common in diabetics as compared to non-diabetics. Conclusion: diabetic cases of ACS presented at a younger age, and the patients were more commonly females. Higher BMI and obesity was more common in diabetic cases. Smoking, hypertension and dyslipidaemia, and double/ triple vessel disease were also significantly more prevalent among diabetic cases of ACS.***

Keywords: Diabetes mellitus, acute coronary syndrome, presentation, risk factors, angiographic profile

1. Introduction

"Diabetes mellitus" (DM) has garnered global concern for being an epidemic. (1) It is a "chronic condition" which multiplies an individual`s risk for acquiring cardiovascular diseases and its complications. (2) Globally, an estimated 537 million population of adults aged 20–79 years that comprises of 10.5% of all people of this age group are considered to have diabetes. By the year 2030, nearly 643 million, and thereafter by the year 2045, 783 million people are projected to be living with diabetes (3). Close links have been established between DM and cardiovascular diseases (CVD). They are the leading causes of morbidity and mortality in diabetic patients. Cardiovascular (CV) risk factors like obesity, hypertension and dyslipidaemia are common in cases of DM type 2, which makes them increasingly vulnerable for experiencing cardiac events. There are several established mechanisms mentioned by the previously conducted studies that underlie the development of CVD in patients having type 2 DM (4-6).

Acute coronary syndrome (ACS) is referred to a group of conditions that includes but is not limited to "ST-elevation myocardial infarction" (STEMI), "non-ST elevation myocardial infarction" (NSTEMI), as well as unstable angina. This category of "coronary heart disease" (CHD), is held responsible for nearly one-third of the total mortality among the population older than 35 years of age (5-7). Diabetes mellitus is a major independent risk factor for acute coronary syndrome (ACS). Additionally, diabetic cases of ACS have increased risk of mortality as compared to their non-diabetic counterparts. (8)

Asian Indians are at a greater risk of acquiring "type 2 diabetes mellitus" (T2DM) and that too at a younger age as well as at comparably lower BMI values when compared to the "western population". Additionally, these Asian Indian populations with "Type 2 DM" harbour a much higher risk of developing "acute coronary artery disease" (CAD) as compared to their white counterparts. The prevalence of diabetes mellitus is on the rise since early 1960s, in both the urban and rural areas irrespective of their socioeconomic status. (9) Hence this study was conducted in a tertiary care teaching hospital of central India to explore the differences in the presentation, risk factors and angiographic profile of cases of acute coronary syndrome with and without diabetes mellitus type 2.

2. Methodology

The present study is a single-centred observational study undertaken in the department of cardiology affiliated with a tertiary care teaching hospital in Nagpur, India. The study included 152 patients of acute coronary syndrome. Ethical clearance was obtained from the institutional ethics committee. A written informed consent was obtained from all study participants. ACS was diagnosed by the presence of

typical chest pain and/or uneasiness, coupled with electrocardiographic changes, and elevation of cardiac enzymes. Cases were sequentially recruited in accordance to the inclusion and exclusion criteria from January 2025 to April 2025. Adult cases of ACS both with and without Diabetes mellitus (DM) type 2 were included in this study. Patients with DM type 1 and those not consenting for the study were excluded. Diabetes mellitus was classified based on the World Health Organisation definitions of "fasting plasma glucose (FPG) level of 126 mg/dL (7.0 mmol/L) or higher"/ "random plasma glucose level of 200 mg/dL (11.1 mmol/L) or higher" / HbA1c ≥6.5% were consider as diabetic. (10). Patients were categorised into two groups: diabetics and non-diabetics. Subjects of both groups underwent complete clinical and laboratory evaluation along with detailed medical histories.

Data was collected, compiled and entered in MS Excel. Frequencies and proportions were calculated and data was presented in tabular and graphical formats. Mean and standard deviations were calculated for continuous data and the student's t-test was used to compare means of two groups. The chi square test was used for categorical data. A p value less than 0.05 was considered to be statistically significant.

3. Results

We studied 152 cases of acute coronary syndrome presenting to our centre from January 2025 to April 2025. The average age of the study subjects was 58±6.5 years (mean ± SD). Our subjects were predominantly male (85, 55.92%). The average BMI of study subjects was 28.25±3.2 (mean ± SD) and more than half (53.28 %) were obese. The baseline characteristics of the study subjects have been detailed in **table 1**. **Fig 1** shows the distribution of study subjects according to their diagnosis. Out of 152, 71(46.71%) had ST segment elevated myocardial infarction, 61(40.13 %) had Non-ST segment elevated myocardial infarction, and 20 (13.15%) had unstable angina.

Table 1: Baseline characteristics of study subjects (n=152)

Variable		Value
Age (mean ± SD)		58±6.5 years
Sex	Male	85(55.92)
	Female	67 (44.08)
BMI (mean ± SD)		28.25±3.2
Obesity	Present	81(53.28)
	Absent	71 (46.71)
H/o smoking	Present	72 (47.37)
	Absent	80 (52.63)
H/o Alcohol consumption	Present	45 (29.61)
	Absent	107 (70.39)
Hypertension	Present	87 (57.24)
	Absent	65 (42.76)
Diabetes	Present	98 (64.47)
	Absent	54 (35.53)
Family history of CAD	Present	51 (33.55)
	Absent	101 (66.45)
Dyslipidaemia	Present	78 (51.32)
	Absent	74 (48.68)
Vessel involved	LAD	85 (55.92)
	LMCA	13 (8.55)
	LCx	24 (15.79)
	RCA	26 (20.39)

SD standard deviation, *BMI* body mass index, *CAD* coronary artery disease, *LAD* Left Anterior Descending, *LMCA* Left Main Coronary Artery, *LCX* Left Circumflex, and *RCA* Right Coronary Artery.

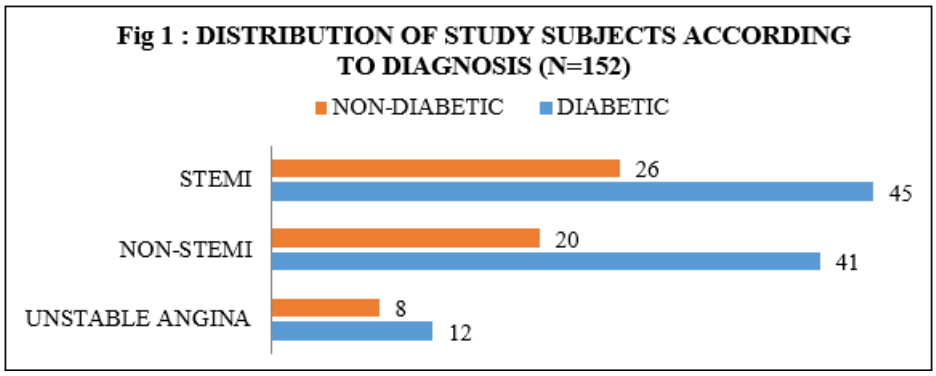

Figure 1: Distribution of study subjects according to diagnosis (n=152)

In our study we found that diabetic cases of ACS were significantly younger (49±5.2 years) as compared to non-diabetic cases. Females were more common in the diabetic group and gender was significantly associated with the diabetic status of ACS study subjects. Average BMI was significantly higher and obesity was more prevalent in diabetic group. Smoking, hypertension and dyslipidaemia were also more common among diabetic cases of ACS. Double/ triple vessel disease was significantly more common in diabetics as compared to non-diabetics **(Table 2).**

Table 2: Association of patient characteristics with diabetic status (n=152)

		Diabetic (n=98)	Non-diabetic (n=54)	P value
Age (mean ± SD)		49±5.2	55±9.3	**0.0001**
Sex	Male	42 (42.86)	43 (79.63)	**0.001**
	Female	56 (57.14)	11 (20.37)	
BMI (mean ± SD)		28.41±3.1	26.21±2.8	**<0.01**
Obesity	Present	59(60.20)	22 (40.74)	**0.02**
	Absent	39 (39.80)	32(59.26)	

H/o smoking	Present	53(54.08)	19 (35.19)	**0.0255**
	Absent	45 (45.92)	35 (45.92)	
H/o Alcohol consumption	Present	30(30.61)	15 (27.78)	0.714
	Absent	68(69.39)	39 (72.22)	
Hypertension	Present	62 (63.27)	25 (46.30)	**0.04**
	Absent	36 (36.73)	29 (53.70)	
Family history of CAD	Present	30(30.61)	21 (38.89)	0.30
	Absent	68 (69.39)	69.39 (61.11)	
Dyslipidaemia	Present	62 (63.27)	16 (29.63)	**<0.01**
	Absent	36 (36.73)	38 (70.37)	
Number of vessels involved	Single vessel disease	22 (22.45)	21 (38.89)	**0.03**
	Double/ triple vessel disease	76 (77.55)	33 (61.11)	
SD standard deviation, *BMI* body mass index, *CAD* coronary artery disease				

4. Discussion

The worldwide rise in diabetes mellitus (DM) has reached pandemic levels, contributing to serious microvascular and macrovascular complications, notably coronary artery disease (CAD), which negatively impacts clinical outcomes and cardiovascular prognosis. Individuals suffering from both acute coronary syndrome (ACS) and DM tend to experience poorer outcomes. This is attributed to multiple underlying pathophysiological mechanisms such as insulin resistance, elevated blood glucose levels, endothelial dysfunction, increased platelet activation and aggregation, and differences in plaque composition and the severity of coronary artery lesions. (10)

This study was conducted among 152 cases of ACS, including 98(64.47%) diabetics and 54(35.53 %) non-diabetics. A cross-sectional study from Indonesia found that among 73 cases diagnosed with ACS, 47 people (64,4%) were diabetic and 26 people (35,5%) were non-diabetic. (11) The average age of the participants in our study was 58±6.5 years (mean ± SD). Our subjects were predominantly male (85, 55.92%). Our findings were corroborated by another prospective observational study conducted on 111 patients with ACS in a tertiary care hospital of India, which reported that the mean age of their patients was 55.7 ± 13.7 years, with 75.68% males and 24.32% females. (12) The average BMI of study subjects was 28.25±3.2 (mean ± SD) and more than half (53.28 %) were obese. Existing literature highlights obesity as an independent risk factor for ACS. Studies consistently show that individuals with obesity, particularly those with severe obesity, are at a higher risk of experiencing ACS events, and this risk is independent of other cardiovascular risk factors. (12-14) Out of 152, 47.37 % were smokers, 29.61% consumed alcohol, 57.24 % were hypertensive, and 51.32% had dyslipidaemia. LAD was the most common vessel involved (55.92%). The most common diagnosis was ST segment elevated myocardial infarction, (71/152, and 46.71%).

A similar trend was observed in a prospective observational cross-sectional study involving 208 patients with acute coronary syndrome (ACS). ST-elevation myocardial infarction (STEMI) was the most frequently diagnosed type of ACS, occurring in 168 patients (80.77%), followed by non-ST-elevation myocardial infarction (NSTEMI) in 37 patients (17.79%), and unstable angina in only 3 patients (1.44%). Coronary angiography revealed single-vessel disease in 105 cases (50.48%), double-vessel disease in 78 cases (37.5%), and triple-vessel disease in 25 cases (12.08%). The right coronary artery (RCA) was the most commonly affected, with involvement in 63.41% of cases, followed by the left anterior descending (LAD) artery in 55.29%, and the left circumflex (LCX) artery in 36.54% of patients. (15)

In our study we found that diabetic cases of ACS were significantly younger (49±5.2 years) as compared to non-diabetic cases. Females were more common in the diabetic group and gender was significantly associated with the diabetic status of ACS study subjects. However, a similar Indian study reported no significant difference in the age and gender distribution in the diabetic and non-diabetic groups. (16) Another study examined 21,374 patients enrolled in the ACS QUIK trial in India and found that the cases with diabetes were more likely to be older and of female gender. (17) Average BMI was significantly higher and obesity was more prevalent in diabetic group. A Korean study among 6978 patients with ACS aged 40–79 years from the Korean National Health Insurance Service-Health Screening Cohort between 2002 and 2015 revealed that compared with patients without diabetes, those with diabetes (n = 3989, 57.1%) were older, were more likely to be females, and had higher BMI and systolic blood pressures. Smoking, hypertension and dyslipidaemia were also more common among diabetic cases of ACS (18). Double/ triple vessel disease was significantly more common in diabetics as compared to non-diabetics in several studies conducted earlier (19-21). A single centred hospital-based study from India had also reported that among hundred patients with ACS (50 diabetics and 50 nondiabetics) in their study, 22 (44%) out of 50 diabetic patients had triple or multi-vessel disease compared to only 8 (16%) out of 50 non-diabetics. (17)

Conclusion: In our study we found that diabetic cases of ACS presented at a younger age, and the patients were more commonly females. Higher BMI and obesity was more common in diabetic cases. Smoking, hypertension and dyslipidaemia, and double/ triple vessel disease were also significantly more prevalent among diabetic cases of ACS.

Ethical consideration: institutional ethics committee approval was obtained prior to the study. A written informed consent was obtained from all study participants.
Funding sources: None

Conflict of interest: None declared

Author Contributions: Both the authors contributed equally to the work.

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