

Research Article

ST Elevation Myocardial Infarction in Younger Population: An Update from a Tertiary Care Hospital in Southern Punjab

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ABSTRACT

Background: ST-segment elevation myocardial infarction (STEMI) is a severe manifestation of coronary artery disease that contributes significantly to global morbidity and mortality. Traditionally associated with older adults, recent trends indicate a rising incidence of STEMI among younger populations, particularly in regions such as Southern Punjab, Pakistan. This shift in demographic distribution necessitates a deeper understanding of the clinical characteristics, risk factors, and outcomes specific to younger patients to inform targeted prevention and treatment strategies.

Objectives: This study aims to compare the frequency, clinical profile, and outcomes of STEMI in younger patients (aged <45 years) with those of an older cohort (aged ≥45 years) in a tertiary care setting. Additionally, the study seeks to identify emerging risk factors contributing to the increased incidence of STEMI in the younger population and to assess the differences in angiographic findings and treatment outcomes between the two groups.

Methods: A prospective, single-center cohort study was conducted at the Cardiology Department of Shaikh Zayed Medical College/Hospital, Rahimyar Khan. A total of 100 patients diagnosed with STEMI were enrolled, with 50 patients each in the younger and older age groups. Data on demographic characteristics, risk factors, clinical presentation, angiographic findings, and treatment outcomes were collected using a structured proforma. Statistical analysis was performed using SPSS software, focusing on identifying significant differences between the two age groups.

Results: The study revealed distinct differences in the clinical profiles and outcomes of STEMI between younger and older patients. Younger patients exhibited a higher prevalence of smoking (60% vs. 45%) and had a lower incidence of hypertension (40% vs. 65%) and diabetes (25% vs. 50%) compared to older patients. Angiographic findings showed that single-vessel disease was more common in younger patients (60% vs. 35%), while multi-vessel disease predominated in the older cohort (50% vs. 30%). In terms of outcomes, younger patients had a lower in-hospital mortality rate (4% vs. 10%) and shorter hospital stays (5 days vs. 8 days) than their older counterparts.

Conclusion: The study underscores the growing burden of STEMI among younger individuals in Southern Punjab, highlighting the critical role of smoking as a predominant risk factor. Despite better immediate outcomes in younger patients, the presence of significant coronary artery disease in this group warrants early and aggressive intervention. For older patients, managing comorbidities such as hypertension and diabetes remains crucial in improving outcomes. These findings call for age-specific prevention and management strategies to effectively address the evolving epidemiology of STEMI in Pakistan.

Keywords: ST-segment elevation myocardial infarction, younger population, coronary artery disease, risk factors, angiographic findings, treatment outcomes, Southern Punjab, Pakistan.

INTRODUCTION

Coronary artery disease (CAD) remains the leading cause of morbidity and mortality worldwide, a trend also evident in Pakistan. While CAD predominantly affects older adults, its manifestation as acute coronary syndrome (ACS) is less common but increasingly concerning in individuals under 40 years of age. Atherosclerosis, the underlying cause of CAD, often begins in early life and represents younger patients with CAD as a critical subgroup requiring targeted attention.

Research commonly uses age 45 as a threshold for classifying younger individuals with CAD and myocardial infarction (MI). ACS, which includes unstable angina, non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI), is generally less common in younger populations than in older people. However, the increasing incidence of ACS among young adults in Pakistan is alarming and reflects the overall increase in the burden of cardiovascular disease (CVD) across the country.

Pakistan has one of the highest CVD rates among South Asian countries, with the prevalence of CAD steadily increasing. Urban areas have CAD prevalence rates between 12% and 14%, while rural regions report rates between 3% and 7%. Despite this escalating trend, there remains a lack of studies examining the clinical presentation, treatment strategies, angiographic profiles, and outcomes of ACS in younger Pakistani patients, as CAD is more commonly observed in middle-aged and elderly individuals. Literature suggests that younger patients with ACS in Pakistan, similar to global trends, are more likely to have traditional cardiovascular risk factors such as smoking, hyperlipidemia, obesity, and a family history of coronary artery disease. Particularly in urban areas, these risk factors have increased significantly over the past 25 years, contributing to an increase in coronary heart disease among the younger population. Additionally, Pakistan has seen a 10% increase in heart-related deaths over the past seven years, with a growing number of these occurring among people in their 20s and 30s.

Advances in medical technology and identification of risk factors have contributed to a global decline in CAD mortality rates. However,

the specific clinical profiles and treatment outcomes of young patients with ACS in Pakistan are still poorly understood. Therefore, this study aims to evaluate the characteristics, treatment approaches, and outcomes of young patients with ACS in a tertiary care hospital in an urban area of Pakistan.

METHODS

Study Design and Setting

This prospective, single-center cohort study was conducted at the Cardiology Department of Shaikh Zayed Medical College/Hospital, Rahimyar Khan, a tertiary care hospital serving a population of approximately 1.5 million in southern Punjab.

Patient Selection

A total of 100 consecutive patients diagnosed with STEMI were enrolled over a 12-month period (January-December 2022). Patients were divided into two groups:

- Group A: Younger patients (aged <45 years)
- Group B: Older patients (aged ≥45 years)

Inclusion criteria

- Diagnosis of STEMI based on ESC/ACC guidelines
- Age 18-45 years (Group A) or ≥45 years (Group B)
- Presentation within 12 hours of symptom onset

Exclusion criteria:

- Prior history of CAD
- Recent (<6 months) myocardial infarction
- Cardiogenic shock at presentation

Data Collection

A structured proforma was used to collect data on:

- Demographic characteristics
- Cardiovascular risk factors
- Clinical presentation
- Angiographic findings
- Treatment modalities
- In-hospital outcomes

Statistical Analysis

Data were analyzed using SPSS version 25.0. Continuous variables were expressed as mean±SD and compared using independent t-tests. Categorical variables were presented as frequencies and percentages, with comparisons made using chi-square tests. A p-value <0.05 was considered statistically significant.

RESULTS

Baseline Characteristics

The study included 100 patients (50 in each group). Baseline characteristics are shown in Table 1.

Table 1: Baseline Characteristics of Study Patients

Variable	Group A (<45 years)	Group B (≥45 years)	p-value
Age (years)	38.5±5.2	58.3±6.1	<0.001
Male gender	42 (84%)	35 (70%)	0.08
Hypertension	20 (40%)	32 (65%)	0.01
Diabetes	12 (24%)	25 (50%)	0.005
Smoking	30 (60%)	22 (45%)	0.04
Family history	15 (30%)	10 (20%)	0.21

Clinical Presentation

Younger patients presented more frequently with atypical symptoms (20% vs. 8%, $p=0.07$) and had shorter symptom duration (3.2 ± 1.5 hours vs. 5.8 ± 2.1 hours, $p<0.001$). The pain-to-needle time was significantly shorter in younger

patients (2.1 ± 0.8 hours vs. 3.4 ± 1.2 hours, $p<0.001$).

Angiographic Findings

Angiographic findings are summarized in Table 2.

Table 2: Angiographic Findings

Finding	Group A (<45 years)	Group B (≥45 years)	p-value
Single-vessel disease	30 (60%)	17 (35%)	0.01
Multi-vessel disease	15 (30%)	25 (50%)	0.02
Left main disease	0 (0%)	3 (6%)	0.08
Normal coronaries	5 (10%)	5 (10%)	1.00

Treatment and Outcomes

Treatment modalities and outcomes are shown in Table 3.

Table 3: Treatment and Outcomes

Variable	Group A (<45 years)	Group B (≥45 years)	p-value
Thrombolysis	28 (56%)	22 (44%)	0.21
Primary PCI	18 (36%)	20 (40%)	0.62
CABG	4 (8%)	8 (16%)	0.15
In-hospital mortality	2 (4%)	5 (10%)	0.23
Hospital stay (days)	5.2 ± 1.3	8.1 ± 2.4	<0.001

DISCUSSION

Our study demonstrates significant differences in the clinical profile and outcomes of STEMI between younger and older patients in southern Punjab. The key findings include:

- Demographic Differences:** Younger patients were predominantly male (84% vs. 70%), consistent with global trends showing higher incidence of STEMI in young men [1].
- Risk Factor Profile:** Smoking was significantly more prevalent in younger patients (60% vs. 45%), while hypertension and diabetes were more common in older patients. This finding aligns with previous studies suggesting that modifiable risk factors play a more prominent role in young STEMI patients [2].
- Angiographic Findings:** Single-vessel disease was more common in younger

patients (60% vs. 35%), while multi-vessel disease predominated in older patients. This suggests that atherosclerosis progression may differ by age, with younger patients often having focal disease [3].

- Treatment Outcomes:** Despite similar treatment modalities, younger patients had shorter hospital stays and numerically lower mortality, though this difference did not reach statistical significance in our sample.

The high prevalence of smoking in young STEMI patients (60%) is particularly concerning and underscores the need for aggressive tobacco control measures in our region. Our findings are consistent with studies from other South Asian countries reporting smoking as a major contributor to premature CAD [4].

The better immediate outcomes in younger patients likely reflect their lower comorbidity

burden and better physiological reserve. However, the presence of significant coronary artery disease in this group warrants attention, as these patients remain at risk for recurrent events.

CONCLUSION

This study highlights important age-related differences in STEMI patients in southern Punjab. While younger patients have better immediate outcomes, their high prevalence of modifiable risk factors (particularly smoking) calls for targeted preventive strategies. For older

patients, aggressive management of comorbidities remains crucial.

Recommendations

1. Implement comprehensive smoking cessation programs targeting young adults
2. Develop age-specific prevention strategies focusing on modifiable risk factors
3. Strengthen primary and secondary prevention programs in younger populations
4. Conduct larger multicenter studies to validate these findings

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