International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 19s, 2025
https://theaspd.com/index.php

Study Of Acute Myocardial Infarction In Young Adults In A Tertiary Care Hospital – A Prospective Observational Study

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Abstract

Background: *Acute myocardial infarction (AMI) in young adults is an emerging clinical concern, often differing from older populations in terms of risk factors and presentation. This study aimed to assess the epidemiological, clinical, and angiographic characteristics of young patients with AMI admitted to a tertiary care hospital.*

Materials and Methods: *A prospective observational study was conducted in the Department of Cardiology at SRM Institute of Medical Sciences, Chennai, from February 2023 to July 2024. A total of 72 patients aged ≤40 years diagnosed with AMI were included. Diagnosis was based on symptoms of myocardial ischemia, ECG changes, elevated cardiac biomarkers (CK-MB/troponin-I), and imaging. Patient demographics, risk factors, symptom profiles, investigation findings, and short-term outcomes were analyzed using IBM-SPSS version 21.0.*

Results: *Most patients (69.4%) were aged 36–40 years; 80.6% were male. Chest pain was universally reported. Sweating (30.6%) and dyspnea (8.3%) were less common. Risk factors included diabetes (54.2%), hypertension (38.9%), smoking (19.4%), and alcohol use (22.2%). BMI was normal in 77.8%, with 12.5% overweight and 9.7% obese. According to the Killip classification, 90.3% were in Class I. Anterior wall infarction (52.8%) was most frequent. PTCA was done in 70.8% for LAD lesions and 29.2% for RCA. SVD was seen in 69.4% of cases; TVD in 6.9%. Thrombolysis with streptokinase was performed in 26.4%.*

Conclusion: *AMI in young adults predominantly affects males and is associated with modifiable risk factors. Early detection and preventive strategies are essential for improving outcomes in this population.*

Keywords: *Acute Myocardial Infarction, Young Adults, Risk Factors, Angiographic Characteristics, Tertiary Care Hospital, Coronary Artery Disease*

INTRODUCTION

Acute myocardial infarction (AMI) is widely recognized as a significant public health issue among young individuals, particularly those under 40 years of age.[1]Historically, acute myocardial infarction (AMI) was perceived as a disorder mostly impacting older persons, attributable to the cumulative influence of risk factors including atherosclerosis, prolonged hypertension, and chronic lifestyle behaviors.[2] Recent studies indicate a global rise in the incidence of acute myocardial infarction among younger populations. This development has acute health issues and long-term effects, affecting individuals and the wider socioeconomic structure. The change in the age demographics of AMI cases is concerning, indicating a transformation in cardiovascular health that necessitates a re-evaluation of existing preventive, diagnostic, and therapeutic approaches [3] .Prevalence of traditional risk factors has increased, which is one of the main causes of the rise in AMI cases among younger individuals. These encompass hypertension, obesity, diabetes mellitus, hyperlipidemia, and detrimental lifestyle choices such as smoking and inadequate

nutritional practices. The contemporary lifestyle, marked by elevated stress levels, sedentary habits, and convenient access to calorie-dense, nutrient-deficient foods, has substantially contributed to the premature start of coronary artery disease (CAD) in younger populations, hence heightening the risk of acute myocardial infarction (AMI)[5]. The interaction between environmental influences and genetic predisposition complicates the situation, rendering it challenging to mitigate AMI risk with straightforward, broad public health measures [6]. Lifestyle choices are a significant factor contributing to the rising prevalence of acute myocardial infarction in young adults. One major factor is smoking, which is still detrimental to many young individuals. conduct notwithstanding awareness initiatives. The proliferation of vaping has exacerbated this problem, as numerous individuals regard e-cigarettes as safer, thereby sustaining nicotine dependence. This dependency results in endothelial impairment, hastening atherosclerosis and elevating the risk of acute myocardial infarction.[7] Young adults with acute myocardial infarction frequently exhibit atypical symptoms, like weariness, dyspepsia, or back pain, instead of the normal chest discomfort. This is particularly applicable to young women, resulting in postponed diagnosis and treatment, which may exacerbate outcomes. Conventional risk calculators for older persons are insufficient for evaluating AMI risk in this population, frequently underestimating the threat due to the lack of cumulative exposure to standard risk variables[8,9]. The economical effects of AMI on young individuals are significant. A significant number are in their prime productive years, resulting in both direct healthcare expenditures, including hospitalization and surgical procedures, and indirect costs, such as diminished production and prolonged disability. [10, 11](Alexim et al., 2022; Luengo-Fernandez et al., 2023)[] The mental health burden, marked by worry, sadness, and dread of recurrence, hinders their capacity to resume normalcy, hence intensifying socio-economic difficulties for impacted families.[12]Despite the increasing prevalence of AMI among young adults, extensive research targeting this demographic is still limited. Most current research focuses on older populations, restricting understanding of the distinct risk profiles and outcomes of younger individuals. For example, young adults may encounter distinct etiologies of acute myocardial infarction (AMI), including spontaneous coronary artery dissection (SCAD), which is more prevalent among younger women. Rectifying these deficiencies is essential for enhancing prevention, diagnosis, and treatment in this at-risk population.[13] This study sought to address this gap by meticulously analyzing the clinical characteristics, risk factors, and outcomes of young adults experiencing their first myocardial infarction. We aim to offer insights that may enhance prevention efforts, refine diagnostic techniques, and improve treatment results for young patients with AMI. Furthermore, comprehending the distinct pathophysiology and epidemiology of AMI in this demographic would enhance public health policies aimed at early identification and reduction of risk factors. This study was to investigate acute myocardial infarction in young adults and to assess the clinical profile, risk factors, and outcomes of young patients presenting with first - time MI.

MATERIALS AND METHODS:

This prospective observational study was conducted in the Department of Cardiology at SRM Institute of Medical Sciences, a tertiary care teaching hospital in Chennai, from February 2023 to July 2024. A total of 72 patients aged ≤40 years diagnosed with acute myocardial infarction (AMI) were included based on specific inclusion criteria, such as symptoms of myocardial ischemia, electrocardiographic evidence of myocardial injury, development of new pathological Q waves, imaging findings consistent with ischemic etiology, and elevated cardiac biomarkers (CK-MB or troponin-I). Patients who refused consent were excluded. Informed consent was obtained before recruitment, and clinical assessments were performed, including baseline demographics, risk factors (hypertension, diabetes, smoking, alcohol use, chronic kidney disease, and dyslipidemia), family history, and presenting symptoms (chest pain, breathlessness, syncope, and palpitations). Short-term patient outcomes were recorded. Diagnostic investigations included electrocardiography, 2D echocardiography, cardiac enzyme analysis, basic biochemical tests, lipid profile assessment, and coronary angiography (CAG). Percutaneous transluminal coronary angioplasty (PTCA) was performed when indicated, and details of the addressed vessel were recorded. The study was self-funded, with no conflicts of interest. Data were analyzed using IBM-SPSS version 21.0, with results presented as mean, standard deviation, frequency, and percentage.

RESULTS:

Table 1: distribution of age and gender of the subjects:

		No of patients(N=72)	Percentage
AGE	<30	5	6.9%
	31 – 35	17	23.6%
	36 – 40	50	69.4%
SEX	MALE	58	80.6%
	FEMALE	14	19.4%

In our study most of the patients were between 36-40years and 81% of patients were male .In our study, all 72 (100 %) patients experienced chest pain (table1)

Table 2: Distribution Of Symptoms(N=72)

		No of patients	Percentage
CHEST PAIN	PRESENT	72	100.0%
	ABSENT	0	0
SWEATING	PRESENT	22	30.6
	ABSENT	50	69.4%
DYSPNEA	PRESENT	6	8.3%
	ABSENT	66	91.7%

Table 2 represents 50 patients (69.4%) had no complaints of sweating, and 22 (30 .6%) had sweating. In our study, the majority, 66 (91.7%) of patients had no complaint of dyspnoea and only 6 (8.3%) of patients had the presence of dyspnoea

Table 3: Distribution of history

Medical history	No.of patients (n=72)	percentage
Hypertension	28	38.9%
Diabetes mellitus	39	54.2%
Social history		
Smoking	14	19.4%
alcohol	16	22.2%
BMI		
Normal	56	77.8%
Over weight	9	12.5%
Obese	7	9.7%

Hypertension analysis indicated that 61.1% were non-hypertensive, whereas 38.9% had hypertension. In terms of diabetes, 54.2% of patients were diabetic, and 45.8% were non-diabetic. The assessment of family history revealed that 86.1% of patients had no family history, while 13.9% had a positive family history. Based on the BMI distribution of study participants, 56 (77.8 %) patients were categorized as normal, 9 (12. 5%) patients were categorized as overweight, and 7 (9. 7%) patients were categorized as obese. The smoking status of the study participants indicated that the majority (58 patients, 80 .6%) were non-smokers, while 14 patients (19.4 %) reported being smokers. In our study, most patients (91.7%) did not experience dyspnea, while a small proportion (8.3%) reported its presence. Regarding BMI, the majority (77.8%) had a normal BMI, followed by 12.5% classified as overweight and 9.7% as obese. Smoking status analysis revealed that 80.6% of patients were non-smokers, whereas 19.4% reported being smokers. Similarly, alcohol consumption data showed that 77.8% were non-alcoholic, while 22.2% consumed alcohol.

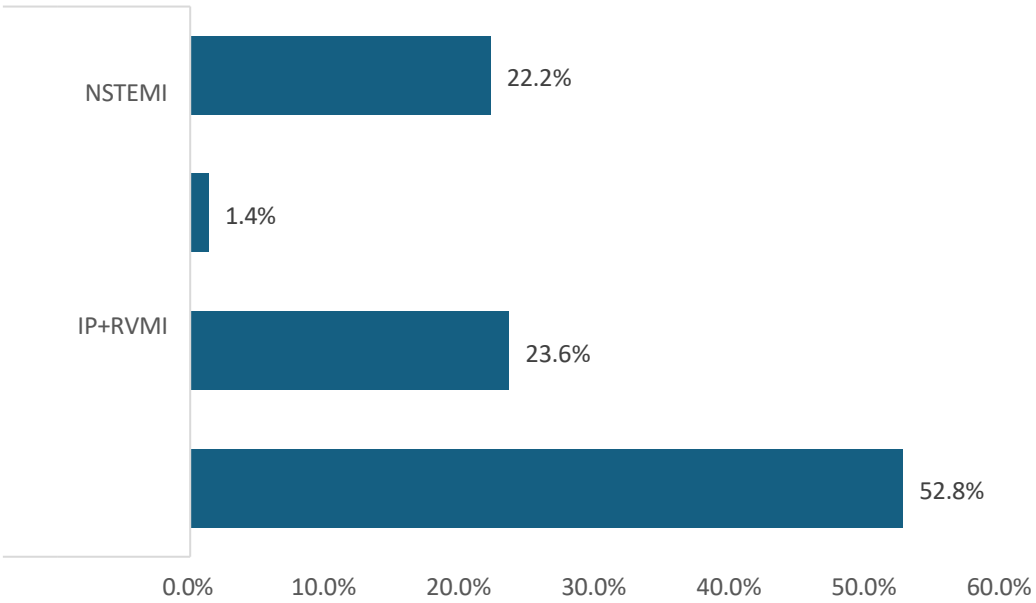
Table 4: Distribution Of Patients With Kii.Ip Classification

	No of patients	Percentage

KILIP CLASS	I	65	90.3%
	II	3	4.2%
	III	2	2.8%
	IV	2	2.8%

Table 4 represents based on the Killip classification, 90.3% of patients were classified as Class I, followed by 4.2% in Class II, and 2.8% each in Class III and IV, indicating varying severity levels of myocardial infarction

Figure 1: Distribution of patients based on site of MI



The site of myocardial infarction showed that 52.8% had anterior wall myocardial infarction (AWMI), 23.6% had inferoposterior wall myocardial infarction (IPWMI), 22.2% had non-ST elevation myocardial infarction (NSTEMI), and 1.4% had both inferoposterior and right ventricular myocardial infarction (IP+RVMI). Regarding regional wall motion abnormality (RWMA), 79.2% of patients had RWMA, indicating impaired heart muscle movement, while 20.8% did not exhibit RWMA which is mentioned in figure 1.

Table 5: Mean And Standard Deviation Of Clinical Parameters

PARAMETERS	Mean	Standard Deviation
SR CREATININE	1.02	0.98
EF	46.63	7.27
SBP	125.83	16.93
DBP	76.25	9.56

Based on the analysis of key clinical parameters, the mean systolic blood pressure (SBP) was 125.83 ± 16.93 mmHg, followed by a mean diastolic blood pressure (DBP) of 76.25 ± 9.56 mmHg. The mean ejection fraction (EF) was 46.63 ± 7.27, the mean serum creatinine level was 1.02 ± 0.98 which is represented in table 5.

Figure 2: Distribution Of Abnormal Level Of Tg, Hdl, Ldl

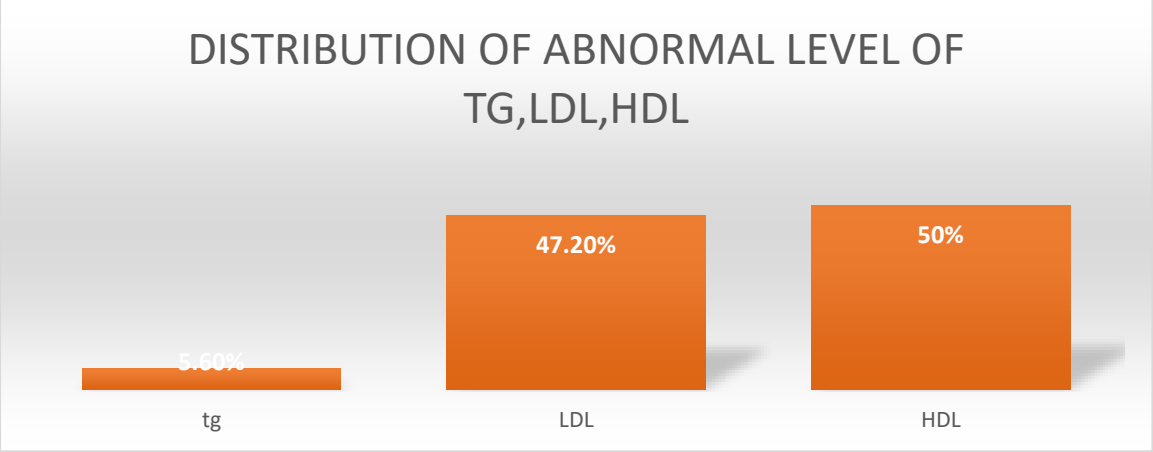
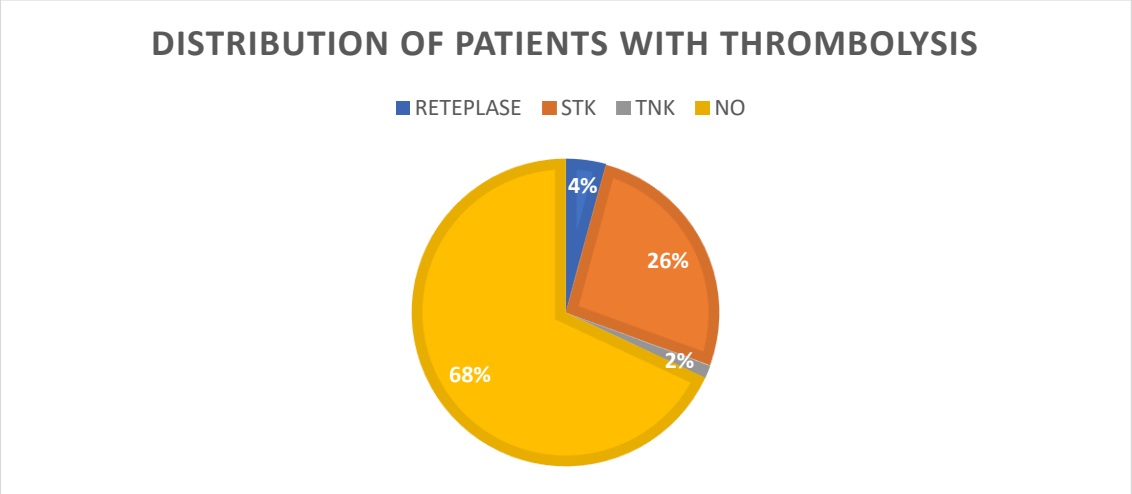


Figure 2 represents that abnormal level of triglycerides, low-density level of cholesterol, high-density level of cholesterol. only 5.6%, exhibited abnormal triglyceride levels and 47.20% and 50% of LDL, HDL respectively.

Figure 3: Distribution Of Patients With Thrombolysis



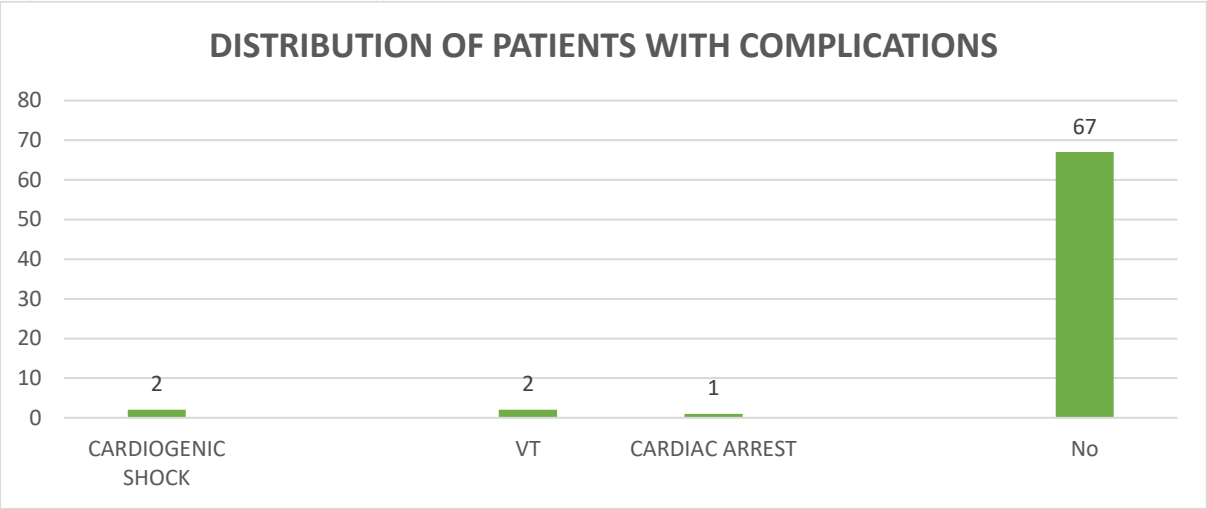
On the basis of thrombolysis-based treatment, the majority, 49 (68.1%), did not receive thrombolysis. Nineteen (26.4%) patients were treated with STK, followed by three (4.2%) who received reteplase and only one (1.4%) who was administered TNK (FIGURE 3).

Table 6: Distribution Of Patients Based On Management

		No of patients	Percentage
CAG	SVD	50	69.4%
	DVD	15	20.8%
	TVD	5	6.9%
	LM+DVD	1	1.4%
	LM occlusion	1	1.4%
PTCA	LAD	51	70.8%
	LCX	8	11.1%
	RAMUS	1	1.4%
	RCA	21	29.2%
CABG	No	69	95.8%
	Yes	3	4.2%

Table 6 represents the study participants, 69.4% had single vessel disease (SVD), 20.8% had double vessel disease (DVD), 6.9% had triple vessel disease (TVD), 1.4% had left main plus DVD (LM+DVD), and 1.4% had left main occlusion. Regarding percutaneous transluminal coronary angioplasty (PTCA), 70.8% underwent treatment for the left anterior descending artery (LAD), 29.2% for the right coronary artery (RCA), 11.1% for the left circumflex artery (LCX), and 1.4% for the ramus artery (RAMUS). In terms of coronary artery bypass grafting (CABG), 95.8% did not undergo the procedure, while 4.2% did.

Figure 4: Distrubution Of Complications



DISCUSSION:

In our prospective observational study of acute myocardial infarction (AMI) in young adults, several critical aspects were discussed. First, recognizing epidemiological trends is essential, as the prevalence of AMI in young adults is rising and is primarily influenced by factors such as lifestyle changes, smoking, obesity, and physical inactivity. [14] This demographic often exhibits different risk profiles than older adults, with a higher prevalence of modifiable risk factors, including substance abuse and poor dietary habits. [15] Young adults with AMI may exhibit atypical symptoms, potentially delaying diagnosis; thus, early recognition is vital for better outcomes [16](Safdar et al., 2018). The study should investigate prevalent AMI types in this group, including STEMI and NSTEMI, and assess coronary artery disease, hypercoagulable states. genetic predispositions, and In terms of diagnostic methods, emphasis can be placed on the role of electrocardiograms (ECG), cardiac biomarkers, and coronary angiography in timely and accurate diagnosis. [17] Management strategies in young adults may differ from those in older populations, focusing on aggressive risk factor modification, the use of antiplatelet agents, thrombolytics, percutaneous coronary interventions (PCI), and, in some cases, coronary artery bypass grafting (CABG). Long-term care involves lifestyle interventions and close monitoring to prevent recurrences. [18,19] In this study, the majority of the patients were 36–40 years old, and most of them were male. This finding aligns with Kanitz et al. (1996s), who reported that the mean age of patients was 34.8 (range, 17 to 39 years) and the majority (81%) were male, out of 74 Discussion 206 patients in their study. [20] Similarly, Bhardwaj et al. (2014) reported that out of 124 patients in their study, 123 were male and the mean age was 35.94 yrs. [21] Based on the clinical presentations in our study, all patients had chest pain, 30.6% had sweating, and only a few (8.3%) were compliant with dyspnoea. This finding aligns with the study conducted by in which 94.8% of the patients had chest pain in their study. Culić et al. (2002) conducted a study on 2123 patients with acute MI and reported that, the majority (87.6%) of male patients had chest pain followed by 59.7% of male patients had the symptom of sweating but dyspnoea was present in 48.4% of female patients.[22] Lichtman et al. (2018) studied 30 women (aged 30–55 years) hospitalized for acute myocardial infarction to investigate their experiences with prodromal symptoms and their decision-making process for seeking medical care. They found that 93% of patients had chest pain, including pressure and heaviness, 57% of patients had shortness of breath/dyspnoea, and only 23% of patients had sweating/diaphoresis. [23]Based on the BMI parameters in our study, the majority of the patients were categorized as normal, and only a few patients were considered obese. Kishi et al. (2014) conducted a study with 3,498 participants to examine the relationship between body mass index (BMI) and its 25-year

change on left ventricular (LV) structure and function. They reported that the majority (61.4%) of patients with a BMI(24).

CONCLUSION:

Young individuals experiencing their first myocardial infarction were predominantly male, with a high incidence of diabetes. Chest pain was the main symptom, though most lacked typical risk factors like hypertension or smoking. Anterior wall myocardial infarction was most common, with low severity per KILLIP classification and minimal heart failure signs. Management varied, with most not receiving thrombolysis but undergoing angioplasty, mainly on the left anterior descending artery. Short-term outcomes were positive, with low complications and mortality. The study highlights the need for early intervention and preventive strategies, urging future research on long-term outcomes and lifestyle modifications.

Conflict of interest: NIL
Acknowledgement : nil

Author contribution:

1-Conceptualization, study design, data collection, statistical analysis, manuscript drafting.
2-Data interpretation, literature review, manuscript editing, and final approval.

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