

Demographic & angiographic profile of young patients aged 40 year & less undergoing coronary angiography in a tier II city of Eastern India

Binayendu Prakash, Anurag Jaiswal, Mandar M. Shah

Department of Cardiology, Tata Main Hospital, Jamshedpur, Jharkhand, India

ABSTRACT

Background: Cardiovascular diseases (CVD) and its complications are on an increasing trend in the younger age group. In this study, we aimed to identify the different risk factor profile and coronary angiographic characteristics of young adults presenting with coronary artery disease. **Methods:** We conducted this retrospective observational study at Tata Main Hospital, Jamshedpur, Jharkhand, for 5 years between April 2015 and March 2020. Inclusion criteria being patients admitted for acute coronary syndrome or chronic stable angina, aged ≤ 40 years, who underwent coronary angiography. Those below 40 years of age who underwent angiography in non-CAD (coronary artery disease) setting were excluded. **Results:** Among the 117 cases included in this study, 81.1% were males and 18.8% were females. Majority of cases, i.e., 52.2% were in the age group of 36–40 years. Risk factor evaluation showed hypertension as the major risk factor, present in 30.76% of patients, followed by diabetes mellitus in 21.36%, Dyslipidaemia was noted in 7.6%. History of smoking was present in 8.54%, history of smokeless tobacco use was in 7.69%, family history of CAD was noted in 9.4% of patients. Among 117 cases, SVD (single-vessel disease) was most prevalent, seen in 55.5% cases. 21.3% had normal or recanalized coronaries. Among SVD, LAD (Left anterior descending artery) was the most commonly involved vessel (80%). **Conclusions:** Young patients with CAD are mainly males, and SVD in the form of LAD is more commonly involved. In this vulnerable age group, more emphasis should be given on diagnosis and management of risk factors.

Keywords: Coronary angiography, coronary artery disease, young adults

Introduction

Cardiovascular diseases (CVD) are responsible for approximately 12 million deaths in the Indian subcontinent every year.^[1] As per The Global Status Report on Noncommunicable Diseases, CVD has caused 2.5 million deaths in India in 2008. According to the World Health Organization statistics of 2014, CVD contributed to 26% of total mortality.^[2]

There are several studies suggesting that Asians in general and Indians are at an increased risk of myocardial infarction at a younger age (≤ 40 years).^[3] Heart diseases among Indians are rising and it presents 5–10 years earlier in comparison to other populations of the world. The mean age at the first presentation of acute myocardial infarction in Indians is 53 years.^[4]

Address for correspondence: Dr. Binayendu Prakash, Department of Cardiology, Tata Main Hospital, Jamshedpur, Jharkhand - 831001, India.
E-mail : binayendu@gmail.com

Premature CAD (PCAD) is defined as the onset of coronary artery disease (CAD) before the age of 40.^[5,6] In young Indians incidence of CAD is about 12%–16%, which is higher than any other ethnic group.^[3,7]

Received: 02-06-2020

Revised: 10-08-2020

Accepted: 21-08-2020

Published: 30-10-2020

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_1063_20

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Prakash B, Jaiswal A, Shah MM. Demographic & angiographic profile of young patients aged 40 year & less undergoing coronary angiography in a tier II city of Eastern India. J Family Med Prim Care 2020;9:5183-7.

Assessment of atherosclerotic cardiovascular risk remains the foundation of primary prevention. All individuals should be encouraged to follow a heart-healthy lifestyle.^[8]

Out of several risk factors like hypertension, diabetes mellitus, dyslipidemia, family history of CAD, obesity, the use of inhaled tobacco products is a strong risk factor for coronary artery disease, myocardial infarction (MI), and mortality in young adults.^[9]

With this background, this study was done to assess the demographic and angiographic profile and risk factors of critical CAD in patients aged ≤ 40 years who were evaluated for chronic stable angina or for the acute coronary syndrome (ACS).

Materials and Methods

This was a cross-sectional, record-based study done in Tata Main Hospital, Jamshedpur, a 980-bedded tertiary care hospital in eastern India. The study population consisted of all patients aged 40 years or less, who underwent coronary angiogram between April 2015 and March 2020.

It was a record-based study in which the details of all such cases were extracted from the case records.

Inclusion criteria included all patients aged ≤ 40 years, who gave written informed consent, presented with ACS or stable angina, and who underwent coronary angiography (CAG) based on the ACC/ESC indications for CAG.^[10,11]

Those aged above 40 years were excluded from the study. Those below 40 years of age who underwent angiography in non-CAD settings were also excluded.

Demographic details were noted. Detailed risk factors evaluation was done through case record and questionnaire.

Diagnostic CAG was performed by interventional cardiologists through radial or femoral route. A detailed analysis of angiographic images was done by the operator.

Patients were grouped into single-vessel disease (SVD), double vessel disease (DVD), and triple vessel disease (TVD) according to the number of major epicardial coronary arteries involved.^[12] Stenosis of the coronary vessels was considered mild when the luminal diameter was reduced by $<50\%$, moderate ($50\%–70\%$), and significant ($>70\%$) of the original diameter.

Results

This was a retrospective observational study. We studied the coronary angiographic findings of 127 cases. Of them, 10 cases were excluded based on exclusion criteria, sample size being 117 of young CAD patients. Among the 117 cases included in the study, 95 (81.1%) were males and 22 (18.8%) were females [Table 1].

Maximum number of cases i.e., 67 (52.2%) were in the age group of 36-40 years, while 37 (31.6%) were between 31-35 years, 8 (6.8%) were between 26-30 years of age group and 5 (4.2%) were between 19 to 25 age group [Table 2].

Out of 117 cases, ST-segment elevated myocardial infarction was seen in 67 (57.2%), Non-ST segment elevated myocardial infarction in 10 (8.5%) and Unstable angina in 13 (11.1%) cases. 27 (23%) patients underwent angiography for chronic stable angina [Table 3].

Risk factor evaluation showed Hypertension as the major risk factor present in 36 (30.76%) of patients, followed by Diabetes mellitus in 25 (21.36%), Dyslipidaemia was noted in 9 (7.6%). History of smoking was present in 10 (8.54%), history of smokeless tobacco use was in 9 (7.69%), two patients were obese, Family history of CAD was noted in 11 patients. One patient had hyperhomocysteinemia. In 25 patients, none of the conventional risk factors could be elicited [Table 4].

Among 117 cases, SVD was most prevalent, seen in 65 (55.5%) cases, followed by DVD in 14 (11.9%) and TVD in 4 (3.41%) cases. 9 (7.6%) had mild to moderate CAD. 25 (21.3%) had normal/re canalized coronaries [Table 5].

Among the single vessel disease cases ($n = 65$), location of stenosis was seen in LAD (Left anterior descending) in 52 (80%), LCX (Left circumflex) in 7 (10.8%), RCA (Right coronary artery) in 6 (9.2%). Among the double vessel disease cases ($n = 14$) involvement of LAD + LCX was seen in 6 (42.5%), LAD + RCA

Table 1: Distribution of cases according to sex

Sex	n (117)	%
Male	95	81.19
Female	22	18.81

Table 2: Distribution of cases according to age

Age (in yrs.)	n (117)	%
19-25	5	4.27
26-30	8	6.83
31-35	37	31.62
36-40	67	57.26

Table 3: Distribution of cases according to presentation

CAD	n (117)	%	
STEMI	AWMI	52	44.44
	IWMI	13	11.11
	LWMI	2	1.70
NSTEMI	10	8.54	
UNSTABLE ANGINA	13	11.11	
CH. STABLE ANGINA	27	23.07	

in 2 (15%) and LCX + RCA in 6 (42.5%) cases. Triple vessel disease was seen in 4 cases [Table 6].

Discussion

The present study determines the demographic characteristics and angiographic extent of coronary artery lesions in young adults. This retrospective observational study was carried out on young patients of age 40 year or less. We studied the coronary angiographic findings of 127 cases. Of them 10 cases were excluded based on exclusion criteria, sample size being 117 young CAD patients.

Among the 117 cases included in the study, 95 (81.1%) were males and 22 (18.8%) were females. The mean age (SD) of

candidates <40 years of age who underwent coronary angiogram was 35.8 year.

Previous studies on epidemiological data from angiographically proven cases of PCAD (≤ 40 years) in native Indians suggest dyslipidaemia as the most prevalent risk factor.^[13-15] In contrast, in our study, hypertension was the most common risk factor, followed by Diabetes mellitus and family history of CAD. 12% patients did not have any risk factors. Often, there is a tendency to miss blood pressure measurement during general examination of young patients. But the above finding in our study highlights the importance of detecting and adequately treating hypertension even in younger population.

In this study, nearly third-fourth of the cases (70.92%) had significant CAD, normal/re canalized coronaries were reported in 21%.

In a study from Poland on angiographic characterization in CAD patients aged <40 years, the mean age in the study group was 35.1 ± 4.4 years and men made up 86.2% of the study group. Angiographically, normal coronary arteries were found in 16.9% of patients diagnosed as ACS. SVD in CAG was seen in 61.9% of patients with positive result of CAG (stenosis >50%). The significant atherosclerotic coronary lesions mainly affected the left anterior descending (LAD) coronary artery (61.6%), followed by right coronary artery (RCA) (27.4%).^[16]

In a study from Bangladesh, 38% of patients <40 years of age had normal coronary arteries and 4% had noncritical coronary lesions.^[6]

In another study from Nepal, SVD (58.3%) was the most common finding in CAG and 7.6% patients had normal or non-obstructive coronary lesions.^[17]

In this study, about two-third of the cases with critical CAD had SVD (74, 66.07%), followed by DVD (25, 22.32%) and TVD (13, 11.61%). LAD was the most common vessel involved (60), followed by RCA (52), left circumflex (41), and left main.^[3]

In another study from South India, majority of the patients (57.14%) had SVD, followed by normal coronaries (22.45%); 16.3% had DVD and 4% had multivessel disease.^[18]

In consistence with Badran *et al.*, Ahmed Hussein, and Christus *et al.*,^[19-21] the present study also found higher rate of SVD among PCAD.

Heart diseases are occurring in Indians 5–10 years earlier than in other populations around the world.^[22] According to the INTERHEART study, the median age for the first presentation of acute myocardial infarction in the South Asian (Bangladesh, India, Nepal, Pakistan, Sri Lanka) population is 53 years, whereas that in Western Europe, China, and Hong Kong is 63 years.^[3]

Table 4: Distribution of cases according to risk factor association

RISK FACTORS	n (117)	%
Hypertension	36	30.76
Diabetes	25	21.36
Family history of CAD	11	9.40
Smoking	10	8.54
Smokeless tobacco	9	7.69
Dyslipidemia	9	7.69
Obesity	2	1.70
Hyperhomocysteinemia	1	0.85
Without risk	14	11.96

Table 5: Distribution of cases according to number of artery involved

CAD	n (117)	%
SVD	65	55.55
DVD	14	11.96
TVD	4	3.41
NORMAL/ RECANALISED CORONARIES	25	21.36
MILD- MODERATE CAD	9	7.69

Table 6: Distribution of cases according to Coronary artery territory

CAD	Territory	n (117)	%
SVD (n 65)	LAD	52	(80%)
	LCX	7	(10.8%)
	RCA	6	(9.2%)
DVD (n 14)	LAD + LCX	6	(42.5%)
	LAD + RCA	2	(15%)
	LCX + RCA	6	(42.5%)
	LAD + LCX + RCA	4	
TVD (n 4)	LAD + LCX + RCA	4	

Primary care physicians need to be aware of this fact of earlier onset of CAD in our population, so that they can be more vigilant in dealing with young patients with chest pain. Prompt diagnosis and timely referral to a cardiac centre for further management, including timely coronary interventions, can result in better outcomes such as preserved LV function, reduction in risk of arrhythmias and heart failure and overall improvement in morbidity and mortality.

It is equally important to emphasize on primary prevention and aggressive risk factors modification, including focus on healthy lifestyle, thereby reducing the incidence of CAD in young.

There are a few main limitations of this study. First, only patients who presented with symptoms and underwent angiogram were included in this study. Second, this was a single-centre study, hence the results cannot be generalized to the community. Nevertheless, this study identifies and scrutinizes a decent sample size to investigate the prevalence of PCAD and provides valuable information regarding the magnitude of the problem.

Conclusion

Incidence of critical CAD is increasing in young adults due to an unhealthy lifestyle. It leads to the loss of work days, transition from an active to sedentary working life and decreased efficiency.

Affected young patients were observed predominantly to be males. Hypertension was the most common risk factor. SVD was more common and LAD was the most commonly involved coronary artery.

In this vulnerable age group, more emphasis should be given on early diagnosis and management of modifiable risk factors. For those who do not have any risk factor further evaluation should be done to search non-conventional risk factors.

Prevention of the disease by changing lifestyle, dietary habits, and regular exercise is the best way to improve the results.

Ethics clearance

The proposal for study was presented to our institutional Ethics Committee and necessary clearances were obtained.

Financial support and sponsorship

Nil.

Special Thanks

Priyanka Ranjan for helping in collection and sorting of data.

Conflicts of interest

There are no conflicts of interest.

References

- Gupta R, Gupta S, Sharma KK, Gupta A, Deedwania P. Regional variations in cardiovascular risk factors in India: India heart watch. *World J Cardiol* 2012;4:112-20.
- World Health Organization. Global Status Report on Noncommunicable Diseases 2014. Geneva: World Health Organization; 2014.
- Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, *et al.* Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): Case-control study. *Lancet* 2004;364:937-52.
- Sharma M, Ganguly NK. Premature coronary artery disease in Indians and its associated risk factors. *Vasc Health Risk Manag* 2005;1:217-25.
- Prajapati J, Jain S, Virpariya K, Rawal J, Joshi H, Sharma K, *et al.* Novel atherosclerotic risk factors and angiographic profile of young Gujarati patients with acute coronary syndrome. *J Assoc Physicians India* 2014;62:584-8.
- Siddique MA, Shrestha MP, Salman M, Haque K, Ahmed M, Sultan M, *et al.* Age related differences of risk profile and angiographic findings in patients with coronary heart disease. *BSMMU J* 2010;3:13-17.
- Mammi MV, Pavithran K, Abdu Rahiman P, Pisharody R, Sugathan K. Acute myocardial infarction in north Kerala - A 20 year hospital based study. *Indian Heart J* 1991;43:93-6.
- Arnett DK, Blumenthal RS, Albert MA, Buroker AB, Goldberger ZD, Hahn EJ, *et al.* 2019 ACC/AHA Guideline on the primary prevention of cardiovascular disease: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines [published corrections appear in *Circulation*. 2019;140(11):e649-e650, 2020;141(4):e60, and 2020;141(16)]. *Circulation* 2019;140:e596-646.
- Biery DW, Berman AN, Singh A, Divakaran S, DeFilippis EM, Collins BL, *et al.* Association of smoking cessation and survival among young adults with myocardial infarction in the partners YOUNG-MI registry. *JAMA Netw Open* 2020;3:e209649.
- Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS); European Association for Percutaneous Cardiovascular Interventions (EAPCI), Wijns W, Kolh P, Danchin N, Di Mario C, Falk V, Folliguet T, *et al.* Guidelines on myocardial revascularization. *Eur Heart J* 2010;31:2501-55.
- Levine GN, Bates ER, Blankenship JC, Bailey SR, Bittl JA, Cercek B, *et al.* 2011 ACCF/AHA/SCAI guideline for percutaneous coronary intervention: A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the society for cardiovascular angiography and interventions. *Circulation* 2011;124:e574-651.
- Shah I, Faheem M, Shahzeb, Rafiullah, Hafizullah M. Clinical profile, angiographic characteristics and treatment recommendations in patients with coronary artery disease. *J Pak Med Stud* 2013;3:94-100.
- Mohan V, Deepa R, Rani SS, Premalatha G; Chennai Urban Population Study (CUPS No.). Prevalence of coronary artery disease and its relationship to lipids in a selected population in South India: The Chennai Urban Population Study (CUPS No 5). *J Am Coll Cardiol* 2001;38:682-7.
- Goel PK, Bharti BB, Pandey CM, Singh U, Tewari S, Kapoor A, *et al.* A tertiary care hospital-based study of conventional

- risk factors including lipid profile in proven coronary artery disease. *Indian Heart J* 2003;55:234-40.
15. Gupta R, Gupta VP, Sarna M, Bhatnagar S, Thanvi J, Sharma V, *et al.* Prevalence of coronary heart disease and risk factors in an urban Indian population: Jaipur Heart Watch-2. *Indian Heart J* 2002;54:59-66.
 16. Maroszyńska-Dmoch EM, Woźakowska-Kapłon B. Clinical and angiographic characteristics of coronary artery disease in young adults: A single centre study. *Kardiol Pol* 2016;74:314-21.
 17. 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 J* 2013;10:12-6.
 18. Sricharan KN, Rajesh S, Rashmi K, Meghana HC, Badiger S, Mathew S. Study of acute myocardial infarction in young adults: Risk factors, presentation and angiographic findings. *J Clin Diagn Res* 2012;6:257-60.
 19. Badran HM, Elnoamany MF, Khalil TS, Eldin MM. Age-related alteration of risk profile, inflammatory response, and angiographic findings in patients with acute coronary syndrome. *Clin Med Cardiol* 2009;3:15-28.
 20. Ahmed Hussein AM. Coronary artery disease in young versus older adults in hilla city: Prevalence, clinical characteristics and angiographic profile. *Karbala J Med* 2012;5:1328-33.
 21. 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? *Heart Views* 2011;12:7-11.
 22. Enas EA, Dhawan J, Petkar S. Coronary artery disease in Asian Indians: Lessons learnt and the role of lipoprotein (a). *Indian Heart J* 1997;49:25-34.