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Original Article

Acute Coronary Syndrome (ACS) in the Young: Angiographic Features and Risk Factor Analysis of Patients with ACS before the Age of 35 Years

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Abstract

Introduction: Although there are many studies of acute coronary syndrome (ACS) in young, there are very few studies of ACS in age group <35 years. Besides, there is hardly any data available about clinical and angiographic profile of our regional population in our young ACS patients <35 years of age.

Aims and Objectives: The aim of the study is to study the clinical and angiographic profile in age group <35 years presenting as ACS.

Material and Methods: It was a prospective hospital-based study. All patients with age <35 years presenting as acute myocardial infarction (MI) from March 2012 to March 2014 were enrolled. Clinical presentation, coventional risk factors, and angiographic profiles were noted.

Results: A total of 30 patients were studied. The mean age of the patients was 30.87 ± 3.72 (range 21-35) years. All patients were males. Of these 14 patients had anterior wall ST elevation MI and other two had anterior wall non-ST elevation MI. 14 patients had infarct of the inferior wall. Smoking (66.66%) and dyslipidemia (50%) were two major conventional coronary risk factors followed by family history of premature coronary artery disease (26.6%) and hypertension (13.3%). The most common arteriographic finding was the involvement of one vessel (60%) followed by zero-vessel disease (23.33%), double-vessel disease was seen in only three patients and there were two patients with triple-vessel disease. None of the patients had left main involvement. The most common vessel to be involved was left anterior descending (LAD) (83.3%).

Conclusion: Smoking and dyslipidemia are the most common modifiable conventional risk factors. Single-vessel disease of LAD was common anatomic presentation. Further larger studies are needed to confirm the findings and implement various preventive strategies to decrease disease burden.

Key words: Angiographic profile, Risk factors, Young acute coronary syndrome

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of death among adults in the developed countries and its incidence is increasing in the developing countries as well[1] by 2020 atherosclerotic disease will become the leading cause of both death and disability worldwide, with number of fatalities projected to increase to more than 24 million a year by 2030[2] the disease has also been to affect Indians at a younger age sometimes with severe diffuse form of involvement and unrelenting course.[3] The overall prevalence of CAD in Jammu and Kashmir population studied by all diagnostic measures was 7.54% with rural of 6.7% and urban of 8.37%, prevalence was higher in males, 7.80% than in females 6.63%.[4] Studies from the 1970s to 1980s suggested that approximately 2-6% of myocardial infarctions (MIs) occur in young patients.[5,6] There is documented evidence that South Asian people develop CAD at a higher rate and also at an early age.[7] In India, 12%-16% of CAD patients are young. Half of

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the cardiovascular disease (CVD) related deaths (52% of CVDs) in India occur below the age of 50 years, and about 25% of acute MI (AMI) in India occurs under the age of 40 years.[8] Indians have a three-fold risk of developing AMI before age of 46 compared to Malays (1.25-fold risk) and Chinese (0.7-fold risk), respectively.[9] In general, MI develops 5-10 years earlier in Asian Indians than in other populations, and its occurrence in patients under 40 is 5-10-fold higher. It is predominantly a disease of men, women have been thought to comprise only approximately 5-10% of all MIs in the younger age groups.[10] Studies have shown that CAD is increasing in younger population.[11,12] Although MI in young patients is most often the result of coronary atherosclerosis, there are a significant number of patients in whom there is no evidence of coronary atherosclerosis.[13,14] Most of the studies have reported a predominance of single-vessel disease by coronary arteriography as the underlying etiological lesion.[15] Although there are many studies of acute coronary syndrome (ACS) in young, there are very few studies of ACS in age group <35 years. Besides, there is hardly any data available for our regional population in our young ACS patients <35 years of age.

Aims and Objectives

The aim of the study is to study the clinical and angiographic profile in age group <35 years presenting as ACS.

MATERIALS AND METHODS

The study was conducted at Fortis Hospital Mohali (Punjab) between the period March 2012 and March 2014. This was a prospective study where 30 patients who presented with ischemic chest pain, evolutionary changes on serial electrocardiogram, and elevated cardiac markers with clinical diagnosis of acute MI in the department of emergency medicine and shifted to cardiac care unit were enrolled for the present study when they fulfilled the study criteria as mentioned below and underwent coronary angiography during the same hospital stay.

Inclusion Criteria

1. Age equal to or <35 years.
2. Definite AMI at admission, i.e., having 2 of the following three (as per the WHO definition of AMI).
   a. Ischemic type chest discomfort
   b. Evolutionary changes on serially obtained electrocardiogram (EKG) tracings
   c. Rise and fall of serum cardiac markers.

Exclusion Criteria

(a) Age was >35 years
(b) Patients not willing for coronary arteriography
(c) Patients not having definite AMI (i.e., patients who did not fulfill the World Health Organization criteria of AMI)
(d) Congenital valvular heart disease or cardiomyopathies
(e) End organ damage.

A detailed history was taken and thorough physical examination was carried out. All patients were investigated for the presence of conventional coronary risk factors. Conventional risk factors included a family history of premature CAD, hypertension, diabetes mellitus, smoking and hyperlipidemia.

All patients enrolled for the study underwent coronary arteriography during the hospitalization. All angiograms were recorded on Innova angiography system and analyzed on ADW/Centricity/DICOM/VIWERLITE. On the basis of coronary anatomy patients were classified as having: Zero-vessel disease (normal coronaries or with 50% or less luminal narrowing), left main disease, single-vessel, double-vessel, and triple-vessel disease. The study was approved by the Institute Ethics Committee.

Statistical Analysis

Thirty patients were taken for the study, the study sample was estimated on the basis of very low incidence of MI in young (2%) with confidence interval of 95% and accuracy of 5%. Cochran Formula was applied for estimation of sample size. The data were analyzed by using statistics is a software package version 20. Mean and standard deviations were calculated for all quantitative data. Frequencies and percentages were calculated for all categorical data.

OBSERVATION AND RESULTS

A total of 30 patients were studied. The mean age of the patients was 30.87 ± 3.72 and range was 21-35 years. All patients were males. The age and sex distribution of participants are shown in Table 1. None of the patient in the current study gave history of angina preceding ACS. 28 patients had ST elevation MI, 14 patients had anterior wall MI, 14 had IWMI, 2 had Non-ST elevation MI. Of 28 patients who were eligible for thrombolysis, 5 were given streptokinase as initial reperfusion therapy, 21 out of 23 patients who had obstructive CAD underwent percutaneous coronary intervention (balloon angioplasty ± stenting).

Table 1: Age and sex distribution in studied patients

Age (years)	Male	Female	Total	Percentage
21-25	3	0	4	10
26-30	8	0	6	26.66
31-35	19	0	20	63.33
Total	30	0	30	100

Risk Factor Analysis

The conventional risk factors are shown in Table 2 smoking (66.66%) and dyslipidemia (50%) were two major conventional coronary risk factors in the present study followed by family history of premature CAD (26.6%) and hypertension (13.3%). One patient had no conventional risk factor, two patients had one risk factor, three patients had two risk factors and 24 patients had more than two risk factors. The lipid profile is shown in Table 3.

Angiographic Findings

The distribution of coronary artery involvement in various patients is shown in Table 4 and Figure 1. The distribution of lesion morphology is shown in the Table 5. The most common involvement was single-vessel disease of left anterior descending (LAD). None of the patients had coronary artery anomaly.

DISCUSSION

Most of the studies involving young ACS patients are reported from Western countries and presently, there is very less contemporary data on the prevalence, risk factors, clinical characteristics, and outcome of such patients in our local population. All the patients in the present study were men. This is similar to the observation made in the Framingham Heart Study where women comprise only 5-10% of young MI patients. Before menopause, women have lower age adjusted incidence and mortality rates for coronary heart disease than men. Gender specific incidence rates converge after menopause, suggesting a major role for estrogens in delaying progression of atherosclerosis. Much of this effect results from beneficial actions of estrogen on lipid fractions. Other potentially beneficial effects include direct vascular mechanisms such as improved endothelial-dependent vasomotion, reduced low-density lipoprotein oxidation, altered adhesion molecule levels, increased fibrinolytic capacity, and enhanced glucose metabolism.

Conventional Risk Factors

Of the five conventional risk factors, the incidence of smoking was quite high in our study (66.66%). This parallels the findings of various studies[13,16-19] which have reported a very high incidence of smoking (60-95%). Smoking therefore appears to be the most common conventional coronary risk factor in young MI

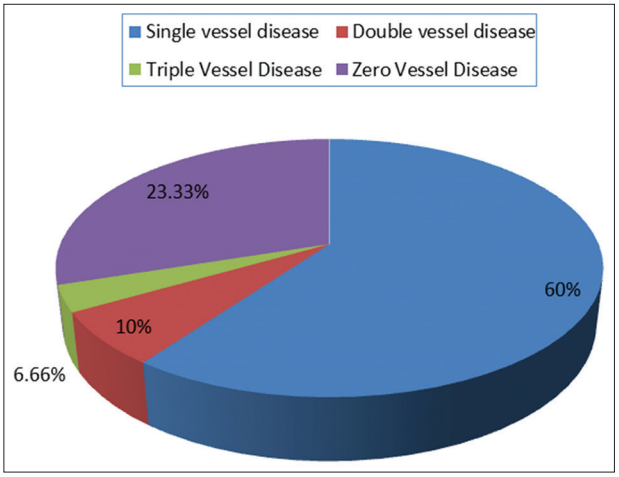

Figure 1: Distribution of coronary involvement

Table 2: Incidence of conventional risk factors in 30 young ACS patients

Conventional risk factors	Number of patients (%)
Smoking	20 (66.66)
Family history of premature CAD	8 (26.66)
Hypertension	4 (13.33)
Diabetes mellitus	2 (6.66)
Dyslipidemia	15 (50)

CAD: Coronary artery disease, ACS: Acute coronary syndrome

Table 3: Lipid profile of 30 young MI patients

Lipid profile (mg%)	Number of patients
Hypercholesterolemia (>240)	7
Hypertriglyceridemia (>200)	6
Low HDL (<35)	3
High LDL (>160)	8

MI: Myocardial infarction, HDL: High-density lipoprotein, LDL: Low-density lipoprotein

Table 4: Distribution of coronary involvement

Vessel involvement	Number of patients (%)
SVD	18 (60.00)
LAD	15 (83.33)
RCA	3 (16.66)
LCX	0 (0)
DVD	3 (10)
LAD+RCA	0 (0.00)
LCX+RCA	2 (66.66)
LAD+LCX	1 (33.33)
TVD	2 (6.66)
Left man	0 (0.00)
Zero-vessel disease	7 (23.33)

SVD: Single-vessel disease, DVD: Double-vessel disease, TVD: Triple-vessel disease, LAD: Left anterior descending, RCA: Right coronary artery, LCX: Left circumflex

Table 5: Type of lesions

Type of lesions	Number of patients
Type A	12
Type B	
Type B1	15
Type B2	0
Type C	1
Total	28

patients, the incidence varies between 60% and 95%, as compared with approximately 40% in the older patients. Dyslipidemia was found in 15 (50%) of our patients and rank second to smoking as the conventional coronary risk factor in the present study. This parallels the incidence in other studies (29-68%).[20-22] Eight (26.66%) participants of the current study gave family history of premature CAD. This was similar to the findings of the study by Biswas *et al.*[19] However, other studies have reported a higher incidence of this coronary risk factor.[23,24] It is not clearly known that how a positive family history increases the risk of MI in young patients, although it may involve inherited disorders of lipid metabolism, blood coagulation, or other genetic factors as yet unknown. Diabetes mellitus was present in two (6.66%) patients in our study. This is consistent with other studies.[23,24] In young patients, the incidence is <10% in most studies. Only four (13.33%) of our patients were hypertensive. This was similar to the incidence reported by various studies.[23,24] Hypertension is therefore less common in young MI patients than in older patients.

Angiographic Profile

Literature is full of studies describing lesion distribution in large series of patients studied with coronary arteriography, but there have been only few reports dealing with patients aged 35 years or less.[18] Quantification of coronary angiographic findings was limited to visual interpretation of attending cardiologist, which is representative of real world practice. Majority had single-vessel disease. This observation parallels the findings of various other studies.[18,19,23] However, other studies have reported a lower incidence of single-vessel disease.[21,24] The most commonly involved vessel in the present study was LAD (83%) followed by right coronary artery (RCA) (16.66%), none of the patients in the present study had single-vessel involvement of left circumflex (LCX). This finding parallels the findings of the other studies.[18,19,24] In our study, the incidence of double-vessel disease (LCX + RCA and LAD + LCX) was 10%. Two vessel diseases are less commonly reported, and the incidence varies from 18% to 36%.[18,19,24] The incidence of triple-vessel disease in the present series was very low. Only two patients (6.66%) had triple-vessel disease. There have been conflicting reports in various studies, some reporting low[18,19] and some high[23,24] incidence of triple-vessel disease. None of the participants of the present study had involvement left main coronary artery. Other studies have also reported no or low (0-2%) involvement of left main.[18,19,23] The incidence of zero-vessel disease was 23.33% in the present study which compares favorably with other studies.[20,25] In a recent review, Choudhury and Marsh[14] have reported 20% incidence of normal coronary-MI.

CONCLUSION

Smoking and dyslipidemia are the most common modifiable conventional risk factors. Single-vessel involvement of LAD was the most common anatomic presentation. Further larger studies are needed to confirm the findings and implement various preventive strategies to decrease disease burden.

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