Original Research Paper

Volume - 16 | Issue - 09 | September - 2026 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Medicine

A COMPARATIVE STUDY ON RISK FACTORS, CLINICAL PROFILE AND OUTCOME OF ST ELEVATED MYOCARDIAL INFARCTION IN PATIENTS OF AGE LESS THAN AND MORE THAN 40 YEARS

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ABSTRACT **Background:** The cardiovascular disease remains a major cause of adverse outcomes in young individuals. This group is not well studied and has a unique risk profile with less traditional cardiovascular risk factors compared with older population. The occurrence of first MI before 40 years is 5 to 10 folds higher. **Materials And Methods:** A hospital based comparative study analyzed 62 patients of Acute ST Elevated MI who satisfied inclusion and exclusion criteria over a period of 18 months. The study compared risk factors, clinical profile and outcome of STEMI in patients of age less than 40 years and more than 40 years. **Results:** There was a significant difference in the distribution of family history, smoking, obesity, and dyslipidaemia between the two groups suggesting a higher prevalence of smoking and family history of coronary artery disease, obesity and dyslipidaemia in less than 40 years ($P < 0.05$). Whereas the prevalence of diabetes and hypertension was more in group II ($P< 0.05$). The clinical profile of patients also differed between the two groups. Younger patients generally presented with better left ventricular systolic function, as evidenced by higher ejection fraction compared to older patients. Additionally, younger patients were more likely to present with lower Killip class, indicating less severe myocardial damage and lower incidence of heart failure at the time of presentation. Older patients, on the other hand, were more likely to present with reduced ejection fraction and higher Killip class, reflecting more severe myocardial injury and impaired cardiac function. P value of < 0.05. **Conclusion:** The profile of coronary artery disease differs in elderly as compared to young patients. This study highlighted that atypical presentation of Acute MI in younger patients.

KEYWORDS : Coronary Artery Disease, ST Elevated Myocardial Infarction, Acute Myocardial Infarction, Ischemic Heart Disease.

INTRODUCTION

Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide, responsible for an estimated 17.9 million deaths in a year, which constitutes about 31% of all global deaths. Among Cardiovascular diseases, Acute ST elevated Myocardial Infarction (STEMI) represents the most serious clinical manifestation of coronary artery disease (CAD) and contributes significantly to morbidity, mortality, and long-term disability.

The epidemiology of AMI has undergone notable changes in the last two decades. While once considered predominantly a disease of elderly populations, there is an alarming trend towards increasing incidence among younger individuals below 40 years. Lifestyle transitions, urbanization, sedentary habits, smoking, psychosocial stress, and dietary imbalances have accelerated the risk of premature atherosclerosis in young adults. This shift demands re-evaluation of risk factors, preventive strategies, and early detection mechanisms tailored specifically to younger age groups. Myocardial infarction is still a major issue in developed nations and is emerging as a growing concern in developing nations. [1]

Indians experience Coronary Artery Disease (CAD) 5 to 10 years sooner than other populations, and the incidence of first myocardial infarction before 40 years is 5 to 10 times greater.[2] Among Indians, the prevalence of CAD is uneven and is twice as high in South Indians. [3] Cigarette smoking is the primary factor strongly linked to CAD in young adults. [4] Equally noteworthy is the weak correlation of other conventional risk factors to CAD in the younger population. Hypertension and physical inactivity are well-known risk factors for CAD overall, yet they seem to play a minimal role in this group

OBJECTIVES OF STUDY

To evaluate the modifiable and non- modifiable risk factors of STEMI in young (< 40 years), to study the clinical profile of STEMI in young, to study the short term outcome of STEMI and to compare the young (< 40 years) with older patients (> 40 years) with reference to the risk factor, clinical profile and short term outcome.

MATERIALS AND METHODS

A hospital based comparative study with detailed descriptions was conducted on 62 patients with acute ST elevated myocardial infarction of age below and above 40 years who were admitted to the ICU of Al-Ameen Medical College Hospital, Vijayapura, over 18 months from April 2024 to October 2025. The study included patients with ECG proven acute ST elevated myocardial infarction and the patients who underwent thrombolytic therapy. The study excluded patients with contraindication to thrombolytic therapy and patients with any myocardial infarction in the past. Injection Streptokinase 1.5 million units dissolved in normal saline was given to all the cases over 45 – 60 min. Patients in both the groups were given tablet aspirin 150 mg, tablet clopidogrel 75 mg, tablet atorvastatin 40 mg once daily and Intravenous heparin (5000 IU QID for 5- 7 days). Close monitoring of patients in both the groups were for development of complications was done. 2D Echo was done on all the patients on day 6 of the presentation. We compared the two patient groups for risk factors (diabetes mellitus, hypertension, smoking, obesity, family history of CAD and dyslipidemia).

Statistical Analysis

The data obtained was entered in a Microsoft Excel sheet, and statistical analysis will be performed using statistical package for the social sciences (Version 20). Results were presented as Mean ± SD, counts and percentages and diagrams. For normally distributed continuous variables between two groups will be compared using Independent t test for not normally distributed variables Mann Whitney U test will be used. Categorical variables between two groups were compared using Chi square test/Fisher\s Exact test. $p<0.05$ was considered statistically significant. All statistical tests were performed two tailed

RESULTS

Table 1: Distribution of Age

Age(Years)	≤40 years	>40 years	Total
≤30	7	0	7
	22.6%	0.0%	11.3%
31 - 40	24	0	24
	77.4%	0.0%	38.7%
41 - 50	0	10	10
	0.0%	32.3%	16.1%
51 - 60	0	12	12
	0.0%	38.7%	19.4%
61+	0	9	9
	0.0%	29.0%	14.5%
Total	31	31	62
	100.0%	100.0%	100.0%

Table 1 shows the distribution of the patients in each group. Among the total 31(100%) in group I, maximum 24(77.4%) were from age of 31-40 years and minimum 7 (22.6%) were from age of ≤ 30 years. Among the total 31(100%) in group II, maximum 12(38.7%) were from age of 51-60 years.

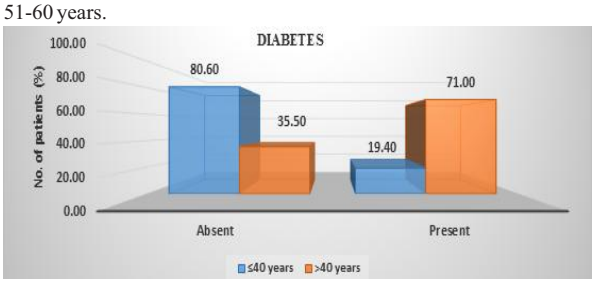

Figure 1: Prevalence of Diabetes

Figure 1 shows the prevalence of diabetic population in both groups. Among the total 31(100%) in group I, 6(19.4%) were having diabetes and 25(80.6%) were not having diabetes. Among the total 31(100%) in group II, maximum 20(64.5%) were having diabetes mellitus. The outcomes were statistically significant. (P=0.003)

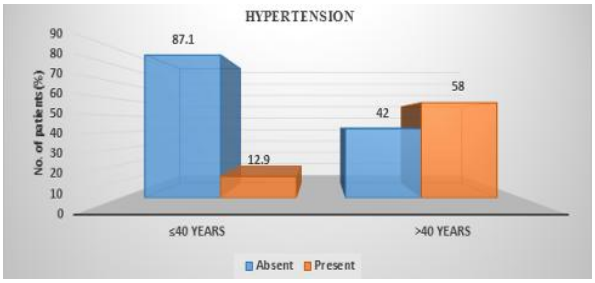

Figure 2: Prevalence of Hypertension

Figure 2 shows the prevalence of hypertension in both groups. Among the total 31(100%) in group I, 4(12.9%) were having hypertension and 27(87.1%) were not having hypertension. Among the total 31(100%) in group II, maximum 18(58.1%) were having hypertension. Results were statistically significant when comparing prevalence of hypertension in both age groups. (P = 0.002)

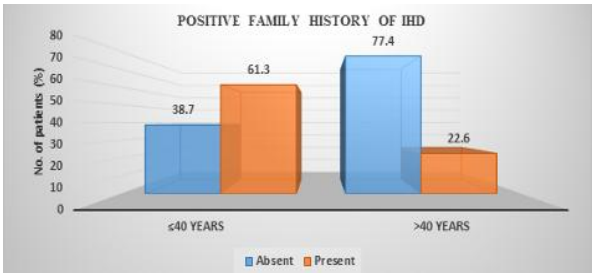

Figure 3: Positive Family History of Ihd

Figure 3 shows presence of positive family history of ischemic heart disease in both groups. 19 patients in group I and 7 patients in the group II had Positive family history of IHD. This is statistically significant (P = 0.002).

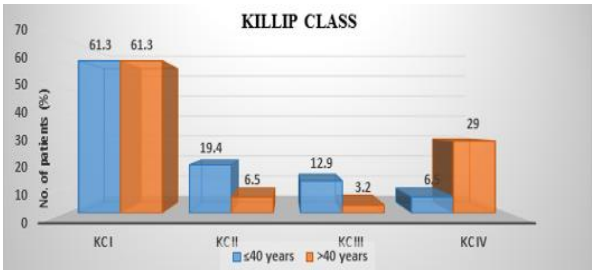

Figure 4: Distribution of Killip Class

Figure 4 shows distribution of killip class in both groups. 19 patients in group I and 19 patients in the group II presented with killip class I. 2 patients in group I and 9 patients in group II presented with killip class IV. The difference is statistically significant (P = 0.041).

Table 2: Prevalence of Smoking

Ejection fraction	≤40 years (n=31)	>40 years (n=31)	Total (n=62)	Chi-square test	Significance value
Less than 50%	11	18	46	3.175	P=0.048*
	34.40%	58.10%	74%		
More than or equals to 50%	20	13	16		
	64.60%	41.90%	26%		
Total	31	31	62		31
	100.0%	100.0%	100.0%		100.0%
Statistically significant					

Table 2 shows prevalence of smoking among both groups having STEMI. 17 patients in the group I and 7 patients in the group II were smokers. 14 patients were nonsmokers in group I and 24 patients were nonsmokers in group II. The difference between both the groups is statistically significant. (P = 0.0012

Table 3: Distribution of Ejection Fraction

Cigarette use	≤40 years (n=31)	>40 years (n=31)	Total (n=62)	Chi-square test	Significance value
Absent	14	24	38	10.53	P=0.0012*
	45.2%	77.4%	61.3%		
Present	17	7	24		
	54.8%	22.6%	38.7%		
Total	31	31	62		
	100.0%	100.0%	100.0%		
*: Statistically significant					

Table 3 shows distribution of ejection fraction in both groups. 11 patients in group I and 18 patients in the group II presented with ejection fraction of less than 50 %. 20 patients in group I and 13 patients in group II presented with ejection fraction of ≥ 50 %. The difference is statistically significant (P = 0.048).

Table 4: Distribution of Total Cholesterol

Total Cholesterol	≤40years (n=31)	>40 years (n=31)	Total (n=62)	Chi-square test	Significance value
<200	8	16	24	4.13	P= 0.042*
	26%	52%	39%		
>200	23	15	38		
	74%	48%	61%		
Total	31	31	62		
	100.0%	100.0%	100.0%		
Statistically significant					

Table 4 shows distribution of total cholesterol in both groups. 23 patients in group I and 15 patients in the group II had elevated total cholesterol values. The difference is statistically significant (P = 0.042).

DISCUSSION

Acute myocardial infarction (AMI) remains one of the leading causes of morbidity and mortality worldwide. In recent years, there has been a growing focus on myocardial infarction occurring in younger individuals because of its significant socioeconomic impact and distinct risk factor profile. [1,2] The current study was conducted to compare the risk factors, clinical profile, and outcomes of ST-elevation myocardial infarction (STEMI) in patients aged less than 40 years and those more than 40 years of age.

Smoking

In this study, smoking was far more common among patients younger than 40 years compared to older patients. This results are in line with previous studies. The Interheart study by Yusuf et al. [5] demonstrated that smoking is a significant risk factor for myocardial infarction, particularly in younger individuals. Similarly, Cole et al. [6] stated that smoking was present in nearly 70–80% of young myocardial infarction patients, demonstrating its strong association with premature coronary artery disease.

Positive Family History of Ischemic Heart Disease

In this study a positive family history of ischemic heart disease was discovered to be more typical among younger patients compared to older group of patients. Genetic predisposition has a significant role in the development of premature atherosclerosis. people with a positive family history of premature ischemic heart disease often inherit abnormalities in lipid metabolism, endothelial function, and inflammatory pathways. Previous studies such as the Framingham Heart Study [7] and Interheart study [5] have shown that positive family

history greatly increases the risk of early onset myocardial infarction. The findings of this study are consistent with above mentioned observations.

Obesity

In current study obesity was also discovered to be more prevalent among younger patients with STEMI. The Interheart study. [5] Obesity contributes to cardiovascular disease through several mechanisms, Obesity promotes insulin resistance, dyslipidaemia, and systemic inflammation, thereby accelerating the process of atherosclerosis.

A rise in the number of young people who have sedentary lifestyles and who have unhealthy dietary habits may explain the rising incidence of obesity-associated myocardial infarction. Similar findings have been recorded in studies by Yusuf et al.[5], and Enas et al.[8].

Dyslipidaemia

The current study demonstrated a strong association between reduced HDL cholesterol and increased LDL and total cholesterol levels with STEMI in patients younger than 40 years. Dyslipidaemia is one of the key factors involved in the development of atherosclerosis. Elevated LDL cholesterol leads to deposition of cholesterol within the arterial wall, resulting in formation of atherosclerotic plaques. Reduced HDL cholesterol impairs reverse cholesterol transport and reduces the protective anti-inflammatory effects of HDL.The results of this study are consistent with previous research. The Interheart study [5] reported that abnormal lipid profile accounted for roughly fifty percent of the population attributable risk for myocardial infarction. Similarly, Enas et al. [8] reported that dyslipidaemia is highly prevalent among young Indian patients with coronary artery disease.

Diabetes Mellitus

In contrast to younger patients, diabetes mellitus was much more typical among patients older than 40 years. Diabetes mellitus accelerates atherosclerosis through several mechanisms including: Endothelial dysfunction, increased oxidative stress, chronic inflammation glycation of vascular proteins. Diabetic patients have a higher chance to develop diffuse and multivessel coronary artery disease. The association between diabetes and myocardial infarction in elderly people have been shown in multiple studies including the Framingham Heart Study. [7] The present study therefore supports the observation that diabetes is a major risk factor for STEMI in older individuals.

Hypertension

Hypertension discovered to be much more typical among older patients with STEMI in the present study. Long-standing hypertension gives rise to structural changes in the arterial wall including: Endothelial injury. increased arterial stiffness. accelerated atherosclerosis. These changes raise the possibility of plaque rupture and coronary thrombosis. The results of present study are consistent with previous findings that have shown hypertension to be a major contributor in elderly patients in causing coronary artery disease.

Left Ventricular Ejection Fraction

The current study showed that the left ventricular ejection fraction was higher in younger patients compared to older patients. Ejection fraction is an important indicator of myocardial damage and cardiac function following myocardial infarction.

The relatively preserved ejection fraction in younger patients may be described by several factors: Less severe coronary artery disease, higher likelihood of single-vessel involvement, better myocardial reserve, absence of long-standing comorbid diseases. These results are consistent with studies by Morillas et al. [9] and Cole et al. [6], which reported better left ventricular function among younger myocardial infarction patients.

Killip Classification

The acute myocardial infarction's severity was also assessed using Killip classification. In this study, younger patients predominantly presented with Killip Class I, indicating absence of clinical heart failure. Conversely, elder patients are more likely to present with higher Killip classes, reflecting greater hemodynamic compromise. The higher Killip class observed in older patients may be attributed to: More extensive myocardial damage, long-standing hypertension, presence of diabetes mellitus, reduced myocardial reserve. These results are consistent with previous studies that has demonstrated that advanced age is associated with more severe clinical presentation of myocardial infarction.

LIMITATIONS

Although the current study offers helpful insights regarding differences between younger and older myocardial infarction patients, certain limitations must be considered. The study's comparatively small sample size may prevent the generalizability of the findings. The study was conducted in a single tertiary care center, and therefore the results may not represent the entire population. The study evaluated short-term outcomes only, and long-term follow-up was not performed. Certain potential risk factors such as lipoprotein(a), inflammatory markers, and genetic predisposition were not evaluated in this study. The study did not include angiographic assessment of coronary artery disease severity, which might have offered more information about the differences in coronary anatomy between younger and older patients. Despite these limitations, the study yields useful data regarding the distinct risk factor patterns and clinical characteristics of STEMI in different age groups.

CONCLUSION

The current study compared the risk factors, clinical profile, and outcomes of ST-elevation myocardial infarction in patients aged less than 40 years and more than 40 years. The study's findings demonstrate that the pattern of risk factors differs significantly between younger and older patients. There was a substantial correlation between smoking, positive family history, obesity, reduced HDL cholesterol, and elevated LDL and total cholesterol with STEMI in younger patients. In contrast, diabetes mellitus and hypertension were frequently connected to STEMI among older patients. The study showed that the ventricular ejection fraction was higher in younger patients and had lower Killip class at presentation, indicating less severe myocardial damage and better cardiac function. Older patients showed poorer cardiac function and more severe clinical presentation, likely because of the existence of long-standing comorbid conditions and more extensive coronary artery disease. These findings highlight the importance of age-specific preventive strategies and early identification of adjustable risk factors to lessen the impact of myocardial infarction.

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