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Original Article

Frequency of Triple Vessel Coronary Artery Disease in Diabetic and Non-Diabetic Patients presenting with NSTEMI

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ABSTRACT

Multi-vessel coronary artery disease (MVD) has profound challenges to the revascularization system. Several investigations showed diverse forms of CAD associated with complete or incomplete revascularization in MVD in PCI. Diabetic patient had more multi-vessel CAD as compared to non-diabetics. **Objectives:** To determine the frequency of triple vessel coronary artery disease and afterwards compare the triple vessel coronary artery disease in diabetic v/s non-diabetics in patients presenting with NSTEMI. **Methods:** This Descriptive Cross-Sectional Study was conducted at Emergency Department of the National Institute of Cardiovascular Diseases (NICVD), Karachi for Six months from March 4, 2019, to September 3, 2019. Samples size n=250 was calculated through non-probability consecutive sampling technique. All the patients of either gender presenting NSTEMI and undergone coronary angiography, aged >40 and < 75 years and agreed to participate after their volunteer affirmation were included in this study. **Results:** Out of 250 patients, 75.6% were male while 24.4% were female with a mean age of 56.60. Triple Vessel Disease was documented in 107(42.8%) patients. As for the study main objective variable diabetes, the comparative analysis of triple vessel disease between diabetic versus non-diabetic resulted in significant difference was noted i.e., p-value =0.030. **Conclusions:** Diabetic Mellitus has a significant factor for 3VD among the patients of NSTEMI patients. As a risk factor and comorbid, DM screening is a necessary factor in all NSTEMI patients who diagnosed with 3VD.

INTRODUCTION

Cardiovascular diseases (CVD) account for 17.9 million deaths each year globally out of which 7.2M deaths were due to CAD [1]. It has been evaluated that presence of 3VD among ACS patients is the most lethal and severe form of coronary artery disease. Moreover, the Highest susceptibility of CAD was observed in ethnicity of Indo-Asian origin and is therefore unexpectedly high mortality in the Indo-Pak subcontinent [2]. Multi-vessel coronary artery disease (MVD) has profound challenges to the revascularization system. Several investigations showed diverse forms of CAD associated with complete or incomplete revascularization in MVD in PCI. 3VCAD is said to be strongly associated form of atherosclerosis and is practically handled by CABG, due to its worst life long-term prognosis [3]. According to the report, 3VCAD presented in 8.7% of cases with NSTMI. Mohr et al., carried out a cross-sectional study that revealed MVCAD is the reason for NSTEMI [4]. In 2018 a cross-sectional study was done with a sample size of 123 patients presented with complaints of NSTEMI. Their results showed raised troponin I levels, more

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than ten times which was the most extreme limit of the typical reach in NSTEMI patients, and it was firmly connected with more unpredictable and severe CAD [5]. In 2016, a cross-sectional study was conducted to find out the frequency of 3VD in patients with NSTEMI. They assumed that the patients with NSTEMI were probably going to have 3VD [6]. A retrospective study in the same year 2016 was carried out to find association between coronary risk factor profile and angiographic features between young STEMI and NSTEMI patients. Their results showed 3VD was significantly more common in the NSTEMI group [7]. Heitner et al., in 2019 had realized that the infarct-related artery (IRA) by coronary angiography can be demanding in patients with NSTEMI. Their analysis has shown that Delayed-Enhancement Cardiac Magnetic Resonance DE-CMR might prompt another IRA analysis or explain non-ischemic pathogenesis [8]. Among the risk factor of CAD, DM plays a major role in cardiovascular diseases and hence cardio-diabetology is the fast aroused subspecialty of CVDs around the world. According to WHO diabetes will be ranked 4th in Pakistan by the year 2025 which was further proofed by a study that reported 3VD 32.78% v/s 27.15% in diabetes v/s non-diabetic NSTEMI patients. In addition to that diabetic patient had more multi-vessel CAD as compared to non-diabetics. The global and regional Mortality projections and disease burden, in the next 20 years CAD will remain the leading cause of death [9]. With this approach, this study aims to determine the frequency of triple vessel coronary artery disease and afterward compare the 3VD in diabetic v/s non-diabetics in patients presenting with NSTEMI.

METHODS

The descriptive cross-sectional study was conducted at the Emergency Department of the National Institute of Cardiovascular Diseases (NICVD), Karachi for Six months from March 4, 2019, to September 3, 2019. Samples size n=250 was calculated through non-probability consecutive sampling technique and by using W.H.O sample size calculator version 2.0, with a confidence interval at 95%, the margin of error (d) 3.5% and P =8.7% expected prevalence of TVCAD. All the patients of either gender presenting NSTEMI and undergone coronary angiography, aged >40 and < 75 years and agreed to participate after their volunteer affirmation were included in this study. Patients diagnosed with chronic kidney diseases who are on dialysis (GFR<15ml/min/1,73m2), anemia (Hb< 7g/dl), ejection fraction less than 20% (low predictor of mortality rate), previous history of coronary artery bypass graft, prior history of any cardiac-related surgery, and History of circulatory collapse requiring cardiopulmonary resuscitation or any major complication during angioplasty like cardiogenic shock, renal failure or unconsciousness, (confirmed through patient history) and situs inversus were excluded from this study. The study was approved by the ethical committee of the College of Physicians & Surgeons, and the National Institute of Cardiovascular Diseases (NICVD), Pakistan (Ref. No: CPSP/REU/CRD-2016-195-1364). Written informed consent was taken from the patient who fulfilled the inclusion criteria were enrolled in this study. In Performa, baseline demographic data including name, age, gender, and admission date were recorded. All patients undergo coronary angiography procedure, having NSEMI with occluded arteries leads to AVR and 3VCAD, under the supervision of experienced consultant cardiologists practicing for > 5 years. All data regarding complete clinical investigations were recorded by the principal investigator on a precontrive Performa. Confounding and biased variables were strictly followed by controlling inclusion-exclusion criteria. Data analysis was done by using SPSS version 20. Mean ± SD was calculated for height, weight, BMI, and age. Categorically defined variables were calculated for gender, blood pressure, obesity, smokers/ non-smokers, family history of cardiovascular diseases, and impact of these on TVCAD, where two-sided probability value < 0.05, considered as statistical criteria of significance for diabetic v/s non-diabetics group. A Chi-square test was used to observe the effect of 3VD on diabetic and non-diabetic patients. For the graphical presentation of data, tar graphs and pie charts were used. Probability value < 0.05 was used to check the significance criteria. Reference for the cutoff values used for the study as per WHO and Asian criteria is given in Table 1.

Weight	"WHO Criteria" BMI Cut Off (Kg/m2)	"Asian Criteria" BMI Cut Off (Kg/m2)
Under Weight	<18.5	<18.5
Normal	18.5-24.9	18.5-22.9
Over Weight	25-29.9	23-24.9
Pre-Obese	-	25-29.9
Obese	≥ 30	≥30
Obese Type 1 (Obese)	30-40	30-40
Obese Type 2 (Morbid Obese)	40.1-50	40.1-50
Obese Type 3 (Super Obese)	>50	>50

Table 1: BMI Standard Chart for Adults (both Male and Female) [10]

RESULTS

Out of 250 patients, 75.6% were male while 24.4% were female with a mean age of 56.60 and standard deviation ±7.724 and BMI mean was 26.58 ± 3.857. The mean ± SD of height was 1.63±0.095 while weight was 70.20 ± 8.682. The prevalence rate of hypertension was found to be 60.8% while 47.2% of patients was Diabetes Mellitus. 105(42%) were smokers and 145(58%) were Non-Smokers. Obesity was noted in 50(20%) patients whereas a Family history of

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heart disease was documented in 63(25.2%) patients and Triple Vessel Disease was documented in 107(42.8%) patients (Table 2). However, Triple vessel disease was found in 11.6% of patients with family history and 31.2% in patients with no family history which shows a non-significant association between family history and triple vessel disease (p=0.549%). In stratification of BMI and triple vessel disease, 17 – 27 and > 27, BMI and triple vessel disease have no significant association i.e. (p= 0.662). Triple vessel disease was found 18.8% in smokers and 24.0% in non-smokers which shows a non-significant association between smoking and triple vessel disease i.e. (p= 0.594). As for the study main objective variable diabetes, the comparative analysis of triple vessel disease between diabetic versus non-diabetic resulted in significant difference was noted i.e., p-value =0.030 (Table 2).

	Triple Vessel Disease		p-Value
	3VD	Non 3VD	
Age Group in Years			
45 -5	50 (20.0%)	99 (39.6%)	0.001
8>58	57 (22.8 %)	44 (17.6 %)	
Gender			
Male	83 (33.2%)	106 (42.4 %)	0.530
Female	24 (9.6 %)	37 (14.8 %)	
Family History			
Yes	29 (11.6%)	34 (13.6%)	0.549
No	78 (31.2%)	109 (43.6%)	
Body Mass Index (In Kg/m2)			
17 - 27	68 (27.2 %)	87 (34.8%)	0.662
>27	39 (15.6%)	56 (22.4%)	
Hypertension			
Present	76 (30.4%)	76(30.4%)	0.004
Absent	31(12.4%)	67(26.8%)	
Obesity			
Present	20 (8.0%)	30 (12.0%)	0.665
Absent	87 (34.8%)	113 (45.2%)	
Smoking Status			
Present	47 (18.8%)	58 (23.2%)	0.594
Absent	60 (24.0%)	85 (34.0%)	
Diabetes Mellitus			
Present	59 (23.6%)	59 (23.6%)	0.030
Absent	48 (19.2%)	84 (33.6%)	

Table 2: Association of demographics characteristics, baseline characteristics, and risk factors with triple vessel coronary artery diseases. Chi-Square T-Test Applied

In the stratification of age group 45 -58 and >58 years, triple vessel disease was found to be 20% and 22.8%, highly showed association between age and triple vessel disease with a p-value = 0.001. In the comparison of triple vessel disease between gender and triple vessel disease, males 33.2% and fhfg9.6% in females were evaluated beside no significant difference was noted in terms of p-value i.e., 0.530. Triple vessel disease was found at 30.4% in hypertensive and 12.4% in non-hypertensive patients. P-value showed a significantly higher association between hypertension and triple vessel disease i.e., P=0.004. In the stratification of obesity, triple vessel disease was found to be 8.0% and 34.8% respectively which shows a non-significant association between obesity and early triple vessel disease (P=0.665) (Figure 1).

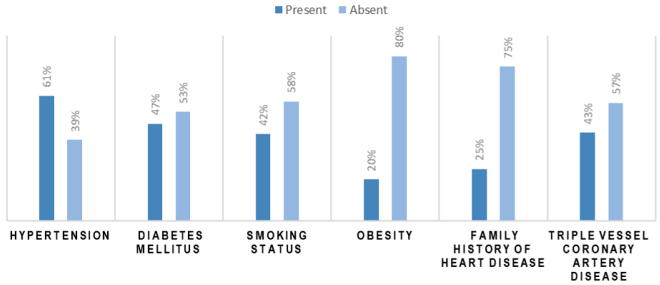

Figure 1: Graphical stratification of variables presence and absence in this study sample size of the diabetic and non-diabetic NSTEMI patients

DISCUSSION

It's becoming increasingly prevalent in our community to have an acute coronary syndrome because of the fast adoption of a sedentary lifestyle, just like in other Asian countries. In a cohort study of 1263 diabetic patients who went through the angiographic screening, 430n had been diagnosed with MVD. After long-term follow-up, it has been validated that PCI has a low mortality rate and require less revascularization as compared to CABG [11]. Clinical investigation results in CAD with DM-II were poor regardless of progress in medicines. Furthermore, this article's findings suggested CABG was better than PCI in treating diabetic patients with MVD. CAD in comparison between diabetic and non-diabetic patients found to be CAD in diabetics had a significantly higher percentage of the extreme and unusual events. Diabetics have a higher danger factor profile and poor clinical results [12]. Retrospective data were retrieved of 2260 young females who went through PCI found out dyslipidemia was the main reason behind ACS in females [13]. A systematic review on the role of advanced glycation end products in the development of coronary artery disease among DM and non-DM, used any therapeutic agents in order to reduce the circulating AGE would be helpful to reduce the complication of DM for the treatment of CAD [14]. If a patient has NSTEMI with coronary artery disease in the left main or three arteries, they have a high mortality rate [15]. Because of this, the use of non-invasive diagnostic tools like the ECG is essential for the early and accurate detection of severe disease in the left main or three vessels CA. To sum up, the findings of these studies offer substantial evidence for increasing the ECG's ability to

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predict clinical outcomes in patients with NSTEMI by taking into account the amount or distribution of ST-segment depression (STD) [16, 17]. In the present study Mean +/-SD of age was 56.60 +/- 7.724 years among them 75.6% were male and 24.4% were female. Hypertension was found in 60.8% while 47.2% were noted as diabetic. In a comparison of triple vessel disease between diabetic versus non-diabetic significant difference was noted i.e. (p=0.030). Our results are comparable with all national and international studies. In the current study, triple vessel disease was documented in 42.8% of patients. Likewise, our study result, Shaikh et al., reported 30.2% of patients presented with triple vessel disease [18]. In the present study Mean ± SD of age was 56.60±7.724 years among them 75.6% were male and 24.4% were female. Hypertension was found in 60.8% while 47.2% were noted as diabetic. In 74 comparisons of triple vessel disease between diabetic versus nondiabetic significant difference was noted i.e. (p=0.030). On the other hand, in Tanindi et al., study 42.9% of patients were diabetic [19-22]. Results are comparable with all national and international studies. Study design which was cross sectional was our main limitation of the study.

CONCLUSIONS

Diabetic Mellitus has a significant factor for 3VD among the patients of NSTEMI patients. As a risk factor and comorbid, DM screening is a necessary factor in all NSTEMI patients who diagnosed with 3VD.

Conflicts of Interest

The authors declare no conflict of interest

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