Research Brief

Clinical and angiographic profile of very young adults presenting with first acute myocardial infarction: Data from a tertiary care center in Central India

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ABSTRACT

Acute myocardial infarction (AMI) is affecting young individuals more frequently nowadays. The present study was planned to evaluate the clinical and angiographic profile in adults aged less than 30 years, presenting with first AMI as data from Central India is very scarce. This cross-sectional study included 41 patients of STEMI with a mean age of 27 ± 2.8 years. Risk factors were male gender (95.1%), dyslipidemia (51.2%), tobacco consumption (48.8%), obesity (34.1%), and smoking (29.3%). Anterior wall myocardial infarction (AWMI) was the most common presentation (82.9%) with obstructive CAD noted in 61% cases frequently due to LAD coronary artery involvement (46.4%). © 2019 Cardiological Society of India. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

1. Introduction

Coronary artery disease (CAD) is responsible for the highest mortality globally.1 Acute coronary syndrome (ACS) represents the most common mode of presentation of CAD.2 Data indicate that Asian Indians are more prone to develop CAD with symptoms occurring a decade earlier than the western population.3 It has been estimated that there could be around 30 million patients suffering from CAD in India.4 Acute myocardial infarction (AMI) in very young adults has been poorly studied but is estimated to be less than 2%.5 In spite of limited data, it has been observed that the clinical and coronary angiographic profile is quite different in young patients as compared to those who develop CAD at an older age.4 Apart from conventional risk factors, ST-segment elevation myocardial infarction (STEMI) in the very young (<30 years) patients has been linked to substance abuse and nontraditional risk factors. Coronary angiographic data from various studies indicate preponderance of single-vessel disease or nonobstructive CAD in very young patients suffering from AMI.5 The present study is aimed to identify the clinical, risk factor and coronary angiographic characteristics in very young adults less than 30 years of age presenting with first STEMI as literature regarding this is very limited and exceptionally scarcer in Central Indian population.

2. Methods

The present study was a cross-sectional hospital-based single-center study conducted among 41 patients aged less than 30 years of age, admitted in the Department of Cardiology, Government Medical College and Super Speciality Hospital, Nagpur, Maharashtra during July 2018 to June 2019, who gave written informed consent. Inclusion criteria were based on the diagnosis of STEMI according to the guidelines given by the Joint European Society of Cardiology (ESC)/American College of Cardiology Foundation (ACCF)/American Heart Association (AHA)/World Heart Federation (WHF) Task Force.6 The patients with a history of prior myocardial infarction or revascularization were excluded from the study. The study was approved by the institutional ethical committee.

All patients were subjected to Coronary Angiography after detailed clinical evaluation. Information on age, sex, history of type-2 diabetes mellitus, hypertension, substance abuse, and family history of premature coronary artery disease (CAD) were obtained through self-report. Patients were classified as obese with BMI >25 kg/m². All patients underwent complete hematological and biochemical investigations and electrocardiograms. Dyslipidemia was defined as serum total cholesterol level (TC) of ≥200 mg/dl, triglyceride (TG) > 150 mg/dl, low-density lipoprotein

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views using eye-balling. The obstructive CAD was de
Angiographic severity was assessed in at least two orthogonal
to by echocardiography.
severely abnormal (RWMA) and diastolic dysfunction were documented
protocol. Table 1 describes the demographic and risk factor pro
STEMI were included in the study according to the prede
The majority of the patients were within
significant emotional stress before the event. None reported
male gender, the most common risk factor
frequency of hypertension and diabetes mellitus was very low.
aldenor, their major branches, or ≥ 50% luminal narrowing of the
anterior artery (LMCA). Accordingly, patients were
ventricular ejection fraction (LVEF), regional wall motion
ascorbed as suffering from single-vessel (SVD), double-
myocardial infarction (AWMI) was the most common presentation
resulting in mild to moderate left ventricular dysfunction. Regional
wall motion abnormality (RWMA) was noted in 90.2% of the cases
with RWMA corresponding to LAD, RCA, and LCx territory being observed in 30 (73.2%), 6 (14.6%) and 1 (2.4%) cases, respectively. However, no RWMA was observed in 4 (9.8%) cases. Also, diastolic dysfunction was found in 95.1% cases, with maximum suffering from Grade - I diastolic dysfunction being observed in 31 (75.6%) cases followed by Grade - II and Grade - III diastolic dysfunction that was observed in 6 (14.6%) and 2 (4.9%) cases respectively.
Notably, 25 (61%) patients underwent thrombolyis before un-
Coronary angiography was performed using standard percuta-
neous techniques either via femoral or radial route after Allen's test.
Angiographic severity was assessed in at least two orthogonal
patients underwent CABG. All the remaining 40 patients followed
involvement are tabulated in Table 3. Obstructive CAD with SVD was the most common angiographic diagnosis. LAD was the most common culprit vessel followed by RCA involvement. The propor-
tion of DVD and TVD was very low. No case of LMCA disease was observed. Spontaneous coronary artery dissection was observed in only 2 (4.87%) patients, while nonculprit vessels were found to be diseased in 7 (17.1%) patients. Notably, more than a single lesion in the culprit vessel was observed in only 4 (9.75%) patients.
and the pattern of coronary artery involvement are tabulated in Table 3. Obstructive CAD with SVD was the most common angiographic diagnosis. LAD was the most common culprit vessel followed by RCA involvement. The propor-
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3. Results
During the one-year study period, 2456 coronary angiograms were done for various indications pertaining to CAD. Forty-one young patients aged less than 30 years of age suffering from acute STEMI were included in the study according to the predefined study protocol. Table 1 describes the demographic and risk factor profile of the enrolled patients. The majority of the patients were within
the age range of 25–30 years. The youngest patient was a 19-year-
old male. Apart from the male gender, the most common risk factor
dyslipidemia, followed by smokeless tobacco consumption, obesity, and smoking. A family history of premature CAD in first-degree relatives was present in less than 10% cases. The fre-
quency of hypertension and diabetes mellitus was very low.
The most common symptom was chest pain in 39 (95.1%) pa-
tients followed by excessive diaphoresis in 36 (87.8%) patients. Two patients presented with heart failure while one patient presented with ventricular tachycardia, which was promptly reverted with
direct current (DC) cardioversion. Thirteen patients (31.7%) re-
ported significant physical stressor, while only 2 patients reported significant emotional stress before the event. None reported
intense physical exercise before the event.
Table 2 depicts the clinical profile of the patients. Anterior wall myocardial infarction (AWMI) was the most common presentation
atherosclerosis in females and high prevalence of smoking in males have been attributed for male preponderance.  

Dyslipidemia is a conventional risk factor for CAD with more than 50% prevalence in the present study (Table- 1). Various other studies conducted among young patients of AMI have reported dyslipidemia in their study cohort ranging from 20 to 80%  

Obesity at a younger age poses a significant threat to the development of early CAD. More than one-third of the patients were found to be obese in the present study (Table- 1). These findings are in line with the study done in North India. However, obesity was reported as an infrequent cause in most of the other previous studies, with a prevalence of 11–15%.  

Systemic hypertension and diabetes mellitus are well-established risk factors for CAD. There was a low frequency of hypertension (12.2%) and diabetes mellitus (2.4%) in the studied population (Table- 1). The prevalence of hypertension ranged between 10 and 44% in other studies.  

However, the prevalence of diabetes mellitus was reported to be less than 10% in many studies.  

A positive family history of premature CAD is associated with increased plaque content in the coronary arteries. Various Indian studies report a much lower prevalence rate of positive family history of premature CAD being centered around 10%, which is quite consistent with the findings of the present study with a prevalence rate of 9.8% (Table- 1). However, few Indian studies contrasting report a much higher prevalence ranging from 30 to 47%. Tobacco use is the most preventable cause of death worldwide that adversely affects all phases of atherosclerosis. There was a high prevalence of smokeless tobacco consumption (48.8%) and smoking (29.3%) in the studied population (Table- 1). Smoking cessation substantially reduces the risk of CAD, and its cessation before the age of 40 years reduces the mortality risk by 90%. Smokeless tobacco consumption is still not an established cardiovascular risk factor. However, it is widely prevalent in the South Asian population, thereby requiring systematic testing before any specific recommendations can be made in context with STEMI.  

Stressful life events can cause instability of the plaque leading to its rupture, thereby resulting in STEMI. This is evident in the present study too by the high prevalence of significant physical stressor (31.7%) before the event.  

LVEF is a commonly employed tool for risk stratification. The mean LVEF in the present study was found to be 43 ± 8.8% (Table- 2). This finding is in close concordance with other studies reporting mild to moderate left ventricular dysfunction with mean LVEF ranging from 37 to 55% in young patients. The left ventricular dysfunction can be attributed to the higher prevalence rate of AWMI and RWMA corresponding to LAD territory (73.2%) in the studied population with more than 80% being diagnosed as AWMI (Table- 2). AWMI, as the most common STEMI pattern, was the most common culprit artery being involved singularly in 46.4% of cases followed by RCA in 7.3% of cases. The findings are in close concordance with other studies where LAD was the most common vessel involved followed by RCA, LCx, and LMCA respectively.  

Obesity at a younger age poses a significant threat to the development of early CAD. More than one-third of the patients were found to be obese in the present study.

5. Conclusion

AWMI is the most common presentation of STEMI among the very young adults in the Indian population. SVD is the most common angiographic diagnosis, with LAD being the most common culprit vessel. Smoking was found to be the most common preventable risk factor. Smokeless tobacco consumption needs further testing to be established as a cardiovascular risk factor. Early diagnosis and treatment of CAD and its modifiable risk factors can have a huge impact on survival in this productive age group.

Conflict of interest

All authors have none to declare.

References

1. Gaziano TA, Bitton A, Anand S, et al. Growing epidemic of coronary heart disease in low- and middle-income countries. Curr Probl Cardiol. 2010;35: 72–115.

2. Badran HM, Elnoamany MF, Khalil TS, et al. Age related alteration of risk profile, inflammatory response, and angiographic findings in patients with acute coronary syndrome. Clin Med Cardiol. 2009;3:15–28.
3. Prabhakaran D, Singh K. Premature coronary heart disease risk factors and reducing the CHD burden in India. Indian J Med Res. 2011;134:8–9.
4. Deora S, Kumar T, Ramalingam R, et al. Demographic and angiographic profile in premature cases of acute coronary syndrome: analysis of 820 young patients from South India. Cardiovasc Diagn Ther. 2016;6(3):193–198.
5. Sinha SK, Krishna V, Thakur R, et al. Acute myocardial infarction in very young adults: a clinical presentation, risk factors, hospital outcome index, and their angiographic characteristics in North India: AMIYA study. AYRA Atheroscler. 2017;13(2):79–87.
6. Thygesen K, Alpert JS, Jaffe AS, et al. Writing Group on the Joint ESC/ACCF/AHA/WHF Task Force for the Universal Definition of Myocardial Infarction Thygesen K, Alpert JS, White HD, et al. ESC Committee for Practice Guidelines. Third universal definition of myocardial infarction. Eur Heart J. 2012;33(20):2551–2567.
7. Iragavarapu T, Radhakrishna T, Babu KJ, et al. Acute coronary syndrome in young - a tertiary care centre experience with reference to coronary angiogram. J Pract Cardiovasc Sci. 2019;5:18–25.
8. Bhardwaj R, Kandoria A, Sharma R. Myocardial infarction in young adults-risk factors and pattern of coronary artery involvement. Niger Med J. 2014;55:44–47.
9. Pathak V, Ruhela M, Chadha N. Risk factors, angiographic characterization and prognosis in young adults presented with acute coronary syndrome at a tertiary care center in North India. BMJ Med. 2016;5:1–5.
10. Jha P, Ramasundarahettige C, Landsman V, et al. 21st-century hazards of smoking and benefits of cessation in the United States. N Engl J Med. 2013;368:341–350.
11. Maroszynska-Dmoch EM, Wozakowska-Kaplon B. Clinical and angiographic characteristics of coronary artery disease in young adults: a single centre study. Kardiol Pol. 2016;74:314–321.
12. Noor L, Adnan Y, Dar MH, et al. Characteristics of the coronary arterial lesions in young patients with acute myocardial infarction. Khyber Med Univ J. 2018;10:81–95.
13. Moret P, Gutzwiller F, Junod B. Coronary artery disease in young adults under 35 years old: risk factors (Swiss Survey). In: Roskamm H, ed. Myocardial Infarction at Young Age. Berlin, Germany: Springer; 1981:17–22.
14. Glagov S, Weisengen E, Zarins CK, et al. Compensatory enlargement of human atherosclerotic arteries. N Engl J Med. 1987;316(22):1371–1375.
15. Kennelly BM, Gersh BJ, Lane GK, et al. The relationship between angiographic findings and risk factors in young men with myocardial infarction. S Afr Med J. 1982;61:508–512.