Analysis of Conventional and Nonconventional Risk Factors, Clinical Profile and Angiographic Correlation in Young Myocardial Infarction at Tertiary Care Centre

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ABSTRACT

Background: CAD in the young require special attention as the clinical profile, risk factors and prognosis are different from that in older patients.

Method: The present study is an attempt to evaluate acute myocardial infarction in young individuals (<40 years of age) undergoing coronary angiography (CAG). A total of 290 patients aged 40 years or younger who underwent CAG in the Department of Cardiology, Coimbatore medical college hospital between December 2019 to February 2021 were included in this study. Demographic characteristics, risk factor profile, laboratory test results, ECG and echocardiographic findings, CAG findings, and in-hospital mortality were assessed. All subjects completed the Hospital Anxiety and Depression Scale (HADS) to assess anxiety levels or presence of depressive symptoms as a potential risk factor among young patients.

Results: The mean patient age was 35.6 ± 4.4 years. Men made up 87.2% of the study sample. STEMI was present in 84 % of acute MI while remaining had NSTEMI. CHF (Killip class II or III) was present at hospital admission 14.4% patients. Angiographically normal coronary arteries were found in 4% of patients with the diagnosis of ACS. The most common location of significant atherosclerotic coronary lesions was the left anterior descending artery (60.1%) followed by the right coronary artery (32.4%).

The most prevalent were conventional cardiovascular risk factors followed by anxiety/depression, a family history of CAD. The findings showed that 32% of the respondents had anxiety caseness and 40% had depression caseness.

Conclusion: Significant risk of CHF on presentation and STEMI most common cases. Modifiable risk factors constitute primary etiology with less commonly evaluated cause as anxiety and depression need to be monitored regularly, provide regular counselling services. 4.0% revealing normal coronaries suggesting microvascular dysfunction important process other than atherosclerosis.

Keywords: [young MI, nonconventional risk factors, STEMI, coronary angiogram]

INTRODUCTION

Coronary artery disease (CAD) is the major cause of morbidity and mortality in especially young individuals in south Asia and India.[1] The Framingham study reported a 10-year incidence rate per 1,000 of myocardial infarctions of 12.9 in men 30 to 34 years old and 5.2 in women of 35 to 44 years old. [2] Young MI patients has different characteristics from that of older patients. Men are the majority; however, women have an increasing prevalence recently. [3-5] CAG studies performed have revealed a relatively high incidence of

normal coronary arteries in young MI patients, nonobstructive coronary lesions, and involving single coronary artery. [6,7] Young patients with AMI has identified a high prevalence of current smoking, hyperlipidemia, and family history as risk factors compared to older patients. [7-11] Other conventional risk factors and non conventional risk factors are less strongly associated in older patients and are more likely in young individuals.[10] The homocysteine levels of range less than 15 micromoles per liter (mcmol/L) are normal. Higher levels are more than 15 (mcmol/L); Moderate (15 to 30 mcmol/L) Intermediate (30 to 100 mcmol/L). Normal Lp(a) levels in the range of under 5 to 29 milligrams per deciliter (mg/dL), which roughly equals under 13 to 73 nanomoles per liter (nmol/L) and elevated are more than 30mg/dl considered.

MATERIALS & METHODS

The present study is an attempt to evaluate the clinical profile, risk factors & angiographic pattern of acute myocardial infarction in young individuals (<40 years of age) undergoing coronary angiography (CAG). A total of 290 patients aged 40 years or younger who underwent coronary angiography (CAG) in the Department of Cardiology, Coimbatore medical college hospital Coimbatore between December 2019 to February 2021 were included in this study. Demographic characteristics, risk factor profile, laboratory test results, electrocardiographic and echocardiographic findings, CAG findings, and in-hospital mortality were assessed. All subjects completed the Hospital Anxiety and Depression Scale (HADS) to assess anxiety levels or presence of depressive symptoms as a potential risk factor among young patients. Myocardial infarction was diagnosed if all of three of the following criteria were present in the study. Sustained chest pain or discomfort typical of cardiac ischemia, lasting longer than 30minutes and not relieved by nitroglycerin. Initial ST elevation of 1mm or more in atleast 2 or more consecutive ECG leads along with elevation of cardiac enzymes such as CK-MB or Cardiac Troponin. Significant coronary disease was defined as at least a 50% reduction in the internal diameter of the right, left anterior descending or left circumflex coronary arteries and their branches, or ->50% reduction in the internal diameter of the left main coronary artery.

Statistical Analysis

The adequate required sample size was estimated based on prevalence of disease and using formula , $n = z^2 pq / d^2$, where; n=sample size, z=1.96(considering 0.05 alpha, 95% confidence limits and 80% beta), p = assumed probability of occurrence or concordance of results, q = 1 – p and d = marginal error (precession). In *Global* Registry of Acute Coronary Events (GRACE) study, the *prevalence of young* acute coronary syndrome (ACS) was 6.3% and marginal error was taken as 5% , which gives our stated sample size for the study. After a written informed consent from cases, individuals were enrolled in the study satisfying our inclusion criteria. The collected data was fed into an excel spreadsheet and then tabulated. SPSS for Windows version 22 software was used for statistical analysis. Chi-square or Fisher's exact test was applied to compare frequency distribution. The student t-test was applied to compare two independent means. Test of normality was performed before applying the statistical test for significance.

RESULT

The mean patient age was 35.6 ± 4.4 years, with 18-30 years group were 35 patients of 290 patients while 255 patients were of 31-40 year of age group. 11.2% patients who presented with STEMI were of age 18-30 years whereas 72.79% STEMI were from age group 31-40 years of total 290 patients. Men made up 87.2% of the study sample of which 75.8% presented with STEMI. Total STEMI was present in 84 % of acute MI while remaining had NSTEMI. CHF (Kilip class II or III) was present at hospital

admission 14.4% patients and CHF developed later during hospitalization in an additional 5.5% patients, making total CHF presentations to around 20% of patients with Kilip class II/III.. Most of the patients (75%) did not have any features of pulmonary edema or cardiogenic shock. Cardiogenic shock was present in 4.9% of total young MI patients as shown in figure 1.
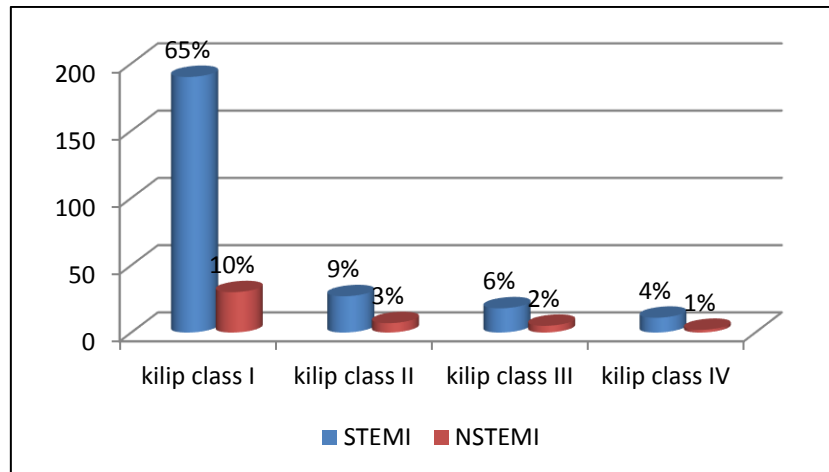

Figure 1: Clinical presentation in young MI among STEMI and NSTEMI

Angiographically normal coronary arteries were found in 4.0 % of patients with the diagnosis of ACS. Single-vessel disease (SVD) was identified in 81.1% of patients with a positive result of CAG (stenosis >50%) ,double vessel disease in 10.5%, triple vessel in 5.7% patients. Of total 218 STEMI patients, 140 (48.27%) had SVD, 20 (6.89%) had DVD, 10(3.44%) had TVD, minor CAD was in 44 patients (15.17) and normal was in 4 patients (1.37%) of total STEMI. The most common location of significant atherosclerotic coronary lesions was the left anterior descending artery (LAD) (60.1%) followed by the right coronary artery (32.4%). The most prevalent conventional cardiovascular risk factors were lipid abnormalities, cigarette smoking and an increased body mass index $\geq$ 25 kg/m2, followed by anxiety/depression, a family history of CAD and hypertension. The detailed distribution of each risk factor is described in figure 2.
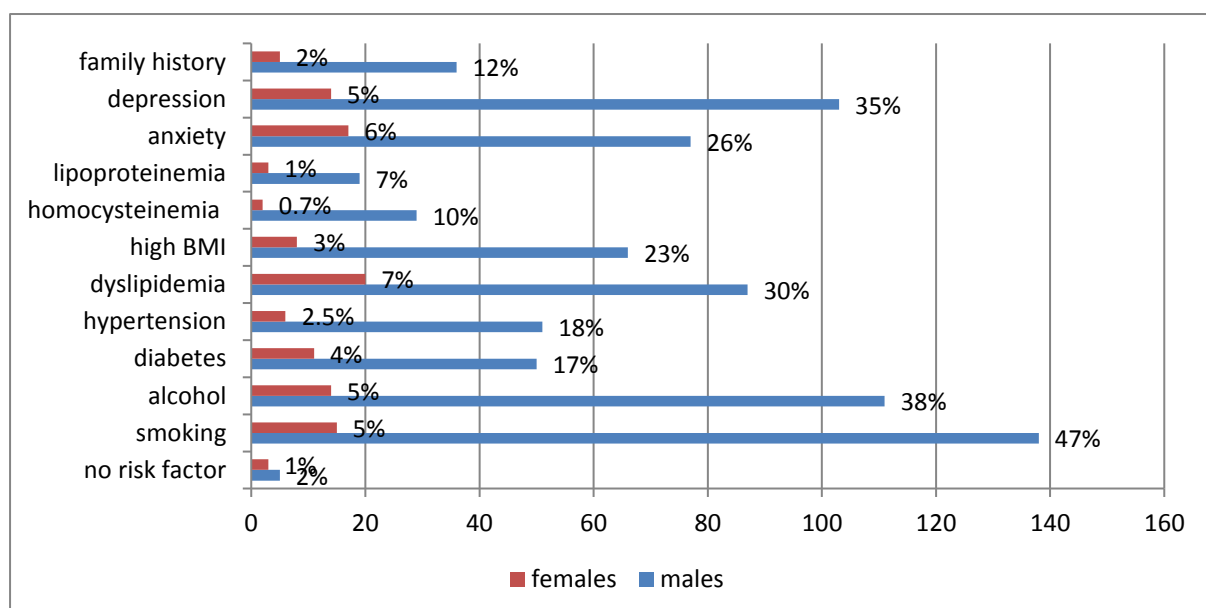

Figure 2: Prevalence of various risk factors in young MI

The majority of risk factors that exist in young MI are still the conventional risk factors in the form of smoking being the most prevalent risk factor followed by alcohol. Non conventional risk factors are on the rise as shown in figure 1, 40% of the respondents had depression caseness and 32% of the respondents had anxiety caseness. Increase prevalence of Hyperhomocysteinemia and hyperlipoprotein a levels are increasing being the risk factors among those who do not have any of conventional risk factors. In spite of extensive evaluation for risk factor analysis, there were 3% patients who did not have any risk factors known to cause MI.

They could have associated microvascular dysfunction or vasospastic etiologies.

The significance of association of conventional risk factors with number of significant coronary artery involvement was tested. The chi-square statistic is 22.5588. The p-value is .003979. The result is significant with p value < 0.05 and hence was concluded that the conventional risk factors like smoking and diabetes were more associated with severe coronary artery involvement and multivessel disease compared to nonconventional risk factors which were more associated with minor coronary artery disease as shown in figure 3.
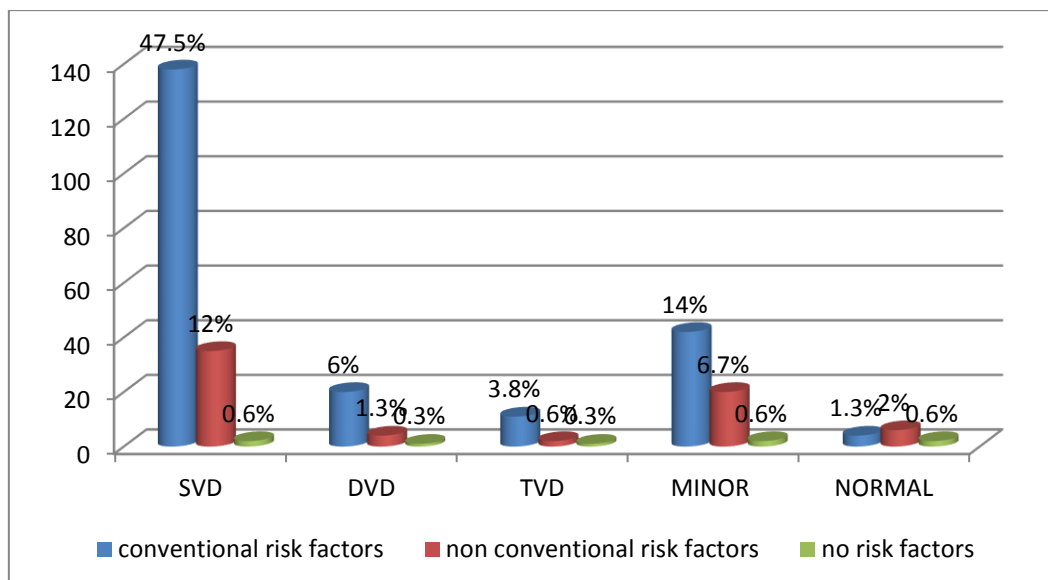

Figure 3: Association of conventional and non conventional risk factors in young MI with coronary artery involvement

DISCUSSION

With the rising prevalence of CAD in India, it is estimated that by the end of 2030, India will be the cardio-diabetic capital of the globe as predicted by WHO. Similar was noted in out study, as CVD is more aggressive and manifests at a younger age in India. Youngest patient presented in our study AMI was 19 years. Most common demonstrated risk factors for CAD is male sex with smoking. [12] Other most important conventional risk factors are diabetes, dyslipidemia, hypertension and high BMI. Incidence of fibrous plaques and their sequelae were increased with plaque rupture and erosion could be probable mechanism

of MI though vasospasm and dissection could be increasing cases in young patients for which need intravascular imaging to demonstrate in further studies. The association is relatively strong between conventional risk factors with multivessel disease though the studies have demonstrated even in the most homogenous groups, a high degree of variability among individuals. [13] Although young patients have the less extensive disease than older patients with significant coronary obstruction but the clinical presentation of higher killip class is on the rise compared to earlier studies. Higher number of individuals in young patients presenting

with rales, pulmonary edema and cardiogenic shock. Females are more commonly presenting with NSTEMI while males with STEMI. The current findings of our study with predominantly single-vessel disease in young patients also suggests the same. [14] These findings of rapid progressive even of thrombosis and plaque rupture, directs the medical fraternity for aggressive approach towards primary and secondary preventions of premature cardiovascular disease. [15] However, the guideline directed therapies are applicable same as to younger patients as they are to older patients [16,17] and hence the benefits of primary

CONCLUSION
Acute myocardial infarction is rising concern among young individuals and forces burden on society. Significant risk of CHF on presentation and STEMI most common cases. Modifiable risk factors constitute primary etiology with less commonly evaluated cause as anxiety and depression need to be monitored regularly, provide regular counseling services, and refer the patients for the treatment when needed. LAD involvement is main culprit vessel with 4% revealing normal coronaries suggesting microvascular dysfunction important process other than atherosclerosis.

Ethical Approval: Approved

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