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Angiography Findings in Diabetic and Non-Diabetic Patients with Cardiac Symptoms

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ABSTRACT

Diabetes mellitus is a chronic metabolic disorder linked with a risk incidence of micro-vascular and macro-vascular illness. This is marked by impressive developments in our comprehension of the processes. The importance of coronary anatomy in predicting cardiovascular events has been known for Coronary Artery Disease, when studies like CASS (Coronary Artery Study) registry were published. This large cohort study showed the ability of anatomical scores of coronary artery disease to predict events, but their routine use was not incorporated to clinical practice. There was no statistical difference between demographic factors, when compared among diabetic and non-diabetic patients. Coronary angiography diagnosis, severe forms of coronary artery lesions were found common among diabetic patients as compared to non-diabetic patients. SYNTAX score has shown a strong positive correlation with severity of coronary artery disease involvement.

Keywords: Diabetes Mellitus, Coronary Artery Disease, SYNTAX Score, Diabetic, Angiography

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INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder linked with a risk incidence of microvascular and macrovascular illness. This is marked by impressive developments in our comprehension of the processes. The essential role of insulin in the control of glucose metabolism was explicitly illustrated in the early 1920's. [1]

Type 2 diabetes mellitus is a prevalent metabolic disorder that often leads to cardiovascular diseases and diabetic cardiomyopathy, which may lead to chronic pressure overload and myocardial infarction. Pathogenetic mechanisms includes mainly hyperglycemia and chronic as well as sustained hyperinsulinemia. Intracellular signaling pathways, increased susceptibility to ischemia, redox status, energy production are the other possible mechanisms. Both the conditions are multifactorial (genetic and environmental factors) in causation and the close relationship between Type 2 DM and cardiovascular diseases has been proved in various researches. Other common risk factors among both the conditions are: insulin resistance, inflammation, dyslipidemia, and thrombophilia [2]. Cardiovascular complications among diabetics, can be classified into macrovascular and microvascular. Diabetic patients have increased risk of cardiovascular risk specifically for coronary artery diseases [3].

Hyperglycemia and Insulin resistance are often associated with low-grade inflammation, oxidative stress, which triggers endothelial dysfunction and hence promots atherogenesis. Among the different soluble mediators like CRP, IL-6, IL-1β, TNF-α take part in atherosclerosis. Type 2 diabetes mellitus is also related with enhanced platelet and hemostatic functions. [4]

AIM AND OBJECTIVES

AIM

"To study the results of Coronary Angiography in Diabetic and compare with non diabetic patients with cardiac symptoms"

OBJECTIVES

To assess whether coronary artery disease is more common in diabetic patients. To assess coronary artery disease frequency compared with age of patients. To assess the complexity of coronary artery lesions in diabetic patients and to compare them with non-diabetic patients. To measure the severity of coronary artery disease in diabetes mellitus using the SYNTAX score.

REVIEW OF LITERATURE

The thorough review of literature was done by using appropriate MeSH (Medical Subject Headings). Some of the MeSH that were used are: Glucose metabolism in humans, Diabetes mellitus: Epidemiology, Diabetes mellitus: types, causes, Pathophysiology, Insulin resistance, Clinical presentation of diabetes mellitus, Complications of diabetes mellitus, Cardiovascular diseases and diabetes mellitus, Electrocardiogram changes in cardiovascular diseases, Coronary angiography findings and SYNTAX Score.

The importance of coronary anatomy in predicting cardiovascular events has been known for Coronary Artery Disease, when studies like CASS (Coronary Artery Study) registry were published. This large cohort study showed the ability of anatomical scores of coronary artery disease to predict events, but their routine use was not incorporated to clinical practice.[5] [6]

Nevertheless, a significant number of patients are eventually submitted to coronary angiography for diagnostic confirmation. Therefore, re-assessing the performance of anatomical scores to predict outcomes, in a context of newer clinical and interventional therapies, is potentially worthwhile. Currently, the SYNTAX (Synergy between percutaneous coronary intervention with Taxus and Cardiac Surgery) Score , a more elaborate method to quantify anatomic lesions, is an available online tool that estimates the anatomical extent of coronary artery disease.[7][8], [9]

The syntax score is a comprehensive angiographic scoring system based on coronary anatomy and lesion characteristics. It was initially developed to determine the extent of coronary artery disease and lesion complexity, which reflect the difficulties in performing myocardial revascularization, particularly percutaneous coronary interventions (PCI). [10]. In the SYNTAX trial, high Syntax score values (above 33) identified patients in whom coronary artery bypass grafting (CABG) resulted in better

outcomes than in patients submitted to percutaneous revascularization. Five-year follow-up of this trial identified patients with scores above 22 as more suitable for CABG.[7]

MATERIAL AND METHODS

Current case study in 18th month period (October 2016 to March 2018). The sample size of calculation was 225 cases.

Inclusion criteria

Case group - Diabetic patients with cardiac symptoms, with or without ECG changes, who have undergone coronary angiography.

Control group - Non-Diabetic patients with cardiac symptoms, with or without ECG changes, who have undergone coronary angiography.

Exclusion criteria

Case group- 1) Non-diabetic patients, 2) Age < 30 years. 3) Diabetic patients who were asymptomatic. And 4) Diabetic patients with advanced age (> 90 years).

Control group- Diabetic patients

OBSERVATION & RESULTS

The present study was conducted among 500 patients (250 diabetic and 250 non-diabetic with cardiac symptoms) admitted in ward or ICU under department of cardiology in KIMS Hospital during the period of 18 months after the approval of institutional ethical committee. Out of which, diabetic patients were included into the CASES group while non diabetic patients were included into CONTROL group.

Table 1: Age Distribution

Age distribution	Diabetic		Non Diabetic	
	n=250	%	n=250	%
31-40	26	10.4	33	13.2
41-50	39	15.6	42	16.8
51-60	93	37.2	97	38.8
61-70	52	20.8	51	20.4
71-80	40	16	27	10.8
Total	250	100	250	100

The present study analyzed age distribution among both the groups, it was observed that the majority of the patients among diabetic group belonged to age groups of 51-60 years followed by 61-70, 41-50 and 71-80 each.

Table 2: Distribution of LVEF

LVEF (Systolic function)	Diabetic		Non Diabetic	
	n=250	%	n=250	%
Normal (>50%)	129	51.6	162	64.8
Mild (40-49%)	48	19.2	55	22
Moderate (<40%)	44	17.6	23	9.2
Severe (<30%)	29	11.6	10	4
Total	250	100	250	100

The present study analyzed Left ventricular ejection fraction (LVEF) among our study subjects. Left ventricular ejection fraction is categorised in three groups accordingly - normal (EF >50%) mild (EF between 40%-49%), moderate (EF between <40%) and severe (EF <30%). It was observed that diabetic patients had more severe systolic dysfunction as compared to non diabetic patients.

Table 3: Distribution of diabetic patients according to coronary angiography diagnosis

Diagnosis on coronary angiography	n=250	%
Normal	31	12.4
Single vessel disease	94	37.6
Double vessel disease	72	28.8
Triple vessel disease	53	21.2
Total	250	100

The present study classified various subjects from the study sample according to their coronary angiography diagnosis. Diabetic patients, according to their coronary angiography diagnosis, were divided into general, single vessel, double vessel and triple vessel disease. 12.4% were found to be normal, 37.6% were suffering from single vessel disease, 28.8% were suffering from double vessel disease and 21.2% were suffering from triple vessel disease.

Table 4: Distribution of non-diabetic patients according to their coronary angiography diagnosis

Diagnosis of coronary angiography	n=250	%
Normal	27	10.8
Single vessel disease	129	51.6
Double vessel disease	55	22
Triple vessel disease	39	15.6
Total	250	100

In Table no. 4, the results are according to their coronary angiography diagnosis. 10.8% were found to be normal, 51.6% were suffering from single vessel disease, 22% with double vessel disease and 15.6% were suffering from triple vessel disease.

Table 5: Comparison between coronary angiography diagnosis among diabetic and non-diabetic patients

Diagnosis on coronary angiography	Diabetic		Non Diabetic	
	n=250	%	n=250	%
Single vessel disease	94	37.6	129	51.6
Double vessel disease	72	28.8	55	22
Triple vessel disease	53	21.2	39	15.6
Total	219	87.60	223	89.20
significance	Chi-square value: 6.95% p-value: 0.0308			

A Comparison between coronary angiography diagnosis among diabetic and non diabetic patients is given in table given below. It can be seen from the table given below that, occurance of severe forms of coronary artery disease seems to be more among diabetics. The findings using Chi-square test were found to be statistically significant.

Table 6: Distribution of SYNTAX scores between diabetic and non diabetic patients.

SYNTAX score	Diabetic		Non-Diabetic	
	n=250	%	n=250	%
Less than 10	19	7.6	57	22.8
11-20	77	30.9	97	38.8
21-30	91	36.4	85	34.8
>30	63	25.2	11	4.4
Total	250	100	250	100

SYNTAX scores were compared between diabetic and non-diabetic groups. It was observed that as the disease becomes severe, the score of SYNTAX is higher in diabetics than in non-diabetic patients. Non-diabetic patients have lower SYNTAX scores than diabetics.

DISCUSSION

The present study has total 500 patients (250 diabetic and 250 non diabetic) with cardiac symptoms admitted in ward or ICU under department of cardiology in KIMS Hospital during the period of 18 months. The study was approved by the institutional ethical committee. The 500 patients were divided into two groups: Diabetic patients were included into cases group while non diabetic patients were included into control group.

Avishek Saha et al conducted a study among 240 patients who presented with chest pain. In their study the mean age of presentation with cardiac symptoms was 55.27 ± 10.76 years., and it was consistent with our study[9]. M K Malthesh et al in their study among diabetics and non diabetic cases presented with acute coronary syndromes, observed that the peak incidence of ACS in diabetics was in the fourth and fifth decade as compared to the fifth and sixth decade in non-diabetics[11].

Among diabetic group, there were 52.8% male patients and 47.2% female patients, similarly among non diabetic group, 57.2% were males and 42.8% patients were females. The present study analyzed age distribution among both the groups, it was observed that the majority of the patients among diabetic group belonged to age groups of 51-60 years (20.4%). After analysis of demographic factors, there was no statistical significant difference between age distribution and gender distribution among diabetics and non diabetics. The study proved hypothesis of association of diabetes with coronary artery disease with the help of statistical correlation. There was strong positive correlation between coronary artery disease involvement (Single, double, triple vessel; disease) and SYNTAX score.

CONCLUSION

There was no statistical difference between demographic factors, when compared among diabetic and non diabetic patients. According to 2D ECHO findings, it was observed that reduced Left ventricular ejection fraction (systolic dysfunction), Diastolic dysfunction were found severe among diabetic patients than non diabetic patients. According to the present study, among coronary angiography diagnosis, severe forms of coronary artery lesions were found common among diabetic patients as compared to non diabetic patients. SYNTAX score has

shown a strong positive correlation with severity of coronary artery disease involvement (Single, double and triple vessel disease).

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