

Coronary Artery Involvement in Diabetic and Non-Diabetic Patients with Acute Coronary Syndrome: A Case Control Study

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Abstract

Background: Coronary artery disease alone accounts for 40% of deaths in diabetics during the 4th decade of life and this amount to 50-70% of deaths above the age of 65 years. Diabetes has become predominantly a disease of the cardiovascular system and hence cardio-dialectology is fast emerging as subspecialty throughout the world to tackle the menace of cardiac related mortality and morbidity in diabetes particularly in NIDDM. **Objective:** To determine an geographic profile among diabetics and non diabetics with acute coronary syndrome. **Methodology:** A case control study among 50 diabetics and 50 non diabetic patients with acute coronary syndrome admitted in ICCU, attached to Tertiary care Medical College, Bangalore was carried out for a period of Two Years. Group 1 (Diabetic): Previously known diabetic or first time detected diabetic by American Diabetes Association (ADA) criteria presenting with acute coronary syndrome. Group 2 (Non-Diabetic): Cases presenting with acute coronary syndrome who are non-diabetic or not fulfilling ADA criteria. **Results:** In the study 50 diabetics and Non diabetics diagnosed with Acute coronary syndrome were included and compared. Among diabetics, 16% were diagnosed to have Unstable Angina, 32% as NSTEMI and 52% as STEMI. Among Non diabetics, 20% were diagnosed to have Unstable Angina, 24% as NSTEMI and 56% as STEMI. Among diabetics, 12% received Medical treatment, 38% underwent PTCA and 50% underwent CABG. Among Non diabetics, 22% received Medical treatment, 62% underwent PTCA and 16% underwent CABG. There was significant difference in Treatment between two groups. **Conclusion:** The severity of stenosis and total occlusion of vessels were more commonly seen in diabetic patients. The incidence of triple vessel or Multivessel disease was significantly high. Majority of the diabetic patients with ACS require CABG as the main mode of treatment.

Keywords: Coronary, Diabetic, Stenosis, Angina, Multivessel.

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Introduction

Cardiac affliction is by far the commonest cause of mortality in patients with diabetes.¹

Dyslipidemia is observed in practically all patients of type-2 diabetes mellitus and every high level of cholesterol in diabetics have 2-3 times higher CAD risk than non-diabetic individuals. Cardiac involvement in diabetes commonly manifest as coronary artery disease (CAD) and less commonly as diabetic cardiomyopathy and cardiac autonomic neuropathy.² Coronary artery disease alone accounts for the major chunk of mortality in diabetes. Accelerated and greater frequency of coronary artery disease has been widely

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documented in hospital, autopsy, epidemiological as well as longitudinal studies in several populations.

Coronary artery disease alone accounts for 40% of deaths in diabetics during the 4th decade of life and this amount to 50-70% of deaths above the age of 65years. Diabetes has become predominantly a disease of the cardiovascular system and hence, cardio-daibetology³ is fast emerging as subspecialty throughout the world to tackle the menace of cardiac related mortality and morbidity in diabetes particularly in NIDDM.

Although the patients history, physical examination and non-invasive techniques like resting ECG, Holter monitoring, stress test (TMT), stress echocardiography, stress thallium imaging are valuable in establishing the diagnosis of myocardial ischemia in diabetes, the definitive diagnosis of CAHD, its precise assessment and anatomic severity requires invasive diagnostic modality like coronary angiography.

Hence, this study was undertaken with the objective to determine angiographic profile among diabetics and non diabetics with acute coronary syndrome.

Material and Methods

A case control study among 50 diabetics and 50 non diabetic patients with acute coronary syndrome admitted in ICCU, attached to Tertiary care Medical College, Bangalore was carried out for a period of Two Years. Patients presenting with complaints of acute chest pain, breathlessness and diagnosed to have ACS based on ECG and cardiac enzymes were included in the study.

Inclusion Criteria

Group 1 (Diabetic): Previously known diabetic or first time detected diabetic by American Diabetes Association (ADA) criteria presenting with acute coronary syndrome.

Group 2 (Non-Diabetic): Cases presenting with acute coronary syndrome who are non-diabetic or not fulfilling ADA criteria.

Exclusion Criteria

Patients having impaired fasting glucose (FPG \leq 126 mg/dl but \geq 110 mg/dl, PPPG 140-200 mg/dl) presenting with acute coronary syndrome.

Methods

Institutional ethical clearance was obtained before the start of study and Informed consent was taken from all the subjects prior to the inclusion. Data was collected using structured questionnaire. Following investigations were done after selection of subjects in to the study. Fasting blood glucose levels by collection method, Random blood glucose levels, HbA1c in diabetic and newly detected diabetes mellitus, Complete cemogram, Blood urea, serum Creatinine, Lipid Profile, Cardiac enzymes; CPK-MB/LDH/SGOT, ECG, 2DECHO, Treadmill Test (TMT), Coronary Angiogram.

RBS, FBS were done for all the patients. HbA1c was sent in patients whom RBS or FBS was in higher range to confirm newly detected diabetes and in all diabetic patients to know the glycemic control. Patients with ACS, both diabetics and non diabetics were treated and once they were stabilized were taken up for coronary angiography which was performed by the standard Judkin's technique after adequate preparation. The indication for performing coronary angiography was unstable angina NSTEMI and STEMI and post infarct angina.

Severity of lesions as noted in angiography were graded as follows-

- Grade 0 : No disease
- Grade 1 : Intimal disease <50% stenosis
- Grade 2 : 50-69% stenosis
- Grade 3 : 70-95% stenosis
- Grade 4 : 96-99% stenosis
- Grade 5 : Total occlusion

Coronary artery narrowing of more than or equal to 70% was considered as significant stenosis.

HbA1c was done in all the diabetics patients and in newly detected T2DM patients. Web classified the diabetic patients with their HbA1c control as <7 is good control, 7-8.5 is fair control and >8.5 poor control.⁸⁰

Depending on the angiographic findings, further treatment was planned whether the patient requires medical line of management, PTCA or CABG. Angiographic parameters and further treatment required were compared between diabetic patients and non diabetic patients with ACS.

Statistical Analysis

Data was analyzed using SPSS 22 version (IBM SPSS Statistics, Somers NY, USA) software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. Independent t test was used as test of significance to identify the mean difference between two quantitative variables. p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.^{4,5}

Results

In the study 50 diabetics and Non diabetics diagnosed with Acute coronary syndrome were included and compared. Mean age of the diabetics was 52.12 ± 4.6 years and Non diabetics was 58.6 ± 2.4 years. There was significant difference in mean age and age distribution between two groups. Majority of subjects in both groups were males compared to females. There was no significant difference in gender distribution (Table 1).

Among diabetics, 16% were diagnosed to have Unstable Angina, 32% as NSTEMI and 52% as

Table 1: General Profile comparison between two groups

		Diabetic		Non Diabetic		p value
		Count	%	Count	%	
Age	<45 years	10	20%	4	8%	0.002*
	46 to 55 years	22	44%	12	24%	
	56 to 65 years	12	24%	12	24%	
	>65 years	6	12%	22	44%	
	Mean \pm SD	52.12 \pm 4.6		58.6 \pm 2.4		
Sex	Male	38	76%	40	80%	0.629
	Female	12	24%	10	20%	

Table 2: ACS distribution comparison between two groups

		Diabetic		Non Diabetic		p value
		Count	%	Count	%	
Type of ACS	Unstable Angina	8	16%	10	20%	0.648
	NSTEMI	16	32%	12	24%	
	STEMI	26	52%	28	56%	

Table 3: ECHO and Angiogram findings distribution between two groups

		Diabetic		Non Diabetic		p value	Odds ratio
		Count	%	Count	%		
ECHO	Normal LV Function	30	60%	40	80%	0.029*	2.667 (1.09, 6.523)
	LV dysfunction	20	40%	10	20%		
Angiogram (No of Vessel)	Single Vessel	12	24%	30	60%	<0.001*	0.2105 (0.089, 0.498)
	Double Vessel	15	30%	12	24%		
	Triple/Multi Vessel	23	46%	8	16%		
Angiogram (Type of Vessel)	LMCA	18	36%	3	6%	<0.001*	8.813 (2.397, 32.4)
	LAD	44	88%	40	80%		
	LCx	29	58%	14	28%		
	RCA	24	48%	16	32%		
Severity of Lesions	Grade 1	4	8%	20	40%	<0.001*	0.1304 (0.04, 0.419)
	Grade 2	8	16%	16	32%		
	Grade 3	10	20%	6	12%		
	Grade 4	16	32%	4	8%		
	Grade 5	12	24%	4	8%		

Table 4: Treatment comparison between two groups

		Diabetic		Non Diabetic		<i>p</i> value
		Count	%	Count	%	
Treatment	Medical Treatment	6	12%	11	22%	0.001*
	PTCA	19	38%	31	62%	
	CABG	25	50%	8	16%	

STEMI. Among Non diabetics, 20% were diagnosed to have Unstable Angina, 24% as NSTEMI and 56% as STEMI. There was no significant difference in Type of ACS between two groups (Table 2).

Among diabetics, 40% had LV dysfunction and among non diabetics, 20% had LV dysfunction. There was significant difference in ECHO findings between two groups. Diabetics had an odds of 2.67 times higher risk for LV dysfunction compared to Non diabetics.

Similarly there was significant difference in No of Vessel involved Type of Vessel involved and Severity of Lesions between two groups. Among diabetics majority had Triple/Multi Vessel (46%) involvement, LAD was the most common vessel involved and majority had Grade 4 (32%) and among Non diabetics, majority had Single Vessel (60%) involvement, LAD was the most common vessel involved and majority had Grade 1 (40%) (Table 3).

Among diabetics, 12% received Medical treatment, 38% underwent PTCA and 50% underwent CABG. Among Non diabetics, 22% received Medical treatment, 62% underwent PTCA and 16% underwent CABG. There was significant difference in Treatment between two groups (Table 4).

Discussion

In the study 50 diabetic and 50 non-diabetic subjects with CAD were included and analysed with special emphasis laid on the coronary angiographic findings in acute coronary syndrome (ACS). In the present study peak incidence of ACS in diabetics was in the fourth and Fifth decade as compared to fifth and sixth decade in non-diabetics. This finding was similar to the studies conducted by WHO. Raheja BS et al.⁶ findings also correlated with the present study findings that Indians tend to be diabetic at a relatively young age at about 45 years, a decade earlier than that of the west. In the present study majority of subjects were males in both the groups. In the Framingham study,⁷ diabetic women

were 2.7 times and men 3.1 times more likely to experience recurrent MI than non-diabetic counterparts. The risk of developing ACS in females was more in diabetics compared to non-diabetics. This risk was doubled when the female patients had features of syndrome X. In the present study among diabetics, 40% had LV dysfunction and among non diabetics, 20% had LV dysfunction. There was significant difference in ECHO findings between two groups. Diabetics had odds of 2.67 times higher risk for LV dysfunction compared to Non diabetics. Kenny A. Shaprio et al.⁸ observed that Systolic and diastolic abnormalities of LV dysfunction, more importantly diastolic have been shown to occur in asymptomatic diabetics. Similarly Fein F et al.⁹ observed that in the absence of significant CAD, some diabetic patients may have diabetic cardiomyopathy leading to systolic and diastolic left ventricular dysfunction.¹⁰

In the present study, coronary angiography revealed that the incidence of Multivessel disease in diabetics was much higher (46%) compared to non- diabetics which was only 16%. This finding correlates with the other study by Calton et al.,¹¹ showed higher incidence of MVD in diabetics (57.3%) compared to 41.3% in non-diabetics. In the study conducted at CMC Vellore, showed that MVD was more common in diabetics (87.5%) compared to Non diabetics (79.6%). In a study by Henry et al.¹² and Sau Paulo et al.,¹³ there was increased incidence of Triple vessel disease and more diffuse lesions were noted. The commonest vessel involved in our study was LAD in both the groups followed by Lcx and RCA. Total occlusion (Grade 5) was observed in 24% of diabetics and 8% of non diabetics. This finding was statistically significant.

Hence from the study it was observed the extent and severity of coronary artery disease was significantly high in diabetic patients with acute coronary syndrome when compared to non diabetic with acute coronary syndrome. This findings were similar in other studies like Mahdi Mossavi et al.,¹⁴ Uddin SN et al.,¹⁵ Nichoils et al.,¹⁶ Jamal S. Rana et al.,¹⁷ where they found the angiographic extent

and severity of coronary artery disease was high in diabetic patients with acute coronary syndromes.

Conclusion

ACS in diabetic patients presented much earlier in life compared tonon-diabetic patients. The severity and extent of coronary artery disease in diabetics was high compared tonon-diabetics. The severity of stenosis and total occlusion of vessels were more commonly seen in diabetic patients. The incidence of triple vessel or Multivessel disease was significantly high. Majority of the diabetic patients with ACS require CABG as the main mode of treatment.

Limitations

Correlation of Glycemic profile with Angiogram findings was not in the present study. Bias related to selection of subjects cannot be ruled out.

Recommendations

The study recommends for regular screening of CAD by ECHO, Lipid profile and early diagnosis of ACS and prompt treatment to reduce the mortality and morbidity among diabetics and Non diabetics.

Conflict of Interest: Nil

Prior publication: Nil

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