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Study of Clinical Profile of Patients of Non-St Segment Elevation Myocardial Infarction

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Abstract

Background: Non-ST segment elevation myocardial infarction (NSTEMI) represents a growing proportion of acute coronary syndrome presentations and is associated with substantial morbidity and mortality. Understanding local clinical, laboratory and echocardiographic patterns is essential to refine risk stratification and optimize management strategies in resource-constrained settings.

Objectives: To describe the clinical characteristics, laboratory profile and echocardiographic patterns of adults presenting with NSTEMI at a tertiary care centre, and to relate these findings to patterns of management including revascularization.

Methodology: This hospital-based, observational study includes 125 consecutive patients aged >18 years with a first episode of NSTEMI, admitted to the cardiology department of CPR Hospital, Kolhapur, from January to March 2026. Patients with known ischemic heart disease are excluded. Detailed clinical history, examination, ECG, cardiac biomarkers, renal function, electrolytes, chest X-ray, 2D echocardiography and coronary angiography are performed using a structured proforma. Data are analyzed in SPSS 28 using descriptive statistics and appropriate chi-square or t-tests with $p<0.05$ considered significant.

Results: Most patients are 51–70 years old (54.4%), with 23.2% aged 31–50 years, and there is slight male predominance (55.2%). Chest pain is the commonest presenting complaint (76%), while 26.4% report atypical pain and 30.4% present without chest pain. Hypertension (68.8%) and diabetes mellitus (55.2%) are the leading co-morbidities, and 60% report alcohol use, whereas smoking/tobacco use is seen in 10.4%. Over half have normal BMI (55.2%), with 41.6% overweight. Laboratory evaluation shows preserved renal function (mean creatinine 1.4±1.5 mg/dL) and normal electrolytes, but elevated blood sugar (mean 158.0±76.8 mg/dL). ECG most often demonstrates ST depression in

lateral (23.2%) and inferior (22.4%) leads. Echocardiography reveals regional wall motion abnormalities predominantly in LAD (26.4%) and RCA (23.2%) territories, with diastolic dysfunction in 76% and preserved or mid-range ejection fraction in 84.8%. Overall, 68% undergo revascularization (PTCA 57, CABG 13), significantly associated with ejection fraction category ($p<0.001$).

Conclusion: NSTEMI patients in this cohort are relatively young, predominantly hypertensive and diabetic, and frequently exhibit diastolic dysfunction with preserved systolic function. High revascularization rates aligned to ejection fraction support guideline-based invasive strategies and emphasize the need for aggressive risk factor control and systematic echocardiographic assessment.

Keywords: Non-ST segment elevation myocardial infarction; Clinical profile; Echocardiography; Risk factors; Revascularization

Introduction

Non-ST segment elevation myocardial infarction (NSTEMI) constitutes a major proportion of acute coronary syndrome (ACS) presentations and is increasingly recognized as a leading cause of cardiovascular morbidity and mortality worldwide. While the overall incidence of acute myocardial infarction has declined in many developed countries, the relative incidence of NSTEMI compared with ST-elevation myocardial infarction (STEMI) has continued to rise. Traditional cardiovascular risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking, obesity and chronic kidney disease are highly prevalent in this population and strongly influence the onset, progression and complications of atherosclerotic disease.

Patients with NSTEMI are often older, with a greater burden of comorbidities and multivessel coronary artery disease than those with STEMI, and they may experience higher long-term post-discharge mortality despite similar or even less impressive initial electrocardiographic changes. The clinical presentation of NSTEMI is heterogeneous, ranging from typical chest pain to atypical symptoms such as dyspnea, fatigue or epigastric discomfort, particularly in the elderly, women and patients with diabetes. This heterogeneity, combined with overlapping features with unstable angina, underscores the importance of careful clinical assessment, serial electrocardiography and high-sensitivity cardiac troponin measurements for accurate diagnosis.

Contemporary practice guidelines from major societies emphasize early risk stratification using validated scores such as TIMI and GRACE, which integrate clinical, electrocardiographic and biochemical parameters to guide decisions regarding invasive versus conservative management strategies. Despite substantial advances in pharmacological therapy and revascularization techniques, gaps remain in the application of guideline-directed therapies, and outcomes vary across different healthcare settings and populations.

NSTEMI patients frequently present with diverse clinical features and multiple co-morbidities, and their risk factor profile and management patterns may differ across populations and healthcare systems. The objective of the present study is to systematically evaluate the clinical profile of patients with non-STEMI, including risk factors, cardiovascular examination findings in order to identify prevalent patterns that may inform risk stratification and management in our setting.

Material and Methods

The present study was conducted in depart of Cardiology, Chhatrapati Pramila Raje (CPR) Hospital, Kolhapur during a period from January 2026 to March 2026. After getting approval from institutional ethical committee, the study was started. A total of 125 Patients of both sexes of age more than 18 years admitted with the diagnosis of non-ST elevation MI and who were willing to participate in the study, were included in the study. Patients of known case of ischemic heart disease were excluded.

Patients were given the consent form and were thoroughly explained given in the language that they best understand. All patients were evaluated clinically by taking history by using pre-structured pretested proforma which includes demographic details such as the ward of the patient, name, age, sex, date of admission, diagnosis, associated medical conditions, and so on and thorough physical examination followed by electrocardiogram (ECG).

After general and systemic examination, blood investigation for cardiac enzyme was done which includes Blood Urea, Serum Creatinine, ECG, Blood sugars, Na+, K+, Chest X-ray, Cardiac Markers which includes Trop T, Trop I, CPK MB. Once patients were stabilized, 2D Echo and Coronary Angiography was done. 2D Echo imaging evidence of loss of viable myocardium or regional wall motion abnormality was assessed and intracoronary thrombus detected on angiography. Other differential diagnosis was excluded clinically and if necessary, by appropriate tests. Outcome measures were Discharge against medical advice (DAMA), prolongation of hospital or ICU stay, disability, death etc.

Data was entered into Microsoft excel data sheet and was analysed using SPSS version 28 (IBM SPSS Statistics, Somers NY, USA). Categorical data was represented in the form of Frequencies and proportions. Chi square test, Fisher Exact tests were used as test of significance for qualitative data continuous data was represented as mean and standard deviation. unpaired t test was used as test of significance to identify the mean difference between two quantitative variables for comparison. p value (Probability that the result is true) of 0.05 was considered as statistically significant after assuming all the rules of statistical tests.

The investigator explained the benefits and risks of participation in the study to each patient to the fullest extent possible about the study, in language and terms they are able to understand. Subsequently a written informed consent prior to the patient's entering the study (i.e., before initiation of routine tests) was obtained.

Results

Table 1: Demographic and Clinical Profile of the patients (n=125):

Demographic and Clinical Profile		Frequency	Percent
Age group (Years)	31 to 50	29	23.2
	51 to 70	68	54.4
	71 to 90	25	20.0
	> 90	3	2.4
Gender	Male	69	55.2

	Female	56	44.8
Presenting complaints	Chest Pain	95	76.0
	Sweating	19	15.2
	Shortness of Breath	17	13.6
	Vomiting	6	4.8
	Syncope	2	1.6
Character of chest pain	Typical	54	43.2
	Atypical	33	26.4
	No chest pain	38	30.4
Co-morbidities	Hypertension	86	68.8
	Diabetes Mellitus	69	55.2
	Treated Tuberculosis	3	2.4
	Active Tuberculosis	3	2.4
	HIV	2	1.6
Alcohol and Smoking	Alcohol use	75	60.0
	Smoking/tobacco use	13	10.4
	No addiction	37	29.6
Drug History	Hypertension	86	68.8
	Diabetes Mellitus	69	55.2
	On ART	3	2.4
	Not on any regular medication	16	12.8

The majority of patients with non-ST elevation myocardial infarction (NSTEMI) were in the 51–70 years age group, accounting for about half of the sample (54.4%). Younger patients aged 31–50 years formed nearly one-quarter (23.2%), while 20% were 71–90 years old. There was a slight male predominance, with 69 patients (55.2%) being males and 56 (44.8%) females.

Chest pain was the commonest presenting symptom, reported by 76% of patients. Sweating (15.2%) and shortness of breath (13.6%) were the next most frequent complaints, often occurring in combination with chest pain. Vomiting (4.8%) and syncope (1.6%) were relatively uncommon. Typical anginal chest pain was reported in 43.2% of patients, while 26.4% had atypical chest pain. Notably, 30.4% of patients presented without chest pain, emphasizing that nearly one-third of NSTEMI cases may be clinically silent with respect to classic angina.

Hypertension was the most prevalent co-morbidity, present in 68.8% of patients, followed by diabetes mellitus in 55.2%. A smaller proportion had a history of

treated (2.4%) or active tuberculosis (2.4%), and HIV infection was documented in 1.6%. These findings highlight a high burden of traditional cardiovascular risk factors, particularly hypertension and diabetes, among NSTEMI patients in this study. A history of alcohol use was seen in 60% of patients, whereas smoking/tobacco use was reported in 10.4%. Nearly one-third of the cohort (29.6%) reported no addiction.

About two-third of patients (68.8%) were on anti-hypertensive medications, and 55.2% were on oral hypoglycemics. Only 12.8% were not on any regular medication, and a small subset (2.4%) were on antiretroviral therapy (ART), indicating that most patients were already receiving some form of chronic therapy at presentation.

Table 2: Body Mass Index of the Patients:

Body Mass Index	Frequency	Percent
Normal (18.5 to 24.99 Kg/m^2)	69	55.2
Over-weight (25 to 29.99 Kg/m^2)	52	41.6
Obese (≥ 30 Kg/m^2)	4	3.2
Total	125	100.0

More than half of the patients (55.2%) had a normal BMI (18.5–24.99 kg/m²), whereas 41.6% were overweight and 3.2% were obese. Thus, although a considerable proportion were overweight/obese, a substantial number of NSTEMI patients in this cohort were within the normal BMI range.

Table 3: CVS Examination findings:

CVS Examination	Frequency	Percent
Systolic Murmur in Mitral Area	15	12.0
S3 sound present	6	4.8
S4 sound present	23	18.4
No murmur	81	64.8
Total	125	100.0

On cardiovascular examination, no murmur was detected in 64.8% of patients. A systolic murmur in the mitral area was heard in 12.0%, S3 in 4.8% and S4 in 18.4% of cases. The presence of S3/S4 in a subset of patients suggests underlying left ventricular dysfunction or stiff ventricle in a minority, while most patients had unremarkable auscultatory findings.

Table 4: Mean values of laboratory parameters (n=125):

Laboratory parameter	Mean	Std. Dev.	Median	Minimum	Maximum
Urea (mg/dL)	36.0	15.1	33	19.5	116
Creatinine (mg/dL)	1.4	1.5	1.2	0.6	15.1
Sodium (mEq/L)	139.0	3.8	139	131.2	146.2

Potassium (mEq/L)	3.8	0.4	3.7	3.2	5.1
Blood sugar level (mg/dL)	158.0	76.8	145	66.5	477

Renal function was relatively preserved, with mean urea 36.0±15.1 mg/dL and creatinine 1.4±1.5 mg/dL, although the upper range of creatinine reached 15.1 mg/dL in some patients. Electrolyte levels were in normal limits (sodium 139.0±3.8 mEq/L, potassium 3.8±0.4 mEq/L), while mean random blood sugar was elevated at 158.0±76.8 mg/dL.

Tale 5: Findings on Chest X-ray:

Chest X-ray	Frequency	Percent
Normal	119	95.2
Cardiomegaly	1	0.8
Cardiomegaly with bilateral hilar opacities	1	0.8
Cardiomegaly with bilateral pleural effusion	1	0.8
Bilateral hilar opacities	3	2.4
Total	125	100.0

The vast majority of patients (95.2%) had a normal chest X-ray. Cardiomegaly alone, cardiomegaly with bilateral hilar opacities, and cardiomegaly with bilateral pleural effusion were each seen in only 0.8% of patients, while bilateral hilar opacities without cardiomegaly occurred in 2.4%. Thus, overt radiographic evidence of heart failure or pulmonary pathology was uncommon at baseline in this NSTEMI cohort.

Table 6: ECG Findings of the patients:

ECG Findings		Frequency	Percent
ST Depression	aVL, V4–V6	29	23.2
	II, III, aVF	28	22.4
	V1–V4	2	1.6
T Wave Inversion (n=26)	II, III, aVF	14	11.2
	V1–V6	14	11.2
	V2–V4	5	4.0
Complete Bundle Branch Block (n=15)	Left BBB	11	8.8
	Right BBB	8	6.4
Sinus Bradycardia		4	3.2
Normal Sinus Rhythm		13	10.4
Total		125	100.0

ST-segment depression was most frequently observed in the lateral leads (aVL, V4–V6) and inferior leads (II, III, aVF), seen in 23.2% and 22.4% of patients respectively, while anterior lead (V1–V4) involvement was less common (1.6%).

T-wave inversion was documented in 26 patients, most commonly in the inferior and precordial leads (each 11.2%), with a smaller proportion involving V2–V4 (4.0%). Complete bundle branch block was present in 15 patients, more often left (8.8%) than right (6.4%). Sinus bradycardia (3.2%) and normal sinus rhythm (10.4%) were noted in a minority.

Table 7: Echocardiographic Findings (n=125):

Echocardiographic Findings		Frequency	Percent
2D ECHO Findings (Over all)	RWMA in RCA territory	29	23.2
	RWMA in LCX territory	8	6.4
	RWMA in LAD territory	33	26.4
	Mild AR / mild concentric LVH	13	10.4
	Global left ventricular hypokinesia	8	6.4
	Normal ECHO	47	37.6
Diastolic Dysfunction	Grade 1	59	47.2
	Grade 2	36	28.8
	No diastolic dysfunction	30	24.0
Ejection Fraction	Preserved EF	73	58.4
	Mid-range EF	33	26.4
	Reduced EF	19	15.2

Regional wall motion abnormality (RWMA) in the LAD territory was the most frequent ECHO abnormality (26.4%), followed by RWMA in the RCA territory (23.2%) and LCX territory (6.4%). Mild aortic regurgitation or mild concentric LVH was noted in 10.4%, and global left ventricular hypokinesia in 6.4%. A normal ECHO was seen in 37.6% of patients, indicating that nearly two-thirds had some structural or functional abnormality on echocardiography.

Diastolic dysfunction was highly prevalent, with Grade 1 dysfunction present in 47.2% and Grade 2 in 28.8% of patients. Only 24.0% had no diastolic dysfunction. More than half of the patients (58.4%) had preserved ejection fraction, while 26.4% had mid-range EF and 15.2% had reduced EF. Thus, although systolic function was preserved in a majority, a significant subset (about 40%) had at least mild to moderate systolic impairment.

Table 8: Interventions done of the patients:

Interventions	Frequency	Percent
Medical Management	40	32.0
PTCA to LAD	44	35.2
PTCA to RCA	25	20.0
PTCA to LCX	3	2.4

CABG	13	10.4
Total	125	100.0

* Per-cutaneous Transluminal Coronary Angioplasty, @ Coronary Artery Bypass Graft Surgery

In terms of management, PTCA to LAD was the most common intervention (35.2%), followed by medical management alone in 32.0% of patients. PTCA to RCA and PTCA to LCX were performed in 20.0% and 2.4% of patients respectively, while 10.4% underwent CABG surgery. Overall, more than half of the patients underwent some form of percutaneous coronary intervention.

Table 9: Association between Ejection Fraction and Type of Management:

Ejection Fraction	Management			Total	Chi Square, p value
	Medical Management	PTCA	CABG		
Preserved EF	33 (45.2%)	40 (54.8%)	0 (0.0%)	73 (100%)	28.98, <0.001
Mid-range EF	6 (18.2%)	19 (57.6%)	8 (24.2%)	33 (100%)	
Reduced EF	1 (5.3%)	13 (68.4%)	5 (26.3%)	19 (100%)	
Total	40 (32.0%)	72 (45.6%)	13 (13.6%)	125 (100%)	

PTCA was the most common treatment across all EF groups, especially in preserved (54.8%), mid-range (57.6%), and reduced EF (68.4%). Medical management was more common in preserved EF (45.2%) but decreased with worsening EF, while CABG was mainly used in mid-range (24.2%) and reduced EF (26.3%) and not in preserved EF. The association between EF and management type was statistically highly significant ($p < 0.001$), indicating that treatment choice varies significantly with EF.

Discussion

The present study describes the clinical profile of 125 patients with non-ST segment elevation myocardial infarction (NSTEMI) and largely corroborates previously published Indian and international data, while also highlighting some distinctive patterns. In our cohort, the majority of patients were aged 51–70 years (54.4%), with a further 23.2% between 31–50 years, reflecting relatively early onset disease in comparison to Western registries where mean ages often approach the mid-60s. Raju et al.[11] reported a mean age of 56.1 years for NSTE-ACS and chronic stable angina in a South Indian population, while Swaminathan et al.[12] found most ACS cases clustered between 30–60 years, both closely paralleling the current findings and underscoring the earlier age at presentation in Indian patients. Male predominance was modest in our study (55.2%), similar to the 71.1% and 74% male proportions reported by Raju et al. [(11)] and Alappatt et al. [13], respectively, suggesting a consistent sex gradient but with substantial female representation in South Asian ACS populations.

Symptomatically, chest pain was the commonest presenting complaint (76%), followed by sweating (15.2%) and dyspnoea (13.6%), whereas 30.4% had no chest pain and 26.4% had atypical pain. This mix of typical and atypical presentations mirrors the heterogeneity reported by Alappatt et al. [13] in young ACS, where chest pain predominated but atypical symptoms and multiple complaints were more frequent in women and younger patients, and by Menzou et al.[14], who also noted sex-related differences in symptom profiles in ACS. The relatively high proportion of

NSTEMI patients without chest pain in our series is clinically relevant, as it likely contributes to delayed diagnosis and may partially explain the substantial burden of comorbidities and advanced coronary disease observed.

Co-morbidities in this NSTEMI cohort were dominated by hypertension (68.8%) and diabetes mellitus (55.2%), with alcohol use in 60% and smoking in 10.4%. Raju et al. [11] reported diabetes in 47.4% and hypertension in 45.9% of NSTE-ACS/CSA patients, while Swaminathan et al. [12] similarly identified diabetes and hypertension as the main risk factors for ACS, both supporting the high cardiometabolic risk burden in Indian populations. Our diabetes prevalence is also comparable to the 47.9% reported by Menzou et al. [14] in male ACS patients and 65% in female patients, and to multicentre data showing diabetes in around 30–40% of NSTEMI cohorts, though often at older ages. The high prevalence and relatively shorter duration of these risk factors, as suggested by Swaminathan et al. [12], may contribute to both earlier onset and greater angiographic complexity, even in patients with preserved or mid-range ejection fraction.

Body mass index showed that 55.2% of patients were in the normal range and 41.6% were overweight, with only 3.2% obese. This contrasts with many Western NSTEMI series where mean BMI often exceeds 27–28 kg/m² and obesity exceeds 30–40%. Alappatt et al. [13] reported similar BMI values between male and female young ACS patients, and Menzou et al.[14] observed higher BMI in women with ACS (28.7 ± 5.6 kg/m²) but overall levels still lower than typical Western cohorts, supporting the concept of "lean but metabolically unhealthy" phenotypes in South Asians.

Electrocardiographically, ST-segment depression was most frequent in lateral (23.2%) and inferior leads (22.4%), while T-wave inversion was seen in 26 patients (20.8%), and complete bundle branch block in 12%. These patterns align with Tuohinen et al. [15], who found ST depression in 45% and T-wave inversion in 85% of a small NSTEMI cohort, with lateral precordial ST depression being typical and T-wave inversion correlating with regional systolic dysfunction.

On echocardiography, regional wall motion abnormality in the LAD territory was the most frequent finding (26.4%), followed by RCA territory (23.2%), with 37.6% having normal ECHO and 58.4% preserved ejection fraction. These proportions are compatible with Swaminathan et al.[12], who noted STEMI predominance but also substantial LAD involvement and mild LV systolic dysfunction, and with Raju et al. [11], who documented LAD as the most commonly involved vessel (occurring in 55.2% of cases) and triple-vessel disease in 32.4% of patients. The high prevalence of diastolic dysfunction (76% overall; 47.2% grade 1 and 28.8% grade 2) in our cohort parallels the association between subendocardial ischemia, diastolic impairment, and ST depression described by Tuohinen et al.[15], and supports the concept that HFpEF-like physiology is common in NSTEMI, particularly in hypertensive and diabetic patients.

Most patients underwent invasive management, with percutaneous transluminal coronary angioplasty (PTCA) performed in 57 (45.6%) and CABG in 13 (10.4%), while 32% were medically managed alone. This pattern is similar to the high rates of revascularization reported in Indian NSTE-ACS cohorts by Raju et al. [11], and reflects adherence to contemporary guideline recommendations favouring early invasive strategies in high-risk NSTEMI patients. Importantly, our finding of a strong association between ejection fraction category

and type of management ($\chi^2 = 58.2$, $p < 0.001$), with PTCA was the common treatment especially in preserved (54.8%), mid-range (57.6%), and reduced EF (68.4%). Medical management was more common in preserved EF (45.2%) but decreased with worsening EF, while CABG was mainly used in mid-range (24.2%) and reduced EF (26.3%) and not in preserved EF.

Conclusion

In this hospital-based cohort of 125 patients with non-ST segment elevation myocardial infarction, the study successfully characterizes a predominantly 51–70-year age group with slight male preponderance, high prevalence of hypertension and diabetes, and frequent typical or atypical chest pain presentations. Echocardiography most often demonstrates regional wall motion abnormalities in LAD/RCA territories, high rates of diastolic dysfunction, and predominantly preserved or mid-range ejection fraction, while chest X-ray abnormalities are uncommon.

Management is largely invasive, with most patients undergoing percutaneous coronary intervention and a smaller proportion receiving CABG, appropriately tailored to left ventricular function categories. These findings underline the importance of early risk factor control and structured evaluation of clinical, laboratory, and echocardiographic parameters in NSTEMI patients. There is need to implement aggressive hypertension/diabetes control, routine comprehensive echocardiography, and protocol-driven early invasive risk-stratified management for NSTEMI.

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