Original Article

FREQUENCY OF THREE VESSEL CORONARY ARTERY DISEASE IN YOUNG PATIENTS OF AGE LESS THAN 40 YEARS UNDERGOING DIAGNOSTIC CORONARY ANGIOGRAPHY ADMITTED WITH ACUTE CORONARY SYNDROME

Naeem Hameed[a], Shahid Abbas[a*], Imtiaz Ahmad[a], Rehan Riaz[a], Shahid Iqbal[a], Ghias[a]

[a]Faisalabad Institute of Cardiology, Faisalabad, Pakistan.
* Corresponding author: drshahidabbas@gmail.com

Submission Date: 14-09-2019
Revision Date: 19-09-2019
Publication Date: 02-11-2019

Author's Contribution

NH:Conducted the study and wrote the article. SA:Helped in review the article. MI:Re-arranged data and corrected article.

All authors declare no conflict of interest.

This article may be cited as: Hameed N, Abbas S, Ahmad I, Riaz R, Iqbal S, Gh. Frequency of three vessel coronary artery disease in young patients of age <40 years undergoing diagnostic coronary angiography admitted with acute coronary syndrome. (J Cardiovasc Dis 2019;15(3):77 - 81)

ABSTRACT

BACKGROUND AND OBJECTIVE: Cardiovascular disease is commonly associated with increased mortality. In patients with age less than 40 one third deaths occur due to cardiovascular morbidity. [1] In young patients it commonly manifests in the form of acute coronary syndrome. More severe form of disease can be present in young patients depending upon presence of risk factors. Different areas of world has different pattern of disease. The purpose of this study was to determine the frequency of three vessel coronary artery disease in young patients with age less than 40 years.

MATERIAL AND METHODS:We studied the disease severity in Pakistani population. This cross sectional, observational study was conducted at Faisalabad institute of Cardiology, from 07-07-2017 to 06-01-2018. Patients of Acute Coronary Syndrome were included after obtaining informed consent. Patients of age less than 40 years regardless of gender were enrolled in study. Total number of 90 patients were included and underwent coronary angiography during hospital stay. Frequency of TVCAD was noted. The mean age was 35.72±3.64. 76.7% (69) were male and 23.3% (19) female. 55.6% (50) patients were having STEMI, 30% (27) NSTEMI and 14.4% (13) unstable angina. TVCAD was found in 24.4% (22) patients. Youngest patient with TVCAD was of 27 years age.

CONCLUSION:In our population the coronary artery disease is in more severer form as compared to other population groups.

KEYWORDS: Coronary artery disease, Acute coronary syndrome, Coronary Angiography, Three vessel coronary artery disease

(J Cardiovasc Dis 2019;15(3):77 - 81)

INTRODUCTION

Mortality due to cardiovascular disease is quite common in high-income countries.[1,2] It is responsible for about 33% of all deaths in young individuals. There are two main categories of coronary artery disease i,e acute coronary syndrome and stable ischemic heart disease. ST segment elevation myocardial infarction, non ST elevation MI and Unstable angina are included in acute coronary syndrome. 25-40% of patients who present with acute coronary syndrome usually have ST segment elevation myocardial infarction and is responsible for 5-6% mortality.[3]

The main etiology of coronary artery disease is the process of atherosclerosis that is the deposition of lipids, fibrous elements, and inflammatory molecules in the arterial wall.[4] Younger patients usually present with acute coronary syndrome which is precipitated due to plaque rupture leading to exposure of intimal layers, platelet activation and thrombotic occlusion of vessel.[5] Different studies have shown diabetes, hyperlipidemia, hypertension and smoking to be important risk factors for the development of coronary artery disease in young patients less than 40 years.[6]

Regarding coronary arteries anatomy, there are two main systems. The left main stem artery is divided into left anterior descending artery and left circumflex artery and the right system has right coronary artery with its two branches in distal part. Coronary angiography is quite accurate and gold standard for the determination of severity of coronary artery disease. It can be divided into single, double or triple vessel disease. The significant stenosis is labeled as more than 70% of luminal narrowing.[7]

In a previous study which included 400 patients with age < 40 years, out of which 18% had involvement of all the three vessels.[8] Rationale of this study was to determine the frequency of three vessel coronary artery disease in young patients. It will help us in better management and prevention of coronary artery disease in young.

MATERIALS AND METHODS:

This was observational cross sectional study conducted at Faisalabad institute of Cardiology, from 07-07-2017 to 06-01-2018 with 95% confidence interval and absolute precision of 8%. Patients of age <40years, of either sex, having first episode of ACS and undergoing angiography for first time were included in study. Patients with history of CABG, history of PCI, those with creatinine >1.5, Hb <8g/dl and INR >1.4 were not included.

Approval from Hospital Ethical committee was taken. Total of ninety patients of ACS who underwent coronary angiography were included. Consent was taken. Consultant Cardiologist performed coronary angiography through femoral or radial artery approach. Then the lesions were quantified and the patients were divided as having single vessel disease or double vessel disease or triple vessel disease. Demographic data and collected information was entered in Performa.

STATISTICAL ANALYSIS:

Version 25 of SPSS was used to analyzed the data. Quantitative variable including age etc. was calculated as mean ± SD. The variables including gender, three vessel coronary artery disease, type of acute coronary syndrome were assessed as frequencies and percentages. Effect modifiers like age, type of acute coronary syndrome and gender were stratified to control its effect on outcome variables. Chi-square test was applied post stratification. Less than 0.05 p value was labeled as significant.

RESULTS:

Ninety patients were included and frequency of three vessel coronary artery disease was determined. Distribution of age of the patients was assessed. It showed that 2.2% (n=2) were between 21-25 years of age, 5.6% (n=5) between 26-30, 23.3% (n=21) between 31-35 and 68.9% (n=62) were between 36-40 years of age. Mean ± SD of age was 35.72±3.64 years. Distribution according to gender showed that 76.7% (n=69) were male whereas 23.3% (n=21) were female. (Table No. 1)

Distribution according to type of ACS showed that 55.6% (n=50) patients were with STEMI, 30% (n=27) with NSTEMI and 14.4% (n=13) patients were admitted with unstable angina. Presence of three vessel coronary artery disease was noted. It showed 24.4% patients (n=22) were having three vessel coronary artery disease whereas 76.6% were without TVCAD. They were either having single vessel disease or two vessel disease or few of them were not having significant coronary artery disease. They were either having recanalized vessels or with mild irregularities of the major vessels. But our study focused only on the presence of three vessel disease.

It was found that TVCAD was most common in age group of 36-40 years being 29% (n=21) and least common in 21-25 years age group as no case was found in this group. 2nd and 3rd group was

having TVCAD as 20% (n=1) and 14.3% (n=3) respectively. Youngest patient with TVCAD was of 27 years age.

TVCAD and type of ACS was analysed on gender basis. 33.96% (n=18) male were having TVCAD whereas 23.53% (n=4) female were having TVCAD. STEMI was present in 61.97% (n=44) male and 31.57% (n=6) female patients. NSTEMI was in 21.13% (n=15) male and 63.15% (n=12) female patients. Unstable angina was in 16.9% (n=12) male and 5.26% (n=1) female patients.

Relationship among TVCAD and type of ACS was found. 20 % (n=10) patients with STEMI were having TVCAD. Among NSTEMI patients, 33.3% (n=9) were having TVCAD and 15.4% (n=2) from unstable angina patients were having TVCAD. Stratification of effect modifiers like age, type of ACS was done. Chi-square test was applied post stratification. Less than 0.05 p value was significant.

Table-1: Basic characteristics associated with TVCAD frequency.

Characteristics		Frequency of TVCAD
Age	35.72±3.64	
Gender		
Male	76.7% (n=69)	33.96% (n=18)
Female	23.3% (n=21)	23.53% (n=4)
AGE groups		
21-25	2.2% (n=02)	0% (n=0)
26-30	5.6% (n=05)	20% (n=1)
31-35	23.3% (n=21)	14.3% (n=3)
36-40	68.9% (n=62)	29.0% (n=18)

Table-2: Frequency of types of ACS associated with TVCAD.

Type of ACS	Frequency	TVCAD
STEMI	55.6% (n=50)	20% (n=10)
NSTEMI	30% (n=27)	33.3% (n=9)
UNSTABLE ANGINA	14.4% (n=13)	15.4% (n=2)

DISCUSSION:

World Health Organization has performed the survey regarding the burden of CAD and it was predicted that its prevalence will increase from 47 to 82 million disability adjusted life years in years from 1990 to 2020. Under the age of 75, 50% of both male and female have coronary artery disease.[9] Premature coronary artery disease (CAD) is defined as development of diseases below the age of 40 years.[10] In a recent study, a prevalence of 1.2% of CAD was reported in patients with age less than 40. South East Asians are more prone to development of coronary artery disease in young patients and an estimated prevalence is 5-10 %. Regarding young patients in our population, the frequency of developing significant coronary artery disease is on the rise and it is estimated to be one in every five middle age Urban adults.[11,12]

In present study of 90 patients of age less than 40 years. We stratified them in various age groups. From 21 to 25 years, 26 to 30, 31 to 35 and 36 to 40 years age group. All patients were of ACS whether STEMI, NSTEMI or unstable angina admitted through emergency. We find out the severity of coronary artery disease in Pakistani population by finding out significant coronary artery lesion in all of the major vessels supplying the heart.

Out of total 90 patients, most common form of ACS was STEMI (55.6%) then NSTEMI (30%) and unstable angina (14.4%). Three vessel CAD was found in 24.4% of study population with ACS. These results were different from study by Bhardwaj R et al. who included 95% patients of STEMI and found TVCAD in 9% patients.[13] Our study showed 20% patients of STEMI were having TVCAD.

Presence of TVCAD was a little higher than the study conducted by Khan H, et al.[14] and higher than study conducted by Noor L, et al.[15] which show prevalence of 18% and 10.6% respectively. TVCAD was most common in age group 36-40 years of age. Youngest patient found to be having three vessel coronary artery disease was 27 years of age.

Our study included both genders who were having ACS and were 40 or less than 40 years of age. According to a study females present at a later age as compare to men with respect to coronary artery disease.[16] ACS was more common among male patients (78.9%) than female (21.1%). These results were consistent with study by Khan H, et al.[14] Among ACS, NSTEMI was more common in female gender (63.15%) than STEMI (31.5%) and unstable angina (5.26%). Male were having STEMI (61.97%) as common entity than NSTEMI (21.13%) and unstable angina (16.9%).

It was noted that ACS and Three vessel disease more prevalent among male patients than female. 33.96% males were having TVCAD as compared to 23.5% females. One study by Ezhumalai B, et al. showed prevalence of multivessel disease as 28% in young woman.[17] Our results were near to this study. We found male preponderance which was similar to study done by Shah SS[18], et al. and Akhtar P et al.[19]

The patients with family history of ischemic heart disease usually develop premature CAD and have increased plaque burden.[20] It may be argued that family history is not the only predisposing risk factor for CAD. [21] Patients with premature CAD have multiple coexisting risk factors.[22] A study conducted

in Nepal over young population which included less than 45 years showed that approximately 6% have triple vessel CAD and majority were reported to have single vessel disease. It is in disparity to the subjects included in our study which showed relatively high frequency of triple vessel disease.[23] The prognosis of young individual is variable as compared to elderly subjects.[24] Comparing data with other studies we found TVCAD as more prevalent in population of Pakistan especially of this area. Proper attention to the prevention of progression of atherosclerosis in young by finding out the risk factors, dietary habits and life style is very important. They can be modified to prevent this form of disease which can be devastating if not identified and controlled properly.

The limitations of this study include small sample volume and diversity of population.

CONCLUSION:

Young patients being very important part of society have much environmental exposure and various risk factors (including smoking, dietary and lifestyle habits). These factors have changed the coronary artery disease pattern in young. Severe form of disease is noted in young now. Our study confirmed the expected findings of severe form of disease in young. If they present with ACS with one culprit vessel which is treated once, they can present again with other vessel as culprit vessel if not treated properly. Early angiography after ACS and timely intervention can prevent further ischemic events in young patients. Change in lifestyle and control of modifiable risk factors can prevent other young individuals from coronary artery disease. This will help in reduction of major burden on our society due to cardiac disease in young being most valuable part of society as all family is dependent on this age group. If we are able to prevent this age group from coronary artery disease, it will affect overall economic circumstances and will improve social growth in every aspect.

REFERENCES

1.Go AS, Mozaffiarian D, Roger VL, et al, and the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2013 update: a report from the American Heart Association. Circulation 2013; 127: e6–245.

2.The European health report 2012: charting the way to well-being. Copenhagen: World Health Organization Regional Office for Europe, 2012.

3.O'Gara PT,Kushner FG,Ascheim DD,Casey DE,Chung MK,de Lemos JA,etal.2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction:a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation 2013; 127:e362-425

4.Sanz J,Moreno P, Fuster V. The year in atherothrombosis. J Am Coll Cardiol. 2013;24(62): 1131–1143

5.Wong CP, Loh SY, Loh KK, Ong PJL, Foo D, Ho HH. Acute myocardial infarction: clinical features and outcomes in young adults in Singapore. World J Cardiol 2012;4:206-10.

6.Sekhri T, kanwer RS, Wilfred R, Prevalence of risk factors for coronary artery disease in an urban Indian population BMJ Open 2014;4:e005346 doi:10.1136/bmjopen-2014-005346

7.Gauchan N, Rawat B, Vaidya A, Rajbhandari S, Bhatta Y, Jaiswal JP. Coronary angiographic findings of Nepalese patients with critical coronary artery disease: which vessels and how severe? Webmed Central CARDIOLOGY 2012; 3:1-13.

8.Khan H, Khan M, Noor MM. coronary artery disease pattern: a comparision among different age groups. J Ayub Med Coll Abbottabad 2014;26(4):466–9.

9.Rosamond W, Flegal K, Friday G, Furie K, Go A, Greenlund K, et al. American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2007 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation. 2007;115(5):e69–171.

10.Konishi H, Miyauchi K, Kasai T, Tsuboi S, Ogita M, Naito R, Katoh Y, Okai I, Tamura H, Okazaki S, et al. Long-term prognosis and clinical characteristics of young adults (≤40 years old) who underwent percutaneous coronary intervention. J Cardiol. 2014;64:171–174

11.Nishtar S, Khan IS, Ahmed N, Mattu MA. Coronary artery disease burden in Pakistanis - A Review. J Pak Inst Med Sci 2001;8-12:592–4.

12.Jafar TH, Qadri Z, Chaturvedi N. Coronary artery disease epidemic in Pakistan: more electrocardiographic evidence of ischaemia in women than in men. Heart 2008;94:408–13.

13.Bhardwaj R, Kandoria A, Sharma R. Myocardial infarction in young adults-risk factors and pattern of coronary artery involvement. Nigerian Medical Journal : Journal of the Nigeria Medical Association. 2014;55(1):44-47. doi:10.4103/0300-1652.128161.

14.Khan H, Khan M, Noor MM. coronary artery disease pattern: a comparision among different age groups. J Ayub Med Coll Abbottabad 2014;26(4):466–9.

15.Noor L, Shah SS, Adnan Y, Sawar S, ud Din S, Amina, Awan ZA, Bangash K, Ahmed S, Dad A. Pattern of coronary artery disease with no risk factors under age 35 years J Ayub Med Coll Abbottabad. 2010 Oct-Dec;22(4):115-9.

16.Aggarwal A, Srivastava S, Velmurugan M. Newer perspectives of coronary artery disease in young. World Journal of Cardiology. 2016;8(12):728-734. doi:10.4330/wjc.v8.i12.728.

17.Ezhumalai B, Jayaraman B. Angiographic prevalence and pattern of coronary artery disease in women. Indian Heart Journal. 2014;66(4):422-426. doi:10.1016/j.ihj.2014.05.009.

18.Saghir T, Qamar N, Sial J. Coronary Angiographic characteristics of Coronary artery diseasein young adults under

age forty compared to those over age forty. Pak Heart J 2008;41(3-4):49–56.
19.Akhtar P, Saghir T, Tahir F, Saleem MD, Mulla KS et al. The Impact of age and sex in the pattern of coronary artery disease. Pak Heart J 2010;43(3):3–4.
20.Otaki Y, Gransar H, Berman DS, Cheng VY, Dey D, Lin FY, Achenbach S, Al-Mallah M, Budoff MJ, Cademartiri F, et al. Impact of family history of coronary artery disease in young individuals (from the CONFIRM registry) Am J Cardiol. 2013;111:1081–1086.
21.Berry JD, Dyer A, Cai X, Garside DB, Ning H, Thomas A, Greenland P, Van Horn L, Tracy RP, Lloyd-Jones DM. Lifetime risks of cardiovascular disease.N Engl J Med. 2012; 366: 321– 329.
22.Celik T, Iyisoy A. Premature coronary artery disease in young patients: an uncommon but growing entity. Int J Cardiol. 2010;144:131–132.
23.Tamrakar R, Bhatt YD, Kansakar S, Bhattarai M, Shaha KB, Tuladhar E. Acute Myocardial Infarction in Young Adults: Study of Risk factors, Angiographic Features and Clinical Outcome. Nepalese Heart Journal. 2014;10:12–16.
24.Kang MK, Chang HJ, Kim YJ, Park AR, Park S, Jang Y, Chung N. Prevalence and determinants of coronary artery disease in first-degree relatives of premature coronary artery disease. Coron Artery Dis. 2012;23:167