



A Clinical Study On Angiographic Profile And Outcomes Of Acute Myocardial Infarction In Young (<40 Years)

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Abstract

Background: Coronary heart disease is the leading cause of death in the world. Premature CAD is due to a rapidly progressive form of atherosclerosis. Acute myocardial infarction is a devastating disease when it occurs in a young patient particularly who is a single earning member of their family. With increasing rates of traditional CV risk factors such as diabetes mellitus (DM), obesity, hypertension, hyperlipidemia, and smoking, especially among adolescents, it is likely that coronary artery disease will become even more prevalent in this study group. **Aim of the study :** The purpose of this study is for identification and documentation of change in disease trend towards very young population. **Method:** This observational study was conducted in GMKMCH Salem after getting approval from the institutional ethical committee over the period of 6 months from January 2022 to June 2022. Informed written consent was obtained. 62 subjects who presented to our institute with Acute Myocardial Infarction (ST elevation MI) with less than or equal to 40 years if age were enrolled into the study out of 438 total STEMI Patients over a period of 6 months, after excluding patients having Preexisting Cardiomyopathy, Prior coronary artery disease underwent CABG/PTCA, Moderate and Severe valvular heart disease and Age younger than 18 .6 patients were taken up for Primary PCI and 26 (in hospital) and 27 (outside hospital) were thrombolysed with streptokinase and taken up for Pharmacoinvasive Therapy in our institute. **Results :** Among risk factors, smoking constituted the most 48(77.41%), followed by hypertension 12(19.35%), diabetes 17(27.41%) and dyslipidemia 4(6.45%). Anterior wall MI in 41(66.12%) patients was the most common type, followed by inferior wall MI in 21(33.88%) and non-ST segment elevation MI was not included. Primary PCI were done 6 (9.67%) and Thrombolysis was done in 53(85.48%), out of which it was successful in 51(82.25%) patients. Angiography was done in 59(95.16%) of patients. SVD in 45(76.27%) patients was the commonest, followed by DVD in 5(8.41%), TVD in 1(1.69%) and LM in 3(5.08%). 5(8.47%) patients had Branch vessel disease and minimal CAD in coronary angiography. LAD 36 (61.01%) was singularly the most common vessel involved. PCI was done in 22(35.48%) of patients. 3 cases were died in our study population. One patient died after LAD stenting due to cardiogenic shock and 2 patients were died before angiography. **Conculsion :** The primary prevention of MI, particularly focus on risk factor modification such as smoking cessation and enhance physical activity. Younger patients had low prevalence of conventional risk factors than elders. And also reduced mortality noted. During coronary angiography, additional diagnostic stools should be used to diagnose microvascular dysfunction which is more prevalent in this study population.

Keywords: Coronary artery disease, Coronary angiography, Young adults

Introduction

Cardiovascular diseases (CVD) and its complications account for approximately 12 million deaths annually in the Indian subcontinent.¹ The Global Status Report on Noncommunicable Diseases has reported that in India, CVD caused more than 2.5 million deaths in 2008. As per 2014 statistics by the World Health Organization, 26% of total mortality in India is contributed by CVD.² Mortality due to coronary artery disease (CAD) is higher in South India.¹ Studies carried out in India and other places suggest that Asians in general and Indians in particular are at an increased risk of myocardial infarction at a younger age (<40 years), irrespective of whether they have migrated to other countries or are resident Asians.³ Heart diseases are rising in Asian Indians and present 5-10 years earlier than in other populations around the world. The mean age for the first presentation of acute myocardial infarction in Indians is 53 years.⁴ Onset of CAD before 40 years of age is considered as premature CAD (PCAD).^{5,6} Incidence of CAD in young Indians is about 12-16%, which is higher than any other ethnic group.^{3,7} If the current trend continues, the burden of CAD in India will surpass other regions of the world by the year 2020.⁸ In addition to higher rate, it is also reported that Indian individuals may develop CAD at a very early age.⁹ According to an estimate, more than half of death related to cardiovascular disease occurs in patients below the age of 50 years and one-fourth of acute myocardial infarction cases are being reported in patients under the age of 40 years.⁹ It has also been noted that the clinical presentation, risk factor profile, and coronary anatomy of young patients who develop CAD differs to those who develops CAD at an older age.⁹⁻¹¹ Overall, these studies have indicated that patients with early onset of CAD exhibit preponderance of single vessel disease, and dominance of coronary risk factors such as hypercholesterolemia, family history of CAD, and cigarette smoking as compared to older patients. However, there have been very limited data on comparison of demographic and angiographic characteristics in young patients stratified according to the type of acute coronary syndrome. We selected an age cut-off of 40 years to define a premature CAD, based on previous studies.^{9,12} Therefore, we aimed to identify the differences between risk factor profile and coronary angiographic characteristics of

young adults presenting with ST- elevated myocardial infarction (STEMI), non-ST- elevated myocardial infarction (NSTEMI), or unstable angina (UA). The purpose of this study is to collect data of young patients presenting with AMI and to assess the incidence of critical CAD in patients aged <40 years who were evaluated for chronic stable angina or acute coronary syndrome (ACS) angiographically so that it would be helpful in future for better management in this particular group of patients.

Method: This observational study was conducted in GMKMCH Salem after getting approval from the institutional ethical committee over the period of 6 months from January 2022 to June 2022. Informed written consent was obtained. 62 subjects who presented to our institute with Acute Myocardial Infarction (ST elevation MI) with less than or equal to 40 years if age were enrolled into the study out of 438 total STEMI Patients over a period of 6 months, after excluding patients having Preexisting Cardiomyopathy, Prior coronary artery disease underwent CABG/PTCA, Moderate and Severe valvular heart disease and Age younger than 18 .6 patients were taken up for Primary PCI and 26 (in hospital) and 27 (outside hospital) were thrombolysed with streptokinase and taken up for Pharmacoinvasive Therapy in our institute. All patients included in the study group underwent coronary angiography, which was performed using standard percutaneous techniques. Generally, 6 or 7 Fr guide catheters were used and were introduced via the femoral artery. Angiographic severity of coronary artery stenosis was assessed visually using at least two orthogonal views. CAD was defined as the presence of a >70% lesion in one of the three major coronary arteries (i.e. left anterior descending coronary artery (LAD), left circumflex coronary artery (LCX), and right coronary artery (RCA)) or their major branches, or >50% luminal narrowing of the left main coronary artery (LMCA). Accordingly, patients were classified as having single- vessel, double-vessel or triple-vessel disease.

Results

There were total 62(14.1%) patients in our study population out of 438 STEMI case over a period of 6 months. Age of presentation were ranging from 23 to 40 years(mean age 33.67 years). There was male

preponderance [n=59 (95.20%) vs 3(4.80%) Among risk factors, smoking constituted the most 48(77.41%), followed by hypertension 12(19.35%), diabetes 17(27.41%) and dyslipidemia 4(6.45%). Anterior wall MI in 41(66.12%) patients was the most common type, followed by inferior wall MI in 21(33.88%) and non-ST segment elevation MI was not included. Primary PCI were done 6 (9.67%) and Thrombolysis was done in 53(85.48%), out of which it was successful in 51(82.25%) patients. Angiography was done in 59(95.16%) of patients.

SVD in 45(76.27%) patients was the commonest, followed by DVD in 5(8.41%), TVD in 1(1.69%) and LM in 3(5.08%). 5(8.47%) patients had Branch vessel disease and minimal CAD in coronary angiography. LAD 36 (61.01%) was singularly the most common vessel involved. PCI was done in 22(35.48%) of patients. 3 cases were died in our study population. One patient died after LAD stenting due to cardiogenic shock and 2 patients were died before angiography.

TABLE :1 STUDY POPULATION

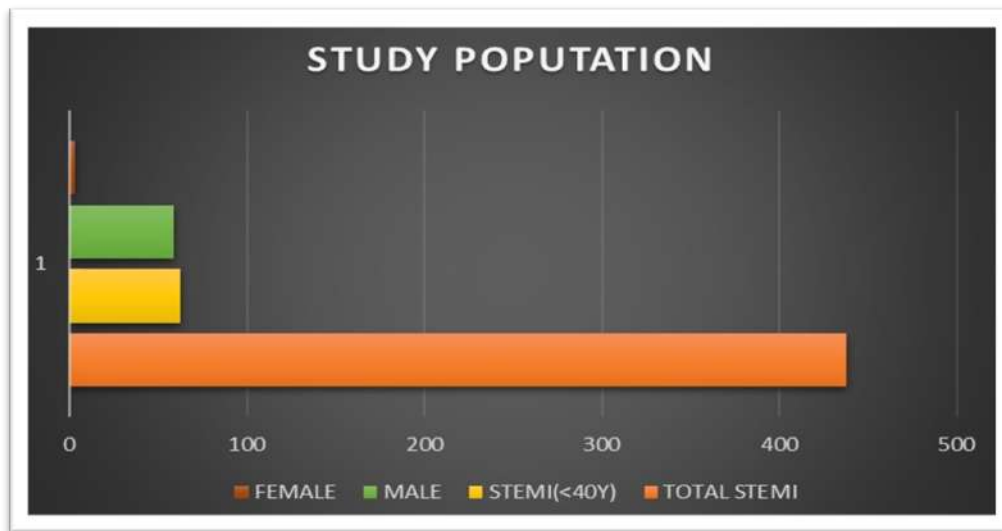


TABLE :2 RISK FACTORS

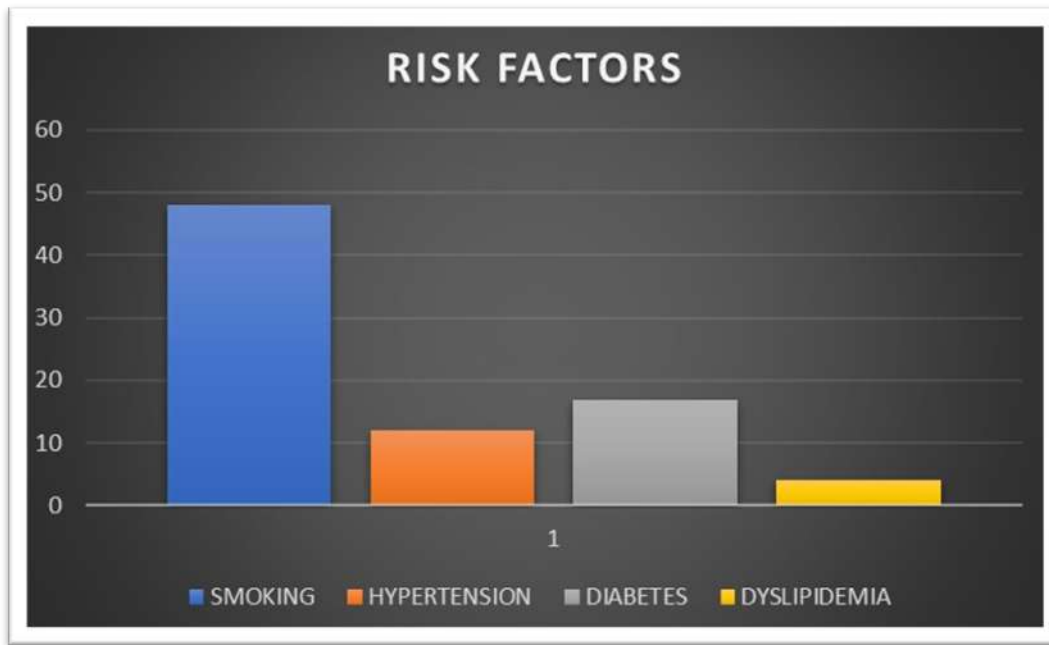


TABLE :3 SEGEMENTS AFFECTED

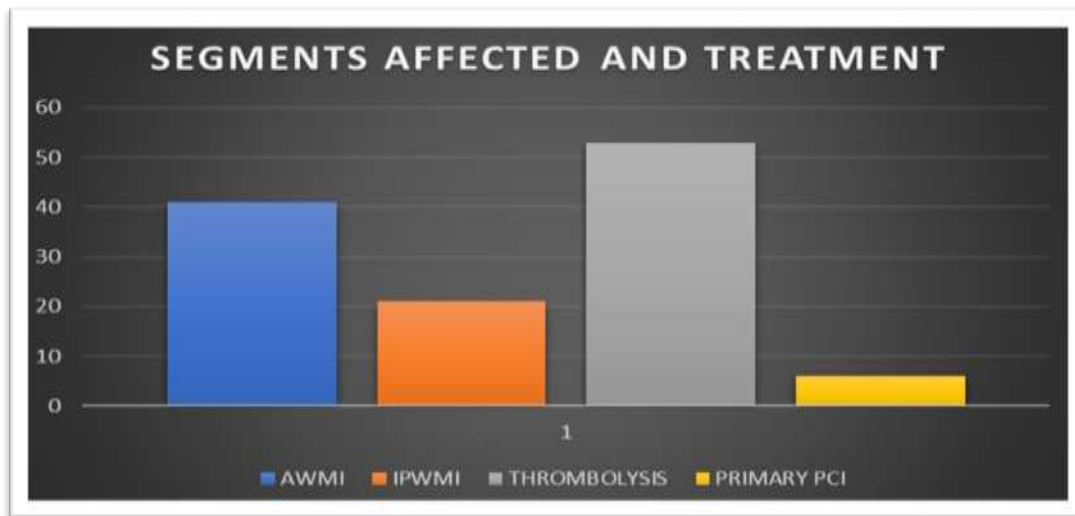
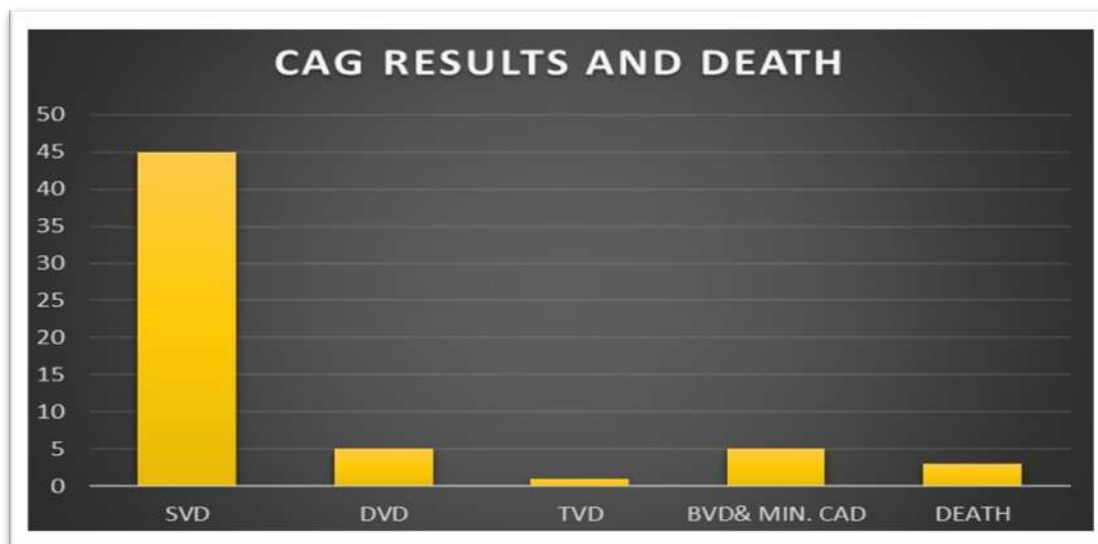


TABLE :4 CAG & DEATH



Discussion

In this study we observed that maximum number of cases i.e. 107 (71.3%) were in the age group 36-40 yr, while 35 (23.3%) were between 31-35 yr and 8 (5.4%) were between 25-30 yr and the mean age of presentation was 37.8 yr. We found SVD as the most common variety of CAD being seen in 103 (68.7%) cases, followed by DVD in 34 (22.6%) and TVD in 13 (8.7%) cases. In accordance with us, Suresh G et al, in their angiographic study on coronary artery disease in young adults, found 87.5% of cases with critical CAD were male and 12.5% were female. They observed 69.6%, 23.2%, 7.1% of cases in the age group 36-40 yr, 31-35 yr and 21-35 yr respectively and the mean age of presentation was 36.5yr. They found SVD in 66.07%, DVD in 22.32% and TVD in 11.61% of cases.¹⁴In this study the location of stenosis among the single vessel disease cases was seen in LAD in 62 (41.3%), LCX in 15 (10%), RCA in 23 (15.3%) and left main coronary artery in 3 (2%) cases. Deora S et al, observed stenosis of LAD in 55.3%, LCX in 11.8%, RCA in 19%, left main coronary artery in 0.5% in cases of STEMI group and LAD in 40.2%, LCX in 23.4%, RCA in 23.4%, left main coronary artery in 2.9% in NSTEMI/UA group patients. They studied on demographic and angiographic profile in premature cases of acute coronary syndrome and observed that majority of the patients in both STEMI (96.4% vs 3.6%) and NSTEMI/UA (81.8% vs 18.2%) group were males. They have seen 82.3% and 17.7% (STEMI), 86.6% and 13.4% (NSTEMI/UA) cases were in the age group 31-40yr and 20-40yr with

mean age 35yr and 36yr respectively. In contrast to us, they observed SVD, DVD, TVD in 56.6%, 10.8%, 3.6% of cases in STEMI group and 30.6%, 15.3%, 10.5% of cases in NSTEMI/UA group.¹⁵ Authors find smoking as the single most common risk factor seen in 98 (65.3%) cases. Other risk factors observed are hypertension in 40 (26.7%), diabetes in 23 (15.3), dyslipidemia in 14 (9.3), family history of CAD in 13 (8.7%) and obesity in 8 (5.3%) cases. Deora S et al, observed association of risk factors with smoking habits 67.9%, hypertension 10.0%, diabetes 8.9%, dyslipidemia 82.4%, obese 11.9%, family history of CAD 7.9% in STEMI group and association of risk factors with smoking habits 69.9% hypertension 37.8% diabetes, 29.2% dyslipidemia 86.6% Obese 18.1% family history of CAD 6.7% in NSTEMI/UA group.¹⁵ We studied double vessel disease cases with involvement of LAD + LCX in 18 (12%), LAD + RCA in 10 (6.7%) and LCX + RCA in 6 (4%) cases. So combination of LAD + LCX variety of DVD is most common and LCX + RCA is least common. Triple vessel disease was seen in 13 (8.7) cases. Tamrakar R et al, observed involvement of LAD + LCX in 18.4%, LAD + RCA in 10.7% and LCX + RCA in 7.6% of cases. They found triple vessel disease in 6.1% cases. They also observed association of risk factors like smoking 64.3%, hypertension 27.8%, diabetes 15.6%, dyslipidemia 9.6%, family history 9.6% and obesity 4.3% of cases, higher incidence of CAD in males (74%) in compare to females (26%), stenosis of LAD in 27.6%, LCX in 10.7%, RCA in 15.3% of single vessel disease cases and 4.3% cases below 30 yr and rest 95.7% of cases in the age group 30-45

yr.¹⁶ In this study we found stenosis of coronary vessels was more than 90% in 110 (73.7%) cases and between 50- 90% in 40 (26.7%) cases. We had observed ST segment elevated myocardial infarction in 88 (58.7%), Non ST segment elevated myocardial infarction in 25 (16.6%) and Unstable angina in 37 (24.7%) cases. Similarly Ewa M et al, in their study on coronary obstructive lesion group observed 50-90% stenosis in 27.1% of patients and $\geq 90\%$ stenosis in 72.9% of patients and ST segment elevated myocardial infarction in 52.8%, Non ST segment elevated myocardial infarction in 17.6% and Unstable angina in 269.6% cases. They also found most of the patients presented with CAD were males (86.2%) and mean age of presentation of CAD in younger patients was 35.1yr and involvement of SVD, multivessel disease and left main coronary artery disease in 61.9%, 34.7% and 3.4% of cases respectively. Prajapati J et al, observed SVD, DVD, TVD and normal vessels in 55%, 15%, 8% and 22% of cases in younger age group (<40yr age). They also observed association of risk factors like smoking 34%, hypertension 16%, diabetes 11%, dyslipidemia 47%, family history 19% and obesity in 3% of cases in their study on younger patients and stenosis of LAD in 44%, LCX in 26.6%, RCA in 29.4% of cases.¹⁸ In accordance to us Foroughi M et al, had also observed combination of LAD + LCX lesions more than LAD + RCA or LCX + RCA lesions, 11.9% vs 3.5% and 1.5% respectively and risk factors association of smoking 65.5%, hypertension 31.9%, diabetes 22.4%, dyslipidemia 36.6%, family history 38.4% in case of males and smoking 15%, hypertension 56.8%, diabetes 46.6%, dyslipidemia 47.9%, family history 38% in case of females. Their angiographic study on coronary artery disease in Iranian young adults revealed 1% patients had left main coronary disease, 68% patients had single vessel disease, 17% patients had two-vessel disease and 14% patients had three-vessel disease.¹⁹ Khadkikar GD et al, observed SVD, DVD, TVD and no vessel disease in 50%, 13.6%, 4.5% and 31.8% of cases respectively and association of risk factors like smoking 25%, hypertension 15.6%, diabetes 11%, dyslipidemia 32.1% and family history 37.5% of cases.²⁰

Conclusions: Based on the observation from our study. Smoking is the most common risk factor in young adults. The trend of AMI in young patients is growing due to physical inactivity and post COVID-

19 state, in addition to the conventional risk factors. Choice of initial revascularization strategy could be pharmaco-invasive strategy in young age and Post-COVID-19 patients with acute ST-elevation myocardial infarction, because about 1/3 of the study population were undergone PCI. Remaining patients were managed without stenting with medical management. The primary prevention of MI, particularly focus on risk factor modification such as smoking cessation and enhance physical activity. Younger patients had low prevalence of conventional risk factors than elders. And also reduced mortality noted. During coronary angiography, additional diagnostic stools should be used to diagnose microvascular dysfunction which is more prevalent in this study population.

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