Original Article

Pattern of Coronary Artery Disease in Young Patients on Coronary Angiography

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ABSTRACT

Objective: To find the frequency of pattern of coronary artery disease on coronary angiography in young patients of age <35years presenting with the acute coronary syndrome.

Study Design: Cross-Sectional Study

Place and Duration of Study: This study was conducted at the Angiography Ward, Punjab Institute of Cardiology, Lahore for 6 months i.e. October 2018 and November 2019.

Materials and Methods: On coronary angiography, main coronary vessels were viewed and a level of stenosis was noted. The collected data was entered and analyzed by using SPSS version 20.

Results: A total of 365 cases presenting with ACS who underwent coronary angiography were included in the study. The Mean age of patients was 26.68±4.04 years. After investigation 288(78.9%) patients had CAD. Among male patients, SVD was predominant followed by DVD and TVD. i.e. [SVD: 82(32.4%), DVD (26.1%) & TVD: 56(22.1%)]. Among STEMI patients, 22(17.5%) patients had normal vessels, 43(34.1%) had SVD, 31(24.6%) patients had DVD and 30(23.8%) patients had TVD. Among NSTEMI patients, 29(24.0%) patients had normal vessels, 34(28.1%) had SVD, 33(27.3%) patients had DVD and 25(20.7%) patients had TVD. However, the p-value showed no statistically significant difference for coronary artery disease in all ACS groups.

Conclusion: CAD is involved in many cases at least a single vessel disease was present in maximum cases.

Key Words: Coronary artery disease, younger age, coronary angiography

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INTRODUCTION

As recently as in 2011, this disease caused the most deaths among people of all ages, it is also the leading cause of death in the United States and in Pakistan.[1] The cardiac disease occurs less commonly in adults but has a devastating impact on patients and their families of any age, so it is referred to as "potentially devastating disease.[1] Most CHD incidents in young people are associated with atherosclerosis, but in seniors, the main cause is usually one of the risk factors.[2] These behaviors—heavy smoking, hypertension, an excess in the intake of animal fat, and diabetes type 2—were significantly linked to CAD in patients under the age of 40, with a BMI of 24 kg/m².[3] An early manifestation of CAD has a detrimental impact on the patient and the family.

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Doctors also opt to examine CAD patients who are in their early 40s because this population seems to have the greatest potential for being helped. Patients under the age of 35 have been referred to as creative. More rigorous research in young patients is conducted on clinical presentation, the seriousness of the disease, its presence, and what it will be like in the future.[4]

The majority of ACS patients do indeed develop congestive heart failure (10 percent), and 15 percent of those will die within 15 years of their first heart attack (or of returning to hospital) (26 percent). Although its occurrence is trivial, its effect on human life spans is considerable. It is a critical requirement. At the age of CAD presentation, patients appear healthier and exhibit various arteriographic and clinical results.[1]

One study has found that among ACS patients of age <35years, the frequency of single-vessel disease (SVD) was 39%, double vessel disease (DVD) was 20% and triple vessel disease (TVD) was 12% while 28% had normal coronary vessels. [1] Other studies supported the evidence and reported that among cases of age <35 years, the frequency of SVD ranged 42-51.9%, DVD ranged 20.2-27.3%,[1–5] TVD ranged 15.6-18[1–3] and the normal coronary artery was ranged 10.4-21.8%.[4–6]

But some reported that SVD is less frequent 14.6-15.2%, DVD was 12.4-18.68%[1,2] and TVD was reported as 40.66% in one study[1] while other reported 6.3-10.6%[7–9] while normal was reported as 25.59%.[1]

The rationale of this study is to assess the pattern of coronary artery disease on coronary angiography in

young patients of age <35years presenting with the acute coronary syndrome. It has been observed through literature that younger patients with ACS can have a controversial angiographic pattern for coronary artery disease. Some have reported that SVD is found in maximum cases while others reported that the incidence of TVD is high. Even, local studies conducted previously contain ambiguity. So to confirm the extent of the problem, we want to conduct this study to confirm the angiographic pattern of ACS in young adults. The latest magnitude will help in planning the treatment strategies in ACS patients.

MATERIALS AND METHODS

This cross-sectional study was carried out in 365 cases presenting with ACS who underwent coronary angiography in Angiography Ward, Punjab Institute of Cardiology, Lahore for the pride of Six October 2018 and November 2019.

Patients having age range 18-35 years of either gender fulfil the criteria for ACS (as per operational definition) planned to undergo coronary angiography presenting with 24 hours of the start of chest pain were included however Patients with deranged LFTs (ALT>40IU, AST>40IU), deranged RFTs (serum creatinine >1.2mg/dl), lipid-lowering drugs like statins (on history and medical record), Diabetes mellitus (BSF ≥126mg/dl and BSR>186mg/dl) were not included. All basic demographic information of each patient (name, age, sex, type of ACS, and contact) was also obtained. The patients underwent coronary angiography under local anesthesia by a single cardiologist with the assistance of the researcher himself. On coronary angiography, main coronary vessels were viewed and a level of stenosis was noted. If stenosis was ≥50% in one, two, or three vessels, then single, double, or triple vessel disease was labeled (as per operational definition). If <50% stenosis, then labeled as normal. All this information was recorded through a pre-designed proforma.

Data Analysis: The collected data was entered and analysed by using SPSS version 20. Quantitative variables like age were presented in form of mean ± S.D. Qualitative variables like gender and angiographic pattern (normal, single, double, or triple vessel disease) were presented in form of frequency and percentage. Data was stratified for age (18-25, 26-35 years), gender (male and female), type of ACS, and smoking. Post-stratification, chi-square was applied to compare stratified groups taking p-value≤0.05 as significant.

RESULTS

A total of 365 cases presenting with ACS underwent coronary angiography were included in the study. The Mean age of patients was 26.68±4.04 years. The minimum and maximum ages of patients were 20 and 35 years respectively. Gender distribution of patients showed that there were 253(69.3%) male and 112(30.7%) female patients. Among the included patients 170(46.6%) were smokers. The mean lesion size of patients was 60.64±13.50. The minimum and maximum sizes of the lesion were 30 and 85 respectively. After investigation 288(78.9%) patients had coronary artery disease lesions.

Vessel involvement after angiography showed that 120(32.9%) patients had single-vessel disease, 91(24.9%) patients had double vessel disease and 77(21.1%) patients had triple vessel disease.

Age was stratified into two groups. i.e. 18-25 years and 26-35 years to see the pattern of the coronary lesion. In the age group, 18-25 years 55(32.5%) patients had SVD, 38(22.5%) had DVD and 36(21.3%) patients had TVD. While in the age group 26-35 years 65(33.2%) patients had SVD, 53(27%) patients had DVD and 41(20.9%) patients had TVD. In both age groups, it was observed that SVD was predominant followed by DVD and TVD. However, the p-value showed no statistically significant difference for coronary artery disease in both age groups.

Table No.1: Descriptive Statistics for Lesion Size and Age Distribution of Patients (N=365)

Age Distribution of Patients	
Mean	26.68
SD	4.04
Minimum	20
Maximum	35
Descriptive Statistics for Lesion Size	
Mean	60.64
SD	13.50
Minimum	30
Maximum	85

Table No.2: Baseline and clinical characteristics of the patients (n = 365)

	Frequency	***Percentage***
GENDER		
Male	253	69.3%
Female	112	30.7%
SMOKING		
Yes	170	46.6%
No	195	53.4%
CORONARY ARTERY DISEASE LESION		
Yes	288	78.9%
No	77	21.1%
INVOLVEMENT OF VESSELS	7	21.1%
Normal Vessel	120	32.9%
SVD	91	24.9%
DVD	77	21.1%
TVD		
Type OF ACS		
Unstable angina	118	32.3%
STEMI	126	34.5%
NSTEMI	121	33.2%

Table No.3: Involvement of vessels in relation to bassline and clinical characteristics of patients (n = 365)

Age Group	Vessel Disease	Frequency	%age	p-value
18-25 Years	Normal Vessel SVD DVD TVD	40 55 38 36	23.7% 32.5% 22.5% 21.3%	**0.623**
26-35 Years	Normal Vessel SVD DVD TVD	37 65 53 41	18.9% 33.2% 27.0% 20.9%	
Gender				
Male	Normal Vessel SVD DVD TVD	49 82 66 56	19.4% 32.4% 26.1% 22.1%	**0.555**
Female	Normal Vessel SVD DVD TVD	28 38 25 21	25.0% 33.9% 22.3% 18.8%	
Smoking				
Yes	Normal Vessel SVD DVD TVD	22 57 47 44	12.9% 33.5% 27.6% 25.9%	**0.0023**
No	Normal Vessel SVD DVD TVD	55 63 44 33	28.2% 32.3% 22.6% 16.9%	
Type of ACS				
Unstable Angina	Normal Vessel SVD DVD TVD	26 43 27 22	22.0% 36.4% 22.9% 18.6%	**0.687**
STEMI	Normal Vessel SVD DVD TVD	22 43 31 30	17.5% 34.1% 24.6% 23.8%	
NSTEMI	Normal Vessel SVD DVD TVD	29 34 33 25	24.0% 28.1% 27.3% 20.7%	

The pattern of coronary artery disease was also seen in relation to the gender of patients. Among male patients, SVD was predominant followed by DVD and TVD. i.e. [SVD: 82(32.4%), DVD (26.1%) & TVD: 56(22.1%)] The same pattern was observed in female patients regarding coronary artery disease. i.e. [SVD: 38(33.9%), DVD (22.3%) & TVD: 56(18.8%)]. As per the p-value distribution of coronary artery disease was statistically the same in male and female patients.

Among smokers and non-smokers, a significant difference was seen for coronary artery disease. Among smokers, only 22(12.9%) patients had normal vessels while among non-smokers 55(28.2%) patients had normal vessels. This difference in having normal vessels among smokers and non-smokers was statistically significant. However, the pattern of the lesion was the same i.e. predominant lesion was SVD [Smokers: 57(33.5%) vs. Non-Smokers:63 (32.3%)] followed by DVD [Smokers: 47(27.6%) vs. Non-Smokers:44 (22.6%)] and TVD [Smokers: 44(25.9%) vs. Non-Smokers:33 (16.9%)] both in smokers and non-smokers.

There were 118 (32.3%) cases of unstable angina, 126 (34.5%) cases had STEMI while 121 (33.2%) cases had NSTEMI.

Among cases of unstable angina, 26(22.0%) patients had a normal vessel, 43(36.4%) had SVD, 27(22.9%) had DVD and 22(18.6%) patients had TVD. Among STEMI patients, 22(17.5%) patients had normal vessels, 43(34.1%) had SVD, 31(24.6%) patients had DVD and 30(23.8%) patients had TVD. Among NSTEMI patients, 29(24.0%) patients had normal vessels, 34(28.1%) had SVD, 33(27.3%) patients had DVD and 25(20.7%) patients had TVD. However, the p-value showed no statistically significant difference for coronary artery disease in all ACS groups.

DISCUSSION

In this study mean age of patients was 26.68±4.04 years. 169 patients were in between 18-25 years and 196 patients were in between 26-35 years.

The trend of coronary artery disease in adults under 35 years old, but with no established risk factors, is defined by Lubna Noor in his research. The mean age was 32,66±3,237 years (range 22–35 years) of the study patients.[10]

Hazrat Ullah Khan of Pakistan recently conducted a study to compare coronary artery disease patterns in young adults under 40 years of age with severe coronary artery coronary angiographic disease in young adults over 40 years old. In the report, 400 patients were taken at 40 years old (Group-A) and 48 years old (Group-B), while 352 years old (Group-B) (88 percent)[11]

The ages of >40 years were 16% and >40 years were 84%, respectively in Shah SS, et al. recorded in its analysis.[12] Tahir sagheer in his study took 299 patients. The patients in group I was those who were less than and equal to 40 years of age. The patients in group II were those who were greater than or equal to 41 years of age.[13]

The age distribution of patients of this study is following that reported by Lubna Noor, Hazrat Ullah Khan, and Tahir Sagheer. In this study, there were

69.3% male and 30.7% female patients. The male to the female percentage reported by Hazrat Ullah Khan in his study was 77% male and 22.5% female.[11] These results show the clear male predominance. Similar results were reported by Shah SS, et al[12], Akhtar P, et al[14], and Lubna Noor.[10] Wolfe et al, Result analyzed daily in pregnant women using maternal plasma-derived MMP-12; analyzed prenatal plasma-derived MMP-12 in expectant mothers 18 Wolfe and colleagues studied patients between the ages of 35 and 49 years, but recorded the only female frequency of 9% in the group of participants they studied.[12]

However, in this study female ratio was very high as compared to that reported by Wolfe. Similarly, the percentage of female patients reported by Lubna Noor, Hazrat Ullah Khan, and Tahir Sagheer was quite low as compared to that of this study.

In this study frequency of significant CAD was seen in 288(78.9%) of the patients. However total significant CAD reported by Hazrat Ullah Khan was 87.25%[11], by Akanda MAK, et al which was 74.4%[15], by Lubna Noor reported significant CAD in his study patients as 83.7%.[10]

In this study 77(21.1%) patients had normal vessels while 120(32.9%) patients had SVD, 91(24.9%) had DVD and 77(21.1%) patients had TVD. These results are comparable to Hazrat Ullah Khan who reported the frequency of SVD, DVD, and TVD as a whole was 30%, 24.5%, and 32.25% respectively.[11]

Akhtar P, et al.[14] found the prevalence of SVD, DVD, and TVD to be 24.9% and 25.7%, and Shah I et al discovered that these frequencies were 18% and 43.5%.[16] In his research, the incidence of one, two, three, and three-vessel disease was estimated to be 54% (21.2%), 22% (10.6%), and 11% (5.8%) respectively.[17] This reported pattern of SVD, DVD, and TVD was quite different from that of our study.

As per findings of this study it was seen that in the age group 18-25 and 26-35 the pattern of CAD was almost the same. In the age group, 18-25 a high frequency of normal vessels was seen in 23.7% of patients while in the age group 26-35 normal vessels were seen in only 18.9% of patients. The pattern of CAD was the same in both groups i.e. SVD was predominant followed by DVD and TVD. What studies have done compared to the younger age group with the old age group for frequency and pattern of CAD? i.e. (p-value=0.623).[17]

Among male patients, significant CAD has seen in 80.63% and among females, it was 75%. No statistically significant difference was seen for CAD and its pattern in male and female patients. However, CAD was predominant in male patients. (p-value=0.555)

Tahir Sgaheer and Hazrat Ullah Khan in their study reported the frequency of smoking among CAD patients as 62%[6] and 41%.[11] In this study as a whole 46.6% included patients were smokers. Among smokers, the frequency of normal vessels was only 12.9% while among non-smokers this frequency was 28.2% which was significantly higher in non-smokers (p-value=0.0023) So these results show that smoking plays a major role in the development of CAD in the younger age group.

CONCLUSION

It has been concluded that CAD is involved in many cases at least a single vessel disease was present in maximum cases. Now we have proved the controversy and revealed that in younger age groups, the incidence of CAD is high and among them, SVD is highly prevalent as compared to other lesions.

Author's Contribution:

Concept & Design of Study:	Muhammad Rafique Kanher
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Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Achar S, Kundu S, Norcross WA. Diagnosis of acute coronary syndrome. Am Fam Physician 2018;72(1):119–26.
2. Rubin JB, Borden WB. Coronary heart disease in young adults. Curr Atheroscler Rep 2019;14(2):140–9.
3. Yang W, Yang Z, Wu Y, Qiao S, Yang Y, Chen J. Factors Associated with Coronary Artery Disease in Young Population (Age⩽ 40): Analysis with 217 Cases. Chinese Med Sci J 2016;29(1):38–42.
4. Christus T, Shukkur AM, Rashdan I, Koshy T, Alanbaei M, Zubaid M, et al. Coronary artery disease in patients aged 35 or less–a different beast? Hear views Off J Gulf Hear Assoc 2018;12(1):7.
5. Foroughi M, Ahranjani S, Ebrahimian M, Saieedi M, Safi M, Abtahian Z. Coronary artery disease in Iranian young adults, similarities and differences. Open J Epidemiol 2014;2014.
6. Saghir T, Qamar N, SIAL J. Coronary angiographic characteristics of coronary artery disease in young adults under age forty years compare to those over age forty. Pakistan Hear J 2016;41(3–4).
7. Hamm CW, Crea F. The year in cardiology 2013:

acute coronary syndromes. Eur Heart J 2014;35(6):349–52.
8. Kohli S, Parajuli M, Maskey A AC. An unusual presentation of acute coronary syndrome. J Nepal Health Res Counc 2015;
9. Antman E, Bassand JP, Klein W, Ohman M, Lopez Sendon JL, Rydén L, et al. Myocardial infarction redefined—a consensus document of the Joint European Society of Cardiology/American College of Cardiology committee for the redefinition of myocardial infarction: the Joint European Society of Cardiology/American College of Cardiolog. J Am Coll Cardiol 2016;36(3):959–69.
10. Noor L, Shah SS, Adnan Y, Sawar S, ud Din S, Amina A, et al. Pattern of coronary artery disease with no risk factors under age 35 years. J Ayub Med Coll Abbottabad 2017;22(4):115–9.
11. Khan HU, Khan MU, Noor MM, Hayat U, Alam MA. Coronary artery disease pattern: a comparision among different age groups. J Ayub Med Coll Abbottabad 2014;26(4):466–9.
12. Shah SS, Noor L, Shah SH, Din SU, Awan ZA, Hafizullah M. Myocardial infarction in young versus older adults: clinical characteristics and angiographic features. J Ayub Med Coll Abbottabad 2019;22(2):187–90.
13. Bhardwaj R, Kandoria A, Sharma R. Myocardial infarction in young adults-risk factors and pattern of coronary artery involvement. Niger Med J Niger Med Assoc 2014;55(1):44.
14. Akhtar P, Saghir T, Tahir F, SALEEM MD, Mulla J, Zaman KS. The Impact of age and sex in the pattern of coronary artery disease. Pakistan Hear J 2016;43(3–4).
15. Akanda MAK, Ali SY, Islam A, Rahman MM, Parveen A, Kabir MK, et al. Demographic profile, clinical presentation & angiographic findings in 637 patients with coronary heart disease. Faridpur Med Coll J 2019;6(2):82–5.
16. Shah I, Faheem M, Hafizullah M. Clinical Profile, Angiographic Characteristics and Treatment Recommendations in Patients with Coronary Artery Disease. J Pakistan Med Students 2013;3(2).
17. Lloyd-Jones D, Adams R, Carnethon M, De Simone G, Ferguson TB, Flegal K et al. Heart disease and stroke statistics—2009 update a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation 2015;119(3):21–181.