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ORIGINAL ARTICLE

To determine the frequency of triple vessel coronary artery disease in patients admitted with acute coronary syndrome.

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ABSTRACT… Objective: To determine the frequency of triple vessel coronary artery disease in patients less than 40 years of age undergone diagnostic coronary angiography and were admitted with acute coronary syndrome **Study Design:** Cross Sectional study. **Setting:** Department of Cardiology, Punjab Institute of Cardiology, Lahore. **Period:** 3rd Sep 2018 to 2nd March 2019. **Methods:** It was consisted of 90 patients **Results:** Total 90 cases were enrolled in the study. All presented with central or left sided chest pain clinically diagnosed to be having acute coronary syndrome. All patients undergo diagnostic coronary angiography for the first time. 36.7 % of the presenting cases included in the present study were females while 63.3 % were males who had acute coronary syndrome. Average age of patients included in present study was 30.1±5.9 Data was stratified according to age, gender, type of ACS present. Post stratification chi-square test was applied. It showed that 23.29 % patients had triple vessel coronary artery disease whereas 76.71% did not have triple vessel coronary artery disease. **Conclusion:** TVCAD was observed in 23.29% of patients presented with acute coronary syndrome in patients less than 40 years of age.

Key words: ACS Acute Coronary Syndrome, TVCD Triple Vessel Coronary Artery Disease.

INTRODUCTION

In developed countries, cardiovascular diseases are perhaps the most common cause of death. It is responsible for about one-third of all deaths in individuals more than 35 years of age. Disease of coronary artery can be divided into acute coronary syndrome and stable ischemic heart disease. There are different forms of acute coronary syndrome. ST segment elevation myocardial infarction accounts for 25-40% of myocardial infarction with mortality of 5-6% in the in-hospital patients in the developed countries of the world. World-wide acute coronary syndrome along with vascular heart disease poses one of the big health issues.[1] Among many other causes, atherosclerosis is the main cause of CAD and is characterized by accumulation of lipids, inflammatory debris and fibrous elements on the walls of coronary vessels. For Acute coronary artery syndrome of none ST elevation variety, proper timing in invasive cardiac angiography was subjected to a research study and observed that little evidence was available on this issue.[2]

Acute coronary syndrome is the first manifestation of ischemia in majority of young patients as compared to older individuals. In recent era, the use of coronary artery topography has swiftly increased in order to diagnose chest pain issues.[3] The management of young patients with coronary disease is quite challenging for the clinicians because these might anticipate a life expectancy measured in decades rather than years. Other than smoking, a subset of ST-segment elevation myocardial infarction in the very young (≤ 40 years) is most likely to be related to either illicit drug use or nontraditional risk factors.

The independent risk factors for coronary artery disease include cigarette smoking, diabetes,

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hyperlipidemia, and high blood pressure. Acute coronary artery syndrome of none ST elevation variety in adults usually have severity of lesion and require revascularization completely.[4]

Invasive coronary angiography, the gold standard to diagnose coronary artery disease, leads to visualization of coronary arteries directly thus defining the site of lesion & then its management plan accordingly to individual patients.

In acute coronary syndrome patients, results of percutaneous coronary intervention and coronary angiography are less known.[5] Based on severity of disease, obstructive coronary artery disease is divided as single, double-, or triple vessel coronary artery illness with significant stenosis if narrowing is >70%. In a study done by Khan H, the frequency of triple vessel coronary artery disease was studied.[8]

For ruling out coronary vessel disease in patients of non-ST segment elevation, the role of coronary CT angiography is limited as a valid CT angiography could be limited due to calcification of cardiac vessel.[6] In that study a total 400 patients of age less than 40 years were included who undergo diagnostic angiography. The results of that study showed that the triple vessel coronary artery disease was present in 18 % of all those patients. For Acute coronary artery syndrome of none ST elevation variety, invasive approach was proved to be more worth-while in comparison to be conservative for survival without any cardiac event.[7] In my study I want to find out the frequency of triple vessel coronary artery disease in young patients who are admitted with acute coronary syndrome and undergo conventional angiography. The results of my study will help in formulating better guidelines for management and prevention of coronary artery disease in young patients. Triple vessel coronary artery disease is the presence of narrowing or blockages in all three of the major coronary arteries that supply blood to the heart and these blockages occupy 50 percent or more of the diameter of the artery. Acute coronary syndrome is a condition in which patient has central squeezing chest pain for > 30mins with or without nausea, diaphoresis and/ or shortness of breath. It consists of unstable angina, non-ST segment elevation & ST elevation myocardial infarctions. ST segment elevation myocardial infarction is a condition defined by symptoms of acute coronary syndrome and ECG changes of ST elevation of minimum 2 mm in two consecutive leads and elevated serum cardiac markers (Trop. I more than 0.30 ng/ml). Non -ST elevation myocardial infarction is a condition characterized by chest pain of acute coronary syndrome and elevated cardiac markers (Trop. I more than 0.30 ng/ml) with or without ECG changes of ischemia including ST segment depression or T wave inversion. Unstable angina is a condition characterized by chest pain with normal cardiac enzymes (Trop I less than 0.30 ng/ml) with ECG changes of ischemia including ST segment depression or T wave inversion.

METHODS

It was conducted at the Cardiology department, Punjab Institute of Cardiology, Lahore from 3rd September 2018 to 2nd March 2019. It was a cross sectional study. The By using WHO sample size calculator sample size of 90 patients[8] was calculated at 5% level of significance and 8% margin of error and taking expected frequency of TVCAD 18 %. Confidence level = 95%. It was non probability consecutive type of sampling.

Inclusion Criteria

All 90 patients of less than 40 years, of both genders, with acute coronary syndrome, undergoing diagnostic angiography for the 1st time were included.

Exclusion Criteria

Patients with serum creatinine more than 1.5mg/dl, hemoglobin less than 8 gm/dl, having INR more than 1.4, with H/O of Percutaneous Coronary Intervention (PCI) & with H/O Coronary Artery Bypass Grafting (CABG) were excluded.

Data Collection Procedure

After getting permission by Ethical review committee (CPSP/REU/CRD-2016-070-1400)[11], Punjab institute of cardiology, total 90 patients of acute coronary syndrome undergoing coronary angiography were selected for study through

angiography department, Punjab institute of cardiology, Lahore. Procedure was explained to individual patients and consent was demanded. Coronary angiography was performed by consultants and I assisted them. Either femoral or radial artery access was used for the procedure. Consultants found the coronary lesions. Presence of Single, double and triple vessel disease was noted. Demographic data and required information was collected.

Data Analysis

Data was analyzed by SPSS-v 22. Quantitative variable like age was calculated by mean & standard deviation. Qualitative variables like gender, triple vessel coronary artery disease, type of acute coronary syndrome were presented in the form of frequencies & percentages. Effective modifiers like age, type of acute coronary syndrome & sex were stratified to control its effect on outcome variables. Post stratification chi-square test was applied. P value ≤ 0.05 was taken as significant.

RESULTS

Total 90 patients presented with acute coronary syndrome and underwent diagnostic angiography for the first time. 36.7 % of the presenting cases included in the study were females while 63.3 % males had acute coronary syndrome. Minimum age in the patients was 18 years and upper age limit was 40 yrs. Average age of patients was 30.3±5.9yrs. These were divided into 3 groups on criteria of age. Study showed that 18% (n=17) were between 18-26 years of age, 44.4% (n=40) between 27-33, and 36.6% (n=33) between 34-40 years of age. Distribution according to type of ACS showed that 55.6% (n=50) patients were with STEMI, 29% (n=32.2) with NSTEMI and 12.2% (n=11) patients were admitted with unstable angina. Presence of three vessel coronary artery disease was noted. It showed that 23.3% patients (n=21) had triple vessel coronary artery disease whereas 76.7% did not have TVCAD. Some of them were having single vessel disease or two vessel disease or few of them did not have significant coronary artery disease. But only patients with TVCAD were of focus. Results showed that TVCAD was more common in males with 29.8 % (n=17) of males had TVCAD while only 12% (n=4) females had TVCAD. It was found that TVCAD was most common in age group of 34-40 years being 33.3% (n=11) and least common in 18-26 years age group being no case found of three vessel disease in this group. 2nd group containing patients with age 27-33 years was having TVCAD as 25% (n=10). STEMI was present in 35.3% (n=6) of patients in age group 18 to 26 years whereas NSTEMI and unstable angina were 47.1% (n=8) and 17.6% (n=3) respectively. Whereas age group 27 to 33 years were having STEMI 65% (n=26) with NSTEMI 27.5% and Unstable angina in 7.5% (n=3). 3rd group from 33 to 40 years age was having STEMI 54.4% (n=3), NSTEMI 30% (n=10) and unstable angina 15.2% (n=5). TVCAD and type of ACS was found on gender basis. 29.6% (n=17) male were having TVCAD whereas 12.1% (n=4) female were having TVCAD. Relationship among TVCAD and type of ACS was found. 26 % (n=13) patients with STEMI were having TVCAD. Among NSTEMI patients, 24.1% (n=7) were having TVCAD and 9% (n=1) from unstable angina patients were having TVCAD. Effect modifiers like age, type of ACS was stratified. Post stratification chi-square test was applied. P value ≤ 0.05 was significant.

Frequency of TVCAD after stratification according to gender

TVCAD		Gender		P-Value
		Male	Female	
TVCAD	Yes	17 (29.8%)	4 (12.1%)	0.047
	No	40 (70.2%)	29 (87.9%)	

Table-I. TVCAD according to gender (n=90)

Frequency of TVCAD after stratification according to age groups

TVCAD		Age Groups			P-Value
		18-26 yrs	27-33 yrs	34-40 yrs	
TVCAD	Yes	0	10 (25%)	11 (33.3%)	0.046
	No	17 (100%)	30 (75%)	22 (66.7%)	

Table-II. Stratification for age (n=90)

Frequency of ACS after stratification according to age

Type of ACS		Age Groups		
		18-26 yrs	27-33 yrs	34-40 yrs
Type of ACS	STEMI	6(35.3%)	26(65%)	18(54.5%)
	NSTEMI	8(47.1%)	11(27.5%)	10(30.3%)
	Unstable Angina	3(17.6%)	3(7.5%)	5(15.2%)

Table-III. Type of ACS stratified for age (n=90)

Frequency of TVCAD stratified for type of disease

Type of ACS		TVCAD		P-Value
		Yes	No	
Type of ACS	STEMI	13 (26%)	37(74%)	0.483
	NSTEMI	7(24.1%)	22(75.95%)	
	Unstable angina	1(9.0%)	10(91%)	

Table-IV. TVCAD stratified for type of ACS (n=90)

DISCUSSION

According to results of the study frequency of TVCAD among patients of ACS undergoing diagnostic angiography was 23.3 %. Rest of the patients had either single vessel or two vessel disease, few patients did not have significant coronary artery disease. Results of my study show slightly greater frequency of TVCAD in young patients < 40 years of age compared to study done by Khan at all which showed frequency of18% of TVCAD in this age group.[9] He also studied frequency of SVD and DVD in acute coronary syndrome. It was a comparative study where total of 400 patients were include to compare frequency of TVCAD in different age groups. In his study 48 (12%) patients were age < 40 yrs. In my study 90 patients of age between 18 – 40 years were included. Average age of the patients included in the study was 30.3 ± 5.9 years compared to 52.78±10.2 years in his study.

In study done by Khan at all 77.5% of included patients were males and 22.5% were female patients this is in accordance with my study in which 36.7% patients were females and 63.3% male patients were included, which shows that acute coronary syndrome is predominantly a disease of male gender. Patients are frequently hospitalized with acute coronary artery syndrome of none ST elevation variety but evidence in this regard is little.[10] In his study Khan et all also studied frequency of various risk factors including smoking, HTN, DM and hyperlipidemia. These risk factors were not included in my study. Khan at all also studied frequency of individual artery involvement in ACS. Pathak at all performed a study to evaluate frequency of risk factors, angiography characterization & prognosis in young patients. Complex heart vessels anatomy in patients of acute coronary artery syndrome was associated with increased TyG index.[11] A total 90 patients of less than 40 years were enrolled in the study. The average age at presentation was 34.4 years for men & 35 years for women that was higher than mean age of my study group. 96.4% of included patients were male in this study. In patients having ischemia, to evaluate micro vascular disease, using Accul MR could have provided valued knowledge which could enhance physiological assessment of circulation at micro level.[12] Out of 111 patients 17% patients had UA comparable to my study where 12.2 % patients had unstable angina. In his study larger proportion (82.2%) had STEMI compared to 55.6% of study population in my group. Pathak at all found that triple vessel disease was present in 10.22% in all patients that is lower than results found in my study.

A research study in Vietnam documented the data for assessment of frailty in patients of acute coronary syndrome.[13] He also found that single vessel disease was most commonly involved being 60%. 14.5% patients had double vessel involvement. Acute thrombosis of stunt is linked to raised mortality and morbidity. Evaluation of prognostic values for c. proteins to albumin ratios and the systemic immunological inflammation index was aimed for prediction of acute thrombosis of stunt for acute coronary artery syndrome patients who had to undergo percutaneous cardiac intervention.[14] Among single vessel disease left anterior descending artery was most commonly affected. He also studied frequency of risk factors of CAD in his study. A study also documented that for suspected acute coronary artery syndrome patients having unobstructed

heart vessels, there exists no difference of mortality amongst women and men if they undergo CMR.[15] Hypertrophied myopathies of heart are usually inherited which affected one in five hundred people.[16] Kumar at all performed a study to determine findings on angiography in young patients with acute chest pain. Acute condition of myocarditis involving inflammatory condition of myocardium is mostly viral.[17] None active and active cancers have association to a raised one year all-causes mortality in comparison to patients having no cancer or cancer.[18] The patients having raised GRACE and TIMI have more association to significant angiographic lesion along with increased CABG referral in comparison to low risk patients.[19] He analyzed young patients (age <40 years) with acute ACS who underwent coronary angiography. Ischemic risk factors and angiography findings were compared among patients having STEMI & NSTEMI/UA types of acute coronary syndrome. In acute coronary artery syndrome, NIVCD, RBBB, LBBB is highly associated to mortality.[20]

820 patients of age ≤40 year age were included. Of them 74% (n=611) patients exhibited STEMI compared to my study where 55.6% patients had STEMI. Rest of the patients 26%(n=209) had NSTEMI or unstable angina. As per W.H.O, diseases of coronary artery are the major causes of cardiovascular associated deaths causing 7 million above deaths a year which makes over thirteen percent global mortality.[21] Angiography findings showed that single-vessel was much more commonly affected in STEMI group (56.61% compared to 36.61 % in non-STEMI group) whereas it was found that triple-vessel coronary artery disease was significantly common in NSTEMI/ unstable angina group (3.61% in STEMI group vs 10.51% respectively; For patients of acute coronary artery syndrome, a research study was conduct to determine the role of myocardial bridge in progressing atherosclerosis of left descending coronary artery.[22]

P<0.001). In my study it was found that 26%(n=13) patients with STEMI had TVCAD, 24.1% (n=7) patients having NSTEMI had TVCAD, while only 9% (n=1) of patients who presented with angina had TVCAD. The condition causing reduction or stoppage of heart blood supply is called acute coronary artery syndrome.[23] That is contrary to results Kumar at all found in his study. He also found that left anterior descending was much more commonly affected in STEMI group (55.31% vs 40.21% in NSTEMI group; P<0.001), whereas left circumflex was more commonly affected in NSTEMI /UA group (11.8% vs 23.4%). This was the same as Pathak et al found in his study. Of note, smoking/tobacco was perhaps the most important coronary risk factor with prevalence of as high as 65% in the two groups. This information is of high value for the prevention & treatment of CAD considering that acute coronary syndrome itself is not very common in young patients.

CONCLUSION

Young patients with myocardial infarction have very good short term prognosis & long time follow up is required to detect any adverse long term outcome and its correlation with coronary angiography findings at presentation. Though acute coronary syndrome is not really found in young adults age 40 years or less, it constitutes an important challenge for both patient & treating physician. It can have a devastating effect on the more active life of young patients who have different risk factor profile. Smoking is most important of them all. Risk factors identification and their control is very much important in both primary & secondary prevention in young patients with CAD. These results strongly suggest that coronary angiography should definitely be performed in young ones with acute coronary event, so that timely intervention if needed can help improve quality of life.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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2	Hina Wajid	Data collection.	
3	Abdul Wasae	Data interpretation.	
4	Aqeel Asghar	Introduction of study.	
5	Mushtaq Ahmad Shahid	Collection, Interpretation.	
6	Mariam Tahir	Statistical analysis.	