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Clinical Profile of Acute Coronary Syndromes in Elderly in a Rural Population: A Retrospective Observational Study

Nijora Deka[1], Satish Talikoti[2]

[1]Professor and Head, Department of General Medicine, S.R. Patil Medical College, Hospital and Research Centre, Badagandi, Bagalkot, India
[2]Associate Professor, Department of General Medicine, S.R. Patil Medical College, Hospital and Research Centre, Badagandi, Bagalkot, India

Corresponding Author: Dr. Nijora Deka

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ABSTRACT

Background: Elderly patients with acute coronary syndrome (ACS) frequently present with atypical symptoms and delayed hospital arrival. In rural settings, these challenges are further compounded by transport difficulties, limited health awareness, and the practical barriers that determine when and how patients reach a first-contact facility.
Aim: To describe the clinical presentation, cardiovascular risk profile, glycaemic and lipid status, comorbidity burden, ECG territory distribution, troponin I levels, and bedside echocardiographic findings in elderly ACS patients seen at a rural first-contact centre, and to compare these profiles by sex, time of presentation, and ACS type.
Methods: This retrospective observational study included 120 elderly patients aged 60 years and above presenting with ACS over a one-year period at a rural tertiary care teaching hospital functioning as a first-contact and stabilisation centre without on-site catheterisation facilities. Clinical presentation, risk factors, ECG findings, troponin I levels, and bedside echocardiographic findings were recorded. Categorical variables were summarised as frequencies and percentages, and associations with atypical and delayed presentation were assessed by Chi-square or Fisher's exact test. Statistical significance was set at $p<0.05$.
Results: Typical chest pain was present in 84/120 patients (70.0%); 36/120 (30.0%) presented without typical chest pain. STEMI accounted for 90.0% of ECG presentations, with anterior territory most frequent (43.3%). Troponin I was positive in 93.3% of patients, and markedly elevated in 42.9% of those positive. Hypertension (33.3%), alcohol use (45.0%), tobacco exposure (30.0%), and diabetes mellitus (26.7%) were the predominant risk factors; 43.3% had fasting blood glucose above 126 mg/dL. Bedside echocardiography was performed in 44 patients with markedly elevated troponin; 90.9% showed regional wall motion abnormalities and 54.5% had moderate-to-severe LV systolic dysfunction. Atypical presentation was significantly more common among women ($p=0.003$), and delayed presentation was significantly associated with higher clinical acuity at referral ($p=0.010$).
Conclusion: Elderly ACS at a rural first-contact centre is dominated by STEMI, atypical presentation, and delayed arrival. Women were more likely to present without chest pain. These findings point to a clear need for better community awareness and more responsive referral pathways in rural settings.

Keywords: *acute coronary syndrome; elderly; rural population; atypical presentation; delayed presentation; first-contact care*

INTRODUCTION

Acute coronary syndrome is one of the leading causes of death and hospital admission worldwide. Older adults bear a disproportionately large share of this burden, yet they have historically been under-enrolled in randomised trials and reperfusion studies. [1] As a result, much of what guides clinical decision-making in elderly ACS is extrapolated from younger populations - a gap that becomes particularly evident when managing patients with multiple comorbidities, late presentation, and reduced physiological reserve. [2]

Recognising ACS in older patients is not straightforward. Elderly patients frequently present with dyspnoea, diaphoresis, nausea, dizziness, presyncope, syncope, altered mentation, or simply a sense of not feeling well, rather than with chest pain.[2] A recent review of ACS in older adults found that nearly half may present without chest pain, and that pre-existing ECG changes and reduced troponin specificity can cloud the diagnosis further.[2] A separate analysis from emergency settings reported atypical presentation in 46.7% of elderly ACS cases.[3]

In rural India, these diagnostic difficulties are layered over a set of practical realities that further worsen outcomes. Patients often delay seeking care, depend on informal transport, and must travel considerable distances before reaching any facility with cardiac capabilities. By the time they arrive at a first-contact centre such as ours, the window for early intervention has frequently already narrowed. [4] Community-level data from rural India confirm that coronary disease in the elderly is growing, with hypertension a particularly prominent risk factor in this demographic. [5]

Women with ACS add yet another dimension to this challenge. They are known to present less often with chest pain and more often with breathlessness, fatigue, nausea, or vague discomfort - symptoms that are easier to miss or attribute elsewhere.[6] Delayed recognition and underuse of invasive treatment are well-documented consequences. In rural populations, the additional barriers of social and cultural norms around women seeking care independently may worsen this further, and likely explain why women are underrepresented in hospital-based series from such settings.

This study was undertaken to document the clinical profile of elderly ACS patients as they presented to our rural first-contact facility. The primary interest was in the symptom pattern, risk factor burden, and ECG findings, and in whether atypical and delayed presentation varied by sex. Since this centre has no catheterisation laboratory and does not provide definitive reperfusion, the study deliberately focuses on what is observable and actionable at the point of first contact, rather than on outcomes that depended on management at receiving facilities.

Aim And Objectives

- To describe the clinical presentation of ACS in elderly patients aged 60 years and above.
- To identify the common cardiovascular risk factors in this population.
- To describe troponin I levels, glycaemic status, lipid profile, and comorbidity burden in the cohort.
- To evaluate the electrocardiographic pattern including territory distribution, and echocardiographic findings (RWMA, LV function) in patients with markedly elevated troponin.
- To assess the relationship between delayed presentation and clinical acuity at the time of referral.
- To examine the distribution of atypical presentation between men and women within the elderly cohort.

MATERIALS & METHODS

Study design and setting

This was a retrospective observational study conducted over a one-year period (2024-2025) in a tertiary care teaching hospital catering predominantly to a rural population. The hospital functions as a first-contact care facility for ACS patients and does not have an on-site catheterisation laboratory or invasive cardiac facilities. All patients received initial clinical assessment, ECG, and cardiac biomarker testing.

Study population

A total of 120 elderly patients aged 60 years and above diagnosed with ACS were included in the study. ACS was defined on the basis of compatible clinical presentation, electrocardiographic findings, and cardiac biomarker evaluation, including troponin, as per routine institutional practice.

Inclusion criteria

- Age 60 years and above.
- Admission with a diagnosis of acute coronary syndrome, including STEMI, NSTEMI, or unstable angina.
- Availability of sufficient clinical, ECG, and laboratory data for analysis.

Exclusion criteria

- Non-cardiac chest pain mimics.
- Patients in whom the diagnosis of ACS could not be reasonably established.
- Records with incomplete essential variables relevant to the primary analysis.

Variables studied

The following variables were recorded: demographic profile (age, sex); mode and timing of presentation; symptoms; cardiovascular risk factors (hypertension, diabetes mellitus, tobacco use, alcohol use, obesity); comorbidities (chronic kidney disease, prior MI, cerebrovascular accident, hypothyroidism, COPD, anaemia); troponin I level (positive/negative and degree of elevation); fasting blood glucose and HbA1c in diabetic patients; lipid profile where obtained; ECG pattern and infarct territory; and bedside echocardiographic findings (RWMA territory, LV systolic function, diastolic dysfunction, pericardial effusion) in patients with markedly elevated troponin. Reperfusion data beyond this facility were not captured and are therefore not reported.

Operational definitions

- Typical presentation: classical ischaemic chest pain as the principal presenting symptom.
- Atypical presentation: absence of typical chest pain, including dyspnoea, nausea, diaphoresis, giddiness, syncope, palpitations, or other atypical manifestations.
- Delayed presentation: hospital arrival more than six hours after symptom onset.

Statistical analysis

Categorical data are presented as frequencies and percentages; continuous variables as mean ± SD. Chi-square and Fisher's exact tests were used to examine associations between atypical presentation and sex, and between delayed presentation and clinical acuity at referral. A p-value below 0.05 was taken as significant.

RESULT

Of 120 patients, 100 (83.3%) were male and 20 (16.7%) females. Chest pain was the main presenting symptom in 84 patients (70.0%); the remaining 36 (30.0%) came in without it. Sweating was noted in 76 (63.3%), nausea or vomiting in 32 (26.7%), dyspnoea in 28 (23.3%), giddiness in 12 (10.0%), and palpitations in 4 (3.3%). Full symptom data are in Table 1.

Among standard cardiovascular risk factors, alcohol use was the most common at 45.0% (n=54), followed by hypertension in 33.3% (n=40), tobacco in 30.0% (n=36), and diabetes in 26.7% (n=32); obesity was present in 6.7% (Table 2). A significant comorbidity burden was also evident: CKD and anaemia each in 13.3%, prior MI and COPD each in 10.0%, and prior CVA in 6.7% (Table 6). Troponin I came back positive in 112 patients (93.3%), and of

these, 48 (42.9%) had values more than ten times the cut-off, indicating extensive myocardial injury (Table 4). Fasting blood sugar exceeded 126 mg/dL in 52 patients (43.3%); 24 of these had no prior diagnosis of diabetes, pointing to a sizeable pool of undetected disease. Among known diabetics, 62.5% had HbA1c above 8.0% (Table 5). Lipid profiling was obtained in 68 patients; low HDL was the leading abnormality at 64.7%, with elevated LDL in 52.9% (Table 7). On ECG, STEMI was found in 108 patients (90.0%), anterior territory the most frequent at 43.3%, inferior at 33.3% (Table 9). Twelve patients (10.0%) had NSTEMI or unstable angina. New or presumed new LBBB was seen in 4 patients (3.3%), and AV block was present on the admission ECG in 8 patients (6.7%).

Bedside echo was done in the 44 patients with markedly elevated troponin. Wall motion abnormalities were present in 40 of them (90.9%), predominantly in the anterior territory (54.5%). LV systolic function was normal in only 8 (18.2%); 16 had moderately reduced EF (35-44%) and 8 had severely reduced EF below 35%. Diastolic dysfunction was found in 32 patients (72.7%). The echo findings were used directly to judge transfer urgency. Full data in Table 8. NSTEMI/UA patients were more likely to present atypically than STEMI patients (66.7% vs 25.9%); see Table 12.

Women were significantly more likely than men to present without chest pain (60.0% vs 24.0%, p=0.003). Dyspnoea was the dominant symptom in 60.0% of women against 16.0% of men (p<0.001), and hypertension was more prevalent among women (60.0% vs 28.0%, p=0.008). Table 10 gives the full sex-based comparison. Sixty-eight patients (56.7%) arrived after six hours. Late presenters had higher clinical acuity at referral (p=0.010), a greater proportion without chest pain (41.2% vs 15.4%), and more markedly elevated troponin (47.1% vs 30.8%) than those who came in earlier. Table 11 shows this comparison.

Table 1. Clinical presentation of ACS in elderly patients (n=120)

Symptom / Presentation	Number (n)	Percentage (%)
Typical chest pain	84	70.0
Atypical / no chest pain	36	30.0
Sweating	76	63.3
Dyspnoea	28	23.3
Nausea / vomiting	32	26.7
Giddiness	12	10.0
Palpitations	4	3.3

Table 2. Cardiovascular risk profile in the study cohort (n=120)

Risk Factor	Number (n)	Percentage (%)
Hypertension	40	33.3
Diabetes mellitus	32	26.7
Tobacco use	36	30.0
Alcohol use	54	45.0
Obesity	8	6.7

Table 3. Electrocardiographic profile (n=120)

ECG Category	Number (n)	Percentage (%)
ST-elevation ACS (STEMI)	108	90.0
Non-ST-elevation ACS (NSTEMI / UA)	12	10.0

Table 4. Troponin I findings in the study cohort (n=120)

Troponin I Result	Number (n)	Percentage (%)
Positive (above institutional cut-off)	112	93.3
Negative / borderline	8	6.7
Markedly elevated (>10× cut-off)	48	42.9 of positive
Moderately elevated (2–10× cut-off)	44	39.3 of positive
Mildly elevated (<2× cut-off)	20	17.8 of positive

Table 5. Blood glucose and glycaemic profile (n=120)

Parameter	Number (n)	Percentage (%)
Known diabetic on treatment	32	26.7
Newly detected hyperglycaemia on admission	24	20.0
Normoglycaemic on admission	64	53.3
Fasting blood sugar >126 mg/dL	52	43.3
Fasting blood sugar 100–125 mg/dL (IFG)	20	16.7
Fasting blood sugar <100 mg/dL	48	40.0
HbA1c >8.0% (poor glycaemic control)	20	62.5 of diabetics
HbA1c 6.5–8.0% (fair control)	8	25.0 of diabetics
HbA1c <6.5%	4	12.5 of diabetics

Table 6. Associated comorbidities in the study cohort (n=120)

Comorbidity	Number (n)	Percentage (%)
Hypertension	40	33.3
Diabetes mellitus	32	26.7
Chronic kidney disease	16	13.3
Prior myocardial infarction	12	10.0
Cerebrovascular accident (prior)	8	6.7
Hypothyroidism	8	6.7
COPD / chronic lung disease	12	10.0
Anaemia	16	13.3
No significant comorbidity	24	20.0

Table 7. Lipid profile in patients where assessed (n=68)

Lipid Parameter	Mean ± SD	Abnormal n (%)
Total cholesterol (mg/dL)	198.4 ± 42.6	28 (41.2)
LDL cholesterol (mg/dL)	128.6 ± 38.4	36 (52.9)
HDL cholesterol (mg/dL)	38.2 ± 8.6	44 (64.7)
Triglycerides (mg/dL)	172.8 ± 56.2	24 (35.3)
Non-HDL cholesterol (mg/dL)	160.2 ± 40.8	32 (47.1)

Table 8. Echocardiographic findings in patients with markedly elevated Troponin I (n=44)

Echocardiographic Parameter	Number (n)	Percentage (%)
Total patients who underwent echo	44	100.0
Regional wall motion abnormality (RWMA) present	40	90.9
— Anterior wall RWMA (LAD territory)	24	54.5

— Inferior wall RWMA (RCA territory)	12	27.3
— Lateral wall RWMA	4	9.1
LV systolic function — Normal (EF ≥55%)	8	18.2
LV systolic function — Mildly reduced (EF 45–54%)	12	27.3
LV systolic function — Moderately reduced (EF 35–44%)	16	36.4
LV systolic function — Severely reduced (EF <35%)	8	18.2
Diastolic dysfunction noted	32	72.7
Pericardial effusion	4	9.1

Table 9. Electrocardiographic profile with territory distribution (n=120)

ECG Category / Territory	Number (n)	Percentage (%)
STEMI — total	108	90.0
— Anterior STEMI (V1–V6 leads)	52	43.3
— Inferior STEMI (II, III, aVF)	40	33.3
— Lateral STEMI (I, aVL, V5–V6)	12	10.0
— Posterior / RV extension	4	3.3
NSTEMI	8	6.7
Unstable angina (non-ST changes)	4	3.3
LBBB (new or presumed new)	4	3.3
AV block on admission ECG	8	6.7

Table 10. Gender-based comparison of clinical and investigative profile

Variable	Men (n=100)	Women (n=20)	p-value
Mean age (years)	67.4 ± 5.8	69.2 ± 6.4	0.214
Typical chest pain	76 (76.0%)	8 (40.0%)	0.001
Atypical / no chest pain	24 (24.0%)	12 (60.0%)	0.003
Dyspnoea as presenting symptom	16 (16.0%)	12 (60.0%)	<0.001
Delayed presentation (>6 hrs)	56 (56.0%)	12 (60.0%)	0.748
STEMI on ECG	92 (92.0%)	16 (80.0%)	0.128
Hypertension	28 (28.0%)	12 (60.0%)	0.008
Diabetes mellitus	24 (24.0%)	8 (40.0%)	0.148
Troponin I positive	92 (92.0%)	20 (100.0%)	0.354

Table 11. Comparison of clinical profile by time of presentation (n=120)

Variable	Presentation ≤6 hrs (n=52)	Presentation >6 hrs (n=68)
Typical chest pain	44 (84.6%)	40 (58.8%)
Atypical / no chest pain	8 (15.4%)	28 (41.2%)
Dyspnoea as predominant symptom	4 (7.7%)	24 (35.3%)
STEMI on ECG	48 (92.3%)	60 (88.2%)
Troponin I markedly elevated (>10×)	16 (30.8%)	32 (47.1%)
Hypertension	16 (30.8%)	24 (35.3%)
Diabetes mellitus	12 (23.1%)	20 (29.4%)
High clinical acuity at referral	4 (7.7%)	20 (29.4%)
p-value (acuity comparison)	—	0.010

Table 12. Comparison of clinical profile between STEMI and NSTEMI / UA (n=120)

Variable	STEMI (n=108)	NSTEMI / UA (n=12)
Mean age (years)	67.1 ± 5.6	70.4 ± 7.2
Male sex	92 (85.2%)	8 (66.7%)
Typical chest pain	80 (74.1%)	4 (33.3%)
Atypical presentation	28 (25.9%)	8 (66.7%)
Delayed presentation (>6 hrs)	60 (55.6%)	8 (66.7%)
Troponin I positive	100 (92.6%)	12 (100.0%)
Troponin I markedly elevated (>10×)	44 (40.7%)	4 (33.3%)
Hypertension	36 (33.3%)	4 (33.3%)
Diabetes mellitus	28 (25.9%)	4 (33.3%)
Echo performed	40 (37.0%)	4 (33.3%)
LV dysfunction on echo	32 (80.0% of echo)	4 (100% of echo)

DISCUSSION

This study documents 120 elderly patients presenting with ACS over one year at a rural teaching hospital in northern Karnataka without on-site catheterisation facilities. The data reflect what is seen at the point of first contact - the symptom pattern, the risk factor burden, the ECG findings, and the degree of myocardial injury - before patients are transferred for definitive care.

One of the more striking findings in this cohort was that 30% of patients arrived without chest pain. Sweating, dyspnoea, and nausea were the dominant accompanying features in this group. The proportion is consistent with published reviews reporting atypical presentation in 30–50% of elderly ACS patients.[3] The consequences of missing this presentation are significant: Brieger et al. showed in the GRACE registry that patients without chest pain were older, sicker, and had substantially higher in-hospital mortality.[1] We could not track mortality in this study, since outcomes depended on management at receiving hospitals; but the frequency of atypical presentation here underscores how much depends on getting the diagnosis right at the first point of contact, before any reperfusion is even possible.

More than half the cohort (56.7%) arrived beyond six hours, and delayed presentation was significantly associated with higher clinical acuity at referral (p=0.010). Prehospital delays of this magnitude are well documented in LMIC settings, where patients typically wait at home, consult a local practitioner first, and depend on family or shared transport to reach a facility. [5] Bedside echocardiography in patients with markedly elevated troponin was useful in this context - it confirmed myocardial injury, identified the territory involved, and helped prioritise transfer without requiring any invasive infrastructure.

Only 20 of our 120 patients were women, and 60% presented without chest pain - compared with 24% of men (p=0.003). Dyspnoea was the predominant symptom in 60% of women versus 16% of men (p<0.001). This sex difference in symptom pattern is consistent with the Kerala ACS Registry and other Indian data. [6] In a rural setting, the problem is compounded by the time that passes before a woman is brought to hospital - decisions about seeking care often rest with male family members, and social factors add to the delay already imposed by distance and transport.

Alcohol use (45%), tobacco (30%), and hypertension (33.3%) were the leading risk factors, as might be expected in a rural elderly male-predominant cohort from this region. Diabetes was documented in 26.7%, but fasting blood sugar exceeded 126 mg/dL in 43.3% of the entire cohort, with 20% having no prior diagnosis. Among known diabetics, 62.5% had HbA1c above 8% -

indicating poor glycaemic control in the majority. CKD and anaemia were each present in 13.3%, and COPD in 10%. Where lipid profiling was done, low HDL was the most frequent abnormality. Many of these patients were therefore carrying several poorly controlled chronic conditions alongside the acute event.

STEMI accounted for 90% of ECG presentations, which is higher than figures typically reported from urban centres where NSTEMI proportions are larger, partly reflecting earlier presentation and better recognition in those settings. In the 44 patients with markedly elevated troponin who underwent bedside echocardiography, 90.9% had regional wall motion abnormalities and over half had moderate-to-severe LV systolic dysfunction. Finding this degree of impairment at first contact, before any reperfusion attempt, reflects the severity of disease in this population and confirms the utility of bedside echo as a triage tool in resource-limited settings. [7], [8]

These observations from a rural first-contact setting complement what is known from urban registries, and point to the changes in community awareness and referral pathways that would most reduce the burden of delayed and missed diagnosis in this population.

CONCLUSION

In this cohort of 120 elderly ACS patients from a rural first-contact centre, STEMI was the dominant ECG pattern, atypical presentation was seen in nearly one-third, and more than half arrived after six hours. Women were significantly more likely to present without chest pain. Bedside echocardiography, used selectively in high-troponin patients, was feasible and clinically informative even without specialist infrastructure. The findings point to a straightforward set of priorities: improving awareness of atypical ACS symptoms in rural elderly communities, reducing the time between symptom onset and hospital arrival, and strengthening referral pathways so that patients reach definitive care before further damage accumulates.

Declaration by Authors

Ethical Approval: This was a retrospective observational study using de-identified existing hospital records. No patient intervention or contact was involved.

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Conflict of Interest: All authors declare no conflict of interest.

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