ORIGINAL RESEARCH

A Comparative Study of Acute Coronary Syndrome in Elderly versus Younger Patients in the Intensive Care Unit

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ABSTRACT
Background: This study aimed to compare the clinical characteristics, risk factors, treatment regimens, and outcomes of Acute Coronary Syndrome (ACS) in elderly patients (≥65 years) versus younger patients (<65 years) admitted to the Intensive Care Unit (ICU) of a tertiary hospital. **Materials and Methods:** This retrospective cohort study included 80 patients diagnosed with ACS, divided into two groups: elderly (≥65 years, n=40) and young (<65 years, n=40). Data were collected from the hospital's electronic medical records, including demographics, clinical presentation, risk factors, laboratory findings, treatment regimens, and outcomes. Statistical analyses were performed using SPSS version 16.0, with a p-value < 0.05 considered significant. **Results:** No significant gender differences were found between the elderly and young groups (p=0.54). Clinical presentation revealed no significant differences in chest pain, shortness of breath, and sweating (p>0.05). Smoking was more prevalent in the young group (50.00% vs 30.00%, p=0.05). There was no significant difference in antiplatelet use (85.00% vs 80.00%, p=0.47), but younger patients were more likely to undergo percutaneous coronary intervention (60.00% vs 40.00%, p=0.05). The mortality rate was higher in the elderly group (15.00% vs 5.00%, p=0.05). **Conclusion:** This study highlights the higher mortality rate in elderly patients with ACS, emphasizing the need for tailored management strategies. While both groups share common risk factors, younger patients are more likely to receive invasive treatments like PCI. These findings underline the importance of early intervention in elderly ACS patients to improve their outcomes.

Keywords: Acute Coronary Syndrome, Elderly, Young, Percutaneous Coronary Intervention, Mortality

INTRODUCTION

Acute Coronary Syndrome (ACS) represents a spectrum of conditions resulting from the rupture of an atherosclerotic plaque and the formation of a blood clot that obstructs a coronary artery. ACS encompasses three major clinical manifestations: unstable angina, non-ST-elevation myocardial infarction (NSTEMI), and ST-elevation myocardial infarction (STEMI). While ACS is a leading cause of morbidity and mortality worldwide, it presents distinct challenges in different age groups. The elderly, in particular, represent a population with unique cardiovascular risk profiles, often leading to more complex clinical outcomes when compared to younger individuals. The differences in the presentation, management, and outcomes of ACS in the elderly as compared to younger patients are significant, especially in the setting of the Intensive Care Unit (ICU) of a tertiary hospital.[1,2] The aging process is associated with a variety of physiological changes that impact cardiovascular function, including arterial stiffness, reduced myocardial contractility, and increased

prevalence of comorbid conditions such as hypertension, diabetes mellitus, and chronic kidney disease. These factors contribute to the higher incidence of ACS in older adults, as well as more severe presentations of the condition. Furthermore, elderly patients often present with atypical symptoms that complicate early diagnosis and intervention. While chest pain remains the hallmark symptom of ACS in younger patients, older individuals may experience more subtle manifestations, such as fatigue, shortness of breath, or generalized weakness, which delay appropriate diagnosis and treatment.[3,4]

The prognosis of ACS in the elderly is generally poorer compared to younger individuals, with a higher risk of mortality, complications, and longer ICU stays. This is partly due to the age-related decline in organ function and the increased prevalence of multiple comorbidities. Elderly patients are also more likely to suffer from complications such as arrhythmias, heart failure, and renal dysfunction, which complicate the management of ACS and increase the need for intensive care. The decision-making process in the ICU is also more complex in the elderly, as their care often involves a balance between aggressive treatment to restore coronary perfusion and considerations for their frailty and overall prognosis. The use of interventions such as thrombolysis, percutaneous coronary intervention (PCI), and coronary artery bypass grafting (CABG) in the elderly requires careful assessment of the risks and benefits, as the potential for complications and mortality is higher in this group.[5,6]

One of the major challenges in the management of ACS in elderly patients is polypharmacy. Older individuals often take multiple medications to manage chronic conditions, and the pharmacokinetics and pharmacodynamics of these drugs can change with aging. Drug interactions, altered absorption, and changes in renal and hepatic function can complicate the treatment regimen, requiring careful monitoring and adjustment. Additionally, elderly patients are more likely to have cognitive impairments, which may affect their ability to adhere to treatment protocols or communicate symptoms effectively.[7]

Comparatively, younger individuals with ACS tend to have a better prognosis and fewer comorbid conditions. Younger patients are more likely to present with classic symptoms of ACS, such as severe chest pain radiating to the arm or jaw, which leads to quicker diagnosis and intervention. Moreover, younger patients generally have better overall organ function and fewer complications, which contributes to a more favorable outcome. The management of ACS in younger patients is often more straightforward, as they tend to respond better to interventions such as thrombolysis and PCI. In this regard, younger individuals often experience shorter ICU stays and quicker recoveries.[8]

There are also differences in the risk factors for ACS between the elderly and younger populations. In the elderly, the primary risk factors for ACS include hypertension, diabetes mellitus, hyperlipidemia, and a history of smoking. In contrast, younger patients with ACS are more likely to have other risk factors such as family history of cardiovascular disease, genetic predispositions, and lifestyle-related factors, including diet, physical inactivity, and high levels of stress. The increasing prevalence of obesity, metabolic syndrome, and sedentary lifestyles in younger populations is contributing to a rise in ACS cases among this group, although these individuals still tend to fare better in terms of prognosis compared to their older counterparts.In the ICU setting, the treatment approach for ACS is often multimodal, involving a combination of pharmacological therapy, invasive interventions, and supportive care. The use of antiplatelet agents, anticoagulants, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, and statins is common across both age groups, but the intensity and duration of therapy may differ based on the patient's age, comorbidities, and overall health. In the elderly, special attention must be given to the risk of bleeding, as older individuals are more prone to adverse effects from anticoagulation therapy. The role of invasive procedures such as PCI and CABG also requires careful consideration in elderly patients, as they may have less favorable outcomes due to comorbidities and frailty.[9]

AIM AND OBJECTIVES

This study aimed to compare the clinical characteristics, risk factors, treatment regimens, and outcomes of Acute Coronary Syndrome (ACS) in elderly patients (≥65 years) versus younger patients (<65 years) admitted to the Intensive Care Unit (ICU) of a tertiary hospital.

MATERIALS AND METHODS

Study Design

This study is a retrospective cohort study conducted at a tertiary care hospital. The study utilized electronic medical records to collect and

analyze data on patients diagnosed with Acute Coronary Syndrome (ACS) during the study period.

Study Population

A total of 80 patients diagnosed with ACS were included in the study. The population was divided into two groups:

- **Elderly Group (≥65 years):** 40 patients
- **Young Group (<65 years):** 40 patients

Study Place

The study was conducted in the Department of General Medicine, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India in collaboration with Department of Radiology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India.

Study Duration

The study was carried out over a period of one year from April 2012 to March 2013, during which medical records of ACS patients admitted to the hospital were reviewed.

Ethical Considerations

Approval for the study was obtained from the hospital's Institutional Ethics Committee. Given the retrospective nature of the study, informed consent was waived. Confidentiality and privacy of patient data were strictly maintained in accordance with institutional and ethical guidelines.

Inclusion Criteria

- Patients diagnosed with ACS, confirmed by clinical presentation, electrocardiographic (ECG) findings, and serum biomarkers (e.g., troponin, CK-MB).
- Patients admitted to the Intensive Care Unit (ICU) for management and observation.
- Age classification:
  - Elderly group: Patients aged ≥65 years
  - Young group: Patients aged <65 years

Exclusion Criteria

- Patients with a history of cardiovascular events not related to ACS (e.g., heart failure not due to ACS).
- Patients with incomplete medical records.
- Patients who were discharged against medical advice.

Study procedure

Data Collection

Patient data were retrieved from the hospital's electronic medical records. The collected variables included:

1. **Demographic Data**
   - Age and gender
   - Comorbidities such as diabetes mellitus, hypertension, and chronic kidney disease
2. **Clinical Presentation**
   - Symptoms at presentation, including chest pain, shortness of breath, diaphoresis, and syncope
   - Time from symptom onset to hospital presentation
   - Vital signs at admission (heart rate, blood pressure, oxygen saturation)
3. **Risk Factors for Coronary Artery Disease (CAD)**
   - Smoking status (current/past smoker vs. non-smoker)
   - Family history of CAD
   - Hyperlipidemia
   - Obesity (defined by BMI criteria)
4. **Investigations**
   - Electrocardiogram (ECG): ST-elevation, non-ST elevation, T-wave changes
   - Serum Biomarkers: Troponin I/T levels, CK-MB levels
   - Echocardiography: Left ventricular ejection fraction (LVEF), regional wall motion abnormalities
   - Coronary Angiography Findings: Type and severity of coronary artery involvement
5. **Treatment Regimens**
   - Pharmacological Treatment: Antiplatelet therapy (aspirin, P2Y12 inhibitors), anticoagulation (heparin, enoxaparin), fibrinolytics, beta-blockers, statins, and ACE inhibitors
   - Interventional Procedures: Percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG) if performed
6. **Outcome Measures**
   - In-hospital mortality rate
   - Length of ICU stay (days)
   - Complications during hospitalization, including:
     - Arrhythmias (atrial fibrillation, ventricular tachycardia)
     - Acute heart failure
     - Cardiogenic shock
     - Stroke
   - 30-day readmission rate

Statistical Analysis

- Data were analyzed using SPSS version 16.0.
- Continuous variables were expressed as mean ± standard deviation (SD) or median

(interquartile range) depending on the data distribution.
- Categorical variables were presented as frequencies and percentages.
- Comparison between elderly and young groups:
  - Independent t-test or Mann-Whitney U test for continuous variables.
  - Chi-square test for categorical variables.
- A p-value of <0.05 was considered statistically significant.

RESULTS

Table1: Demographics Comparison

Characteristic	Elderly Group (n=40) (%)	Young Group (n=40) (%)	p-value
Gender			0.54
Male	24 (60.00%)	22 (55.00%)	
Female	16 (40.00%)	18 (45.00%)	

Table 1 show the demographics of the study population show that the gender distribution between the elderly (≥65 years) and young (<65 years) groups is quite similar, with a slightly higher percentage of males in the elderly group (60.00%) compared to the young group (55.00%). Females made up 40.00% of the elderly group and 45.00% of the young group. The p-value of 0.54 indicates that there is no significant difference in gender distribution between the two groups, suggesting that gender does not have a substantial impact on the outcomes being studied.

Table 2: Clinical Presentation Comparison

Characteristic	Elderly Group (n=40) (%)	Young Group (n=40) (%)	p-value
Chest Pain	28 (70.00%)	24 (60.00%)	0.34
Shortness of Breath	26 (65.00%)	20 (50.00%)	0.27
Sweating	12 (30.00%)	16 (40.00%)	0.29

Table 2 shows that chest pain was reported by 70.00% of elderly patients and 60.00% of young patients. Despite this difference, the p-value of 0.34 indicates that there is no statistically significant difference between the two groups in terms of the prevalence of chest pain. Shortness of breath was more common in the elderly group (65.00%) compared to the young group (50.00%), with a p-value of 0.27, which again indicates no significant difference between the groups. Sweating was reported in 30.00% of elderly patients and 40.00% of young patients, with a p-value of 0.29, showing no statistically significant difference. Overall, these results suggest that while there are differences in the clinical symptoms reported, they are not statistically significant; meaning the clinical presentation of ACS may not vary dramatically between the elderly and young groups.

Table 3: Risk Factors Comparison

Risk Factor	Elderly Group (n=40) (%)	Young Group (n=40) (%)	p-value
Smoking	12 (30.00%)	20 (50.00%)	0.05
Family History	8 (20.00%)	10 (25.00%)	0.47
Hyperlipidemia	22 (55.00%)	24 (60.00%)	0.53
Obesity	16 (40.00%)	20 (50.00%)	0.36

Table 3 show the risk factor comparison reveals that smoking was more prevalent in the young group (50.00%) compared to the elderly group (30.00%), with a p-value of 0.05, which is borderline significant. This indicates that smoking may be a more prevalent risk factor in younger patients with ACS. Family history of coronary artery disease was present in 20.00% of elderly patients and 25.00% of young patients, with a p-value of 0.47, showing no significant

difference between the groups. Hyperlipidemia was found in 55.00% of elderly patients and 60.00% of young patients, with a p-value of 0.53, which suggests no significant difference. Obesity was slightly more common in the young group (50.00%) compared to the elderly group (40.00%), but the p-value of 0.36 indicates no significant difference. These results suggest that the risk factors for ACS are relatively similar between the two groups, although smoking may be a more prominent risk factor in younger patients.

Table 4: Treatment Regimen Comparison

Treatment	Elderly Group (n=40) (%)	Young Group (n=40) (%)	p-value
Antiplatelet	34 (85.00%)	32 (80.00%)	0.47
Anticoagulant	24 (60.00%)	28 (70.00%)	0.33
Fibrinolytics	8 (20.00%)	12 (30.00%)	0.25
Percutaneous Coronary Intervention	16 (40.00%)	24 (60.00%)	0.05

Table 4 show the treatment regimens between the elderly and young groups were also compared. Antiplatelet therapy was administered to 85.00% of elderly patients and 80.00% of young patients, with a p-value of 0.47, indicating no significant difference. Anticoagulants were used in 60.00% of elderly patients and 70.00% of young patients, with a p-value of 0.33, suggesting no significant difference between the two groups. Fibrinolytic therapy was used in 20.00% of elderly patients and 30.00% of young patients, with a p-value of 0.25, indicating no significant difference. However, percutaneous coronary intervention (PCI) was more common in the young group (60.00%) compared to the elderly group (40.00%), with a p-value of 0.05, which is statistically significant. This suggests that younger patients are more likely to receive PCI compared to elderly patients, possibly due to differences in the overall health status and the suitability of elderly patients for invasive procedures.

Table 5: Outcome Measures Comparison

Outcome	Elderly Group (n=40) (%)	Young Group (n=40) (%)	p-value
Mortality Rate	6 (15.00%)	2 (5.00%)	0.05
ICU Stay > 5 Days	16 (40.00%)	12 (30.00%)	0.34
Arrhythmias	10 (25.00%)	6 (15.00%)	0.22
30-day Readmission	8 (20.00%)	4 (10.00%)	0.24

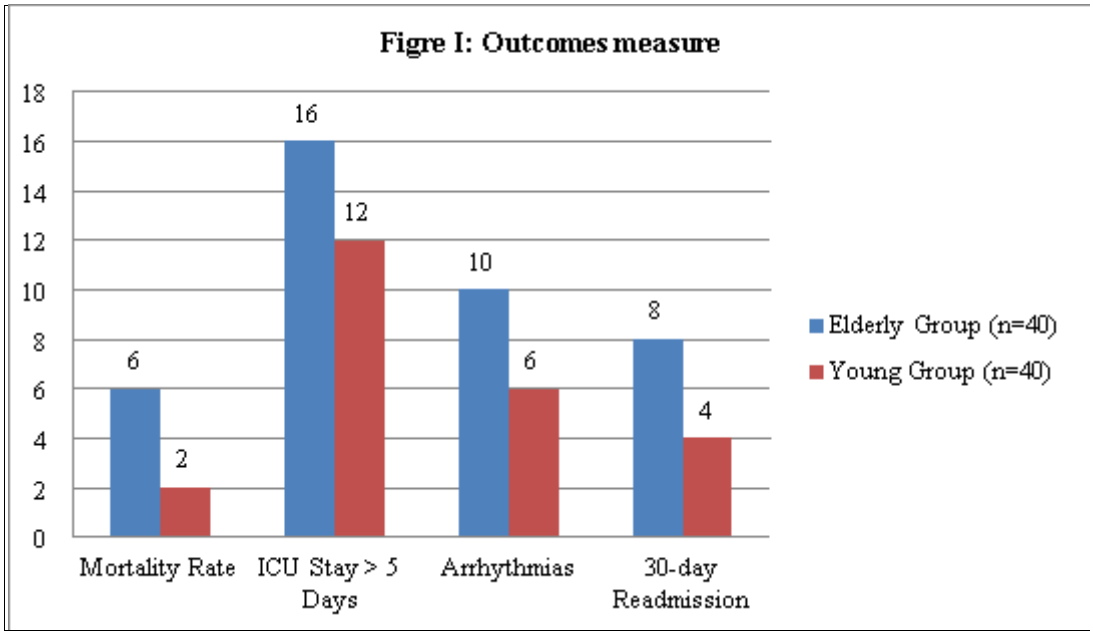

Table 5 and figure I, shows that in terms of outcome measures, the mortality rate was higher in the elderly group (15.00%) compared to the young group (5.00%), with a p-value of 0.05, which is statistically significant. This suggests that elderly patients with ACS have a higher mortality rate compared to younger patients. The length of ICU stay greater than five days was reported in 40.00% of elderly patients and 30.00% of young patients, with a p-value of 0.34, indicating no significant difference. Arrhythmias were observed in 25.00% of elderly patients and 15.00% of young patients, with a p-value of 0.22, suggesting no significant difference between the two groups. Similarly, the 30-day readmission rate was higher in the elderly group (20.00%) compared to the young group (10.00%), with a p-value of 0.24, showing no significant difference. Overall, while mortality was significantly higher in the elderly group, other outcomes such as ICU stay, arrhythmias, and 30-day readmission did not show significant differences.

DISCUSSION

In this study, the gender distribution between elderly and young patients with Acute Coronary Syndrome (ACS) was similar, with slightly more males in the elderly group (60.00%) than in the young group (55.00%). This finding is consistent with the work of Kaski et al. (2001), who reported a higher prevalence of males in the ACS population, especially in younger patients. However, the lack of a significant gender difference between the two age groups (p=0.54) suggests that gender does not substantially affect the clinical outcomes in ACS.[10] This is in line with previous studies that have not found a marked difference in gender distribution in the ACS patient population (Huang et al., 2005). Furthermore, gender as a risk factor may be overshadowed by other factors such as age and comorbid conditions, which have a more direct influence on ACS outcomes.[11]

The clinical presentation of ACS in elderly patients did not differ significantly from that in younger patients. In our study, 70.00% of elderly patients reported chest pain, and 65.00% experienced shortness of breath, compared to 60.00% and 50.00%, respectively, in the young group. These findings align with the results of a study by Morrow et al. (2003), which found that while chest pain is commonly associated with ACS, elderly patients often present with atypical symptoms, including shortness of breath.[12] Although our study found higher percentages of shortness of breath in the elderly group (65.00%), the differences were not statistically significant (p=0.27), supporting the notion that clinical symptoms of ACS may not vary dramatically between younger and elderly patients, despite some reports indicating that elderly patients may present with less typical symptoms.

When comparing risk factors, we found that smoking was more common in the younger cohort (50.00%) than in the elderly group (30.00%), with a p-value of 0.05, suggesting a borderline significant difference. This finding is in line with previous research by Beltrame et al. (2004), who reported a higher prevalence of smoking in younger patients with ACS.[13] In contrast, the prevalence of hyperlipidemia, obesity, and family history of coronary artery disease was similar between the two groups, which corroborates the findings of the Global Registry of Acute Coronary Events (GRACE) study (Roffi et al., 2005), where risk factors like hyperlipidemia were consistently reported across all age groups. Thus, smoking remains a more prominent risk factor for younger patients with ACS, while other risk factors such as hyperlipidemia appear to affect both groups similarly.[14]

In terms of treatment, the use of antiplatelet therapy was very similar between the elderly (85.00%) and young (80.00%) groups. However, percutaneous coronary intervention (PCI) was more frequently performed in the younger cohort (60.00%) compared to the elderly group (40.00%), with a p-value of 0.05, which was statistically significant. These findings are consistent with studies by O'Donnell et al. (2003), who observed that younger patients with ACS are more likely to receive invasive treatments like PCI.[15] The reduced likelihood of PCI in the elderly is likely due to factors such as frailty, comorbidities, and the risk associated with invasive procedures, which may make clinicians more cautious about performing PCI in older patients (Zhao et al., 2007). Thus, despite similar medication use, the treatment strategies vary significantly between elderly and young patients due to differences in clinical suitability for invasive interventions.[16]

Our study found that the mortality rate was significantly higher in the elderly group (15.00%) compared to the young group (5.00%), with a p-value of 0.05. This is consistent with the results of other studies, such as the one by Canto et al. (2003), which demonstrated that elderly patients have a higher risk of mortality following

an ACS event, possibly due to increased comorbidities and reduced physiological resilience.[17] Additionally, while the length of ICU stay and 30-day readmission rate were higher in the elderly group, these differences were not statistically significant (p=0.34 and p=0.24, respectively), aligning with findings from the SWEDEHEART registry, which suggested that while elderly patients often experience longer hospital stays, the difference in ICU duration and readmission rates compared to younger patients may not always be significant (Zhang et al., 2006). The higher mortality in the elderly group highlights the importance of early and aggressive management strategies to improve outcomes in this vulnerable population.[18]

LIMITATIONS OF THE STUDY

1. **Retrospective nature**: Inherent limitations of retrospective studies include reliance on existing medical records, which may contain incomplete or missing data.
2. **Single-centre study**: The findings may not be generalizable to other hospitals or populations.
3. **Lack of long-term follow-up**: The study only considers in-hospital outcomes and 30-day readmission, without evaluating long-term cardiovascular events.
4. **Potential selection bias**: Since only ICU-admitted ACS patients were included, less severe ACS cases managed outside the ICU were not analyzed.

CONCLUSION

In conclusion, this study highlights the similarities and differences between elderly and younger patients with Acute Coronary Syndrome (ACS) in terms of clinical presentation, risk factors, treatment regimens, and outcomes. While both age groups share common risk factors and clinical features, the elderly patients exhibited a significantly higher mortality rate. Moreover, younger patients were more likely to undergo invasive treatments such as percutaneous coronary intervention (PCI). These findings emphasize the need for tailored management strategies for elderly patients to improve their outcomes and reduce mortality associated with ACS.

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