



## ACUTE MYOCARDIAL INFARCTION IN YOUNG INDIVIDUAL: THE STARTLING REALITY OF CORONARY PROGERIA

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### ABSTRACT

**Objective:** To study the epidemiology and clinical silhouette, risk profile, angiographic patterns, management, and long term outcomes of Coronary artery disease presenting as an ACS (cute coronary syndrome) in young individuals of age less than 40 years presenting to our tertiary care centre. **Methods:** We incorporated 251 patients aged less than 40 years who presented with ACS (STEMI or NSTEMI/UA) to the department of cardiology Coimbatore Medical College, Coimbatore. **Results:** 251 young patients aged 40 years or less who presented with ACS were included in the study. Smoking turned out to be the most deadly risk factor and was associated with the most number of cases present in 68% of cases. Next in line was diabetes (54%) and family history (48%) of cases. 54% patients were reported to be having significant depression. Hypertension (44%) and dyslipidemia (40%) were also seen in a large proportion of cases. Most of the cases presented as STE-ACS (80%) and other presented as NSTEMI-ACS (20%). Out of 251 patients 178 patients underwent CAG, of all the patients undergoing Coronary angiogram most recurring angiographic profile was that of being Single vessel disease (65%) mostly involving the LAD. There was in-hospital mortality of 4 patients, one of which had presented with concomitant diabetic ketoacidosis. Most common complication of the patients was Cardiogenic shock which occurred in 22% of the patients, while 18% of them had post MI period complicated by Arrhythmias. **Conclusions:** STE-ACS was the most common presentation of ACS in the young population. Smoking was the most common risk factor. The majority of the patients had single-vessel disease. Our study concluded that modifiable risk factors are the most penetrative factors which could be dealt with in an ideal manner to reduce the relative risk of CAD in young

### KEYWORDS :

#### INTRODUCTION

Coronary artery disease has silently emerged as major health issue that has become a cause of concern for not only India but the world, risk factors with varying epidemiological penetration has changed over time to engulf the younger sections of society as well, which were previously assumed to be relatively immune to the diseases of coronaries. The prevalence of CAD in India for more than a few decades has ranged between 1.6% to 7.4% in rural populations and from 1% to 13.2% in urban populations. At the current demographic position, India is sitting on a volcano of patients with young patients with CAD. As far as a quarter of all deaths in India are attributable to cardiovascular diseases. Indian population has a tendency to get affected a decade earlier than the western counterpart. Coronary atherosclerosis is the most common forerunner amongst the etiology of CAD in youth, other causes like the coronary vasospasm, embolism, hypercoagulable states, vasculitis and substance abuse follow it closely. Although the CAD in young have a relatively benign course, but still it carries paramount affects on the psychological impact, morbidity, financial burden and a substantial loss of DALYs

#### MATERIALS AND METHODS

##### Study Design

Ours is a cross sectional observational study carried out in a tertiary care centre of India presenting to the Intensive Coronary Care unit of Department of Cardiology.

##### Material and methods

The study was conducted from February 2021 to June 2022. The study included the subjects younger than 40 years of age who presented with acute coronary syndrome. Acute MI was defined as per the 4<sup>th</sup> universal definition of myocardial infarction. NSTEMI-Acute Coronary Syndrome was defined as per the latest American heart association guidelines. ECG Manifestations of Acute MI (in the Absence of LBBB). New ST elevation at the J point in two contiguous

leads with the following cut points:

- $\geq 0.1$  mV in all leads (except V2-V3)
- In leads V2-V3 the following cut points apply:
  - $\geq 0.2$  mV in men  $\geq 40$  years
  - $\geq 0.25$  mV in men  $< 40$  years
  - $\geq 0.15$  mV in women

2D echocardiography (VERSANA, GE Healthcare™) was performed to evaluate the left ventricular systolic and diastolic function and to look for any unforeseen mechanical complications. Definition of Cardiogenic shock as taken as systolic blood pressure (SBP) of less than 90mmHg for 30 min or the use of drugs for maintaining an SBP of 90 mm Hg. Latest ACC/AHA and ADA guidelines and statements were taken as the reference standards for the definition of Hypertension, dyslipidemia and Diabetes. Family history was considered positive if the 1<sup>st</sup> degree relative of the patient had a documented CAD at the age of  $< 55$  in males and  $< 65$  in females. Our Institute's ethics committee thoroughly scrutinized our study and approved our study protocol, and proper consent was obtained from every capable patient or their authorized next of kin. The guidelines of the Declaration of Helsinki were strictly adhered to.

##### STATISTICAL ANALYSIS

All the acquired data were initially uploaded in the Excel Sheet, Google Inc, USA and then were analysed using SPSS software. The significance of differences between the means of normally distributed data was studied using the Students T test. The assessment of categorical variables connecting the study groups was undertaken using the chi-square test. The P value of  $< 0.05$  was taken as statistically significant

##### RESULTS

251 young patients aged 40 years or less who presented with ACS were included in the study. Most of the study population were aged between 36 and 40 years. The youngest

of all was 23 years old. Many risk factors were taken into consideration. But Smoking turned out to be the most deadly risk factor and was associated with the most number of cases present in 68% of cases. Next in line was diabetes (54%) and family history (48%) of cases. We used HADS scoring system to study the affective depressive disorder, and it turned out that 54% patients were reported to be having significant depression while another 18 % had a borderline score. Hypertension (44%) and dyslipidemia (40%) were also seen in a large proportion of cases. Most of the cases presented as STE-ACS (80%) and other presented as NSTEMI-ACS (20%). Out of 251 patients 178 patients underwent CAG, of all the patients undergoing Coronary angiogram most recurring angiographic profile was that of being Single vessel disease (65%) mostly involving the LAD. The diabetic patients were more prone for having involvement of more than one vessel involvement. Total of 18 patients were referred for CABG for having involved three vessels or a critical left main involvement. Out of these 13 patients were found to be diabetic. 4 were smokers. Of the patients presenting with STE-ACS, 88% of the patients were thrombolysed. 4% of the patients were taken for primary PCI. There was in-hospital mortality of 4 patients, one of which had presented with concomitant diabetic ketoacidosis. Most common complication of the patients was Cardiogenic shock which occurred in 22% of the patients, while 18% of them had post MI period complicated by Arrhythmias. Most common arrhythmia encountered was Ventricular tachycardia (8%) which was self limiting in most of the cases. Atrial fibrillation was seen in 4% of the patients.

## DISCUSSION

Our study included 251 patients of less than 40 years of age who presented with ACS. CAD in young patients is reasonably infrequent. Young patients more often than not present with the ACS as a manifestation of Coronary artery disease. The definitions of 'young' for a CAD has garnered various thoughts, but we took 40 years as a cut off. Unparallel to other communities, Asians, for the most part Indians, are at elevated peril of developing CAD at a young age. The pervasiveness of CAD is increasing among the young population. Nevertheless, the minutiae on risk factors and outcomes among young CAD populations, with special reference to those below 40 years of age, is very much inadequate. Some studies have reported a incidence of CAD to be 3% in those <40 years of age. In the more topical statistics from the YOUNG-MI registry, among patients <50 years of age admitted with ACS, approximately 1/5<sup>th</sup> were <40 years. GRACE study revealed a prevalence of around 6 percent for young CAD. There are very few registries in India that offer data on the young population's prevalence and profile with CAD. The first registry in India, which published figures on the young CAD population, was the CADY registry.<sup>3</sup> In a retrospective study of more than 8000 patient with ACS from India, just about 10% were <40 years of age. Young patients with coronary involvement are almost at all times, males, as Diabetes mellitus and systemic hypertension are familiar risk factors for CAD in the young population, which manifested in our study. Patients with a narration of premature CAD in their families have augmented plaque content in their coronaries. Various studies from have shown a wide disparity in the prevalence of a family history of premature CAD. Smoking was the most frequent risk factor for ACS in the young population, analogous to other studies. The most widespread diagnosis was AWMI followed by IWMI and NSTEMI-ACS, which was akin to prior studies in young ACS patients. Patients with STE-ACS were having an average age of 36 years and had a high proportion of worsened LV function (p<0.001) as compared to patients

with NSTEMI-ACS. Past history of prior CAD was superior in patients with NSTEMI-ACS as compared to STEMI. Angiographic patterns are dissimilar in young MI patients as against to those with older MI patients. About 30% of those who underwent CAG had non obstructive CAD, which was in line with prior studies.

A good number studies in young ACS patients agreed with the predominance of SVD, as seen in the our study. 4 in-hospital deaths were encountered, and all patients were discharged in a hemodynamically steady state. Many patients who could not undergo coronary interventions were managed medically. These findings are an evidence for the fact that young adults with ACS have a good prognosis.

## LIMITATIONS

This study is a cross-sectional which is devoid of any control group; hence, each factor's risk and statistical implication could not be analyzed. Risk predictors like lipid profile, Serum homocysteine, CRP data were not available in all patients. Intravascular imaging may possibly have precisely established the underlying cause for CAD (atherosclerotic versus nonatherosclerotic) in these young patients, particularly in patients with MINOCA and patients with non-obstructive coronaries

## CONCLUSION

Coronary artery disease with special reference to acute coronary syndrome was thought of as a senile disease with less penetration into the young population. But well into the 21<sup>st</sup> century with the generational change in the epidemiological transition the occurrence of acute MI in young population is no more a hidden secret. Although the risk association of CAD do copy the elderly profile in the young as well, but nevertheless there is some uniqueness in risk profile of the young patients. Our study concluded that modifiable risk factors are the most penetrative factors which could be dealt with in an ideational manner to reduce the relative risk of CAD in young

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