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ORIGINAL ARTICLE

Admission Lactate Levels and 1-Month Mortality in Elderly Patients with Non-ST Elevation Myocardial Infarction (NSTEMI) Undergoing Coronary Angiography

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ABSTRACT

Background: Serum lactate is an easily measurable marker that reflects tissue hypoperfusion and systemic stress. Although numerous studies have investigated this topic, no lactate cut-off value associated with mortality has been established for elderly patients with non-ST-segment elevation myocardial infarction (NSTEMI).

Aim: This study aimed to determine the relationship between lactate levels and 1-month mortality and complications in elderly patients with NSTEMI.

Study Design: Retrospective cohort study.

Methods: This study included 110 patients aged ≥65 years who were diagnosed with NSTEMI between August 2024 and August 2025. Baseline lactate levels, duration of hospital stay, 1-month mortality, arrhythmia, cerebrovascular events, recurrent myocardial infarction (MI), contrast-induced nephropathy, deep vein thrombosis/pulmonary embolism, and bleeding events were evaluated.

Results: The mean age was 78.61±8.27 years, and the mean ejection fraction was 46.68±11.52%. The 1-month mortality rate was 16.4%. Admission lactate demonstrated good discriminatory ability for predicting mortality [area under the curve=0.785; 95% confidence interval (CI): 0.651-0.919; p<0.001]. A cut-off value of ≥2.25 mmol/L yielded a sensitivity of 72.2% and a specificity of 72.8%. Patients with lactate levels ≥2.25 mmol/L had significantly higher mortality than those with lower levels (34.2% vs. 6.9%, p<0.001). In the multivariable logistic regression analysis, only lactate levels [odds ratio (OR)=1.35; 95% CI: 1.04-1.76; p=0.023] and fasting glucose levels (OR=1.01; p=0.010) were identified as independent predictors of mortality.

Conclusion: Higher lactate levels were associated with short-term mortality in elderly patients with NSTEMI. Because of its rapid availability and low cost, lactate may serve as a practical and useful marker for early risk assessment in this population.

Keywords: Lactate, myocardial infarction, NSTEMI, elderly patients

INTRODUCTION

Non-ST-segment elevation myocardial infarction (NSTEMI) is the most common form of acute coronary syndrome (ACS) in older adults. The risk of mortality is higher in older patients because of the often atypical clinical presentation, the high prevalence of multiple comorbidities, and the increased occurrence of multivessel disease.[1-4] Therefore, identifying markers associated with mortality in patients with NSTEMI has become increasingly important, and there is a need for inexpensive, easily measurable biomarkers.

Lactate, a metabolic byproduct, provides information about the adequacy of tissue oxygenation and perfusion.[5,6] Its use is particularly common in intensive care units and among patients with shock or sepsis for monitoring treatment response.[6,7] A study of patients with STEMI showed that elevated lactate levels at presentation to the emergency department were associated with higher mortality.[8]

In NSTEMI, another ischemic condition, very few studies have examined lactate levels, particularly in elderly patients with NSTEMI. Therefore, this study aimed to investigate the relationship between lactate levels and 1-month mortality and complications in elderly patients with NSTEMI.

METHODS

Study Design and Setting

This retrospective study was conducted at a Gaziantep City Hospital, the only 24/7 primary percutaneous coronary intervention (PCI) center

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in the city. The ethics committee approval was obtained by Gaziantep City Hospital Non-Interventional Clinical Research Ethics Committee at its meeting numbered 2026/27, decision number 444/2026 and dated: 18.02.2026. Due to the retrospective design of the study, written informed consent was not obtained from the patients.

Selection of Participants

All patients diagnosed with NSTEMI by cardiology specialists who underwent coronary angiography (CAG) between August 2024 and August 2025 were included in the study. Eligible participants were aged ≥65 years. Patients aged ≥65 years were further evaluated by decade of age. Patients with incomplete medical records or unclear 1-month follow-up data after the procedure were excluded.

Measurements and Outcomes

Sociodemographic characteristics, comorbidities, symptoms, hematological and biochemical parameters (complete blood count, glucose, lipid profile, renal function tests, and liver function tests), baseline electrocardiograms, echocardiographic findings [valvular pathologies and ejection fraction (EF)], and CAG findings were reviewed. Duration of hospitalization, 1-month mortality, arrhythmia, cerebrovascular events, recurrent myocardial infarction (MI), contrast-induced nephropathy, deep vein thrombosis/pulmonary embolism, gastrointestinal/genitourinary bleeding, were also evaluated.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics are presented as frequencies and percentages (n, %) for categorical variables and as mean±standard deviation or median (minimum-maximum) for continuous variables. Receiver operating characteristic (ROC) curve analysis was performed to assess the predictive value of lactate levels for mortality. Independent samples t-tests were used for comparisons between two groups. Pearson chi-square tests and Fisher exact tests were used to compare categorical variables. A p value <0.05 was considered statistically significant. Variables associated with 1-month mortality were first identified using univariate logistic regression analysis. Variables found to be significant in the univariate analysis were included in the multivariable logistic regression model along with clinically important variables. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. Model fit was assessed using the -2 log likelihood and Nagelkerke R^2 statistics. All statistical tests were two-sided, and $p<0.05$ was considered statistically significant.

RESULTS

Table 1 summarizes the sociodemographic and clinical characteristics of the patients included in the study. The mean age was 78.61±8.27 years. By age group, 35.5% of the patients were aged 65-74 years, 36.4% were aged 75-84 years, and 28.2% were aged ≥85 years. No significant difference was observed in the sex distribution between women (52.7%) and men (47.3%) (Table 1).

Regarding comorbidities, hypertension was present in the majority of patients (71.8%), whereas diabetes mellitus was identified in 55.5% of cases. Coronary artery disease was present in 40.0% of patients, whereas peripheral artery disease was observed in 10.9% of cases. A history of coronary artery bypass grafting (CABG) was reported in only 1.8% of patients. Hyperlipidemia was present in approximately half of the patients (50.9%), whereas a history of cerebrovascular disease was reported in 6.4% of cases. Chronic obstructive pulmonary disease was identified in 7.3% of cases (Table 1).

Cardiac function assessment showed that the mean EF was 46.68±11.52%. The majority of patients had sinus rhythm (94.4%), whereas atrial fibrillation (AF) was observed in 5.6% of patients (Table 1).

Regarding hospital admission characteristics, the mean intensive care unit stay was 3.98±3.21 days, and the mean total hospital stay was 6.97±5.71 days. According to the CAG findings, PCI was performed in 59.1% of patients, CABG was planned in 22.7%, 15.5% were managed with optimal medical therapy, and 2.7% received medical therapy alone (Table 1).

When early clinical outcomes were evaluated, the 1-month mortality rate was 16.4%. Within 1 month, contrast-induced nephropathy was observed in 14.5% of cases, and new-onset AF, ventricular tachycardia (VT), or atrioventricular block occurred in 11.8%. During the same period, ischemic cerebrovascular events occurred in 5.5% of cases, whereas hemorrhagic cerebrovascular events occurred in 0.9%. Recurrent MI occurred in 11.8% of cases, whereas deep vein thrombosis/pulmonary embolism (0.9%) and gastrointestinal/genitourinary bleeding (9.1%) were also observed (Table 1).

Table 2 presents the descriptive statistics of the laboratory parameters. Regarding metabolic and acid-base status, the mean lactate level was 2.51±2.27 mmol/L, with values ranging from 0.30 to 14.00 mmol/L. The mean pH was 7.37±0.09, and the mean ionized calcium level was 1.12±0.08 (Table 2).

Renal function assessment showed that the mean urea level was 52.41±24.75, and the mean creatinine level was 1.03±0.39. Among the hematological parameters, the mean white blood cell (WBC) count was 10.16±3.26, the mean platelet count was 252.04±63.20, and the mean hemoglobin level was 12.74±2.05 (Table 2).

Table 3 shows the predictive value of lactate levels for 1-month mortality in the overall study population and across age subgroups, as assessed by ROC curve analysis. In the overall study population, lactate levels demonstrated good discriminatory ability for predicting 1-month mortality [area under the curve (AUC)=0.785; 95% CI: 0.651-0.919; p<0.001]. A cut-off value of ≥2.25 mmol/L yielded a sensitivity of 72.2% and a specificity of 72.8% (Table 3).

In subgroup analyses, lactate levels showed good discriminatory ability for mortality in patients aged 65-74 years (AUC=0.884; 95% CI: 0.739-1.000; p=0.029), with a sensitivity of 66.7% and a specificity of 75.0% at a cut-off value of ≥2.25 mmol/L. In patients aged 75-84 years, the discriminatory ability of lactate levels was even greater (AUC=0.924; 95% CI: 0.838-1.000; p<0.001). At a cut-off value of ≥2.65 mmol/L, the sensitivity was 85.7% and the specificity was 84.8% (Table 3). In contrast, among patients aged ≥85 years, lactate levels showed limited discriminatory ability for predicting 1-month mortality (AUC=0.611; 95% CI: 0.352-0.871), and the association was not statistically significant (p=0.355) (Table 3).

Table 1. Distribution of sociodemographic and clinical variables

Variables	n	%
Age		
Mean±SD	78.61±8.27	
Median (min-max)	77.5 (65-101)	
65-74	39	35.5
75-84	40	36.4
≥85	31	28.2
Gender		
Female	58	52.7
Male	52	47.3
HT		
Yes	79	71.8
DM		
Yes	61	55.5
PAD		
Yes	12	10.9
CAD		
Yes	44	40.0
History of CABG		
Yes	2	1.8
Hyperlipidemia		
Yes	56	50.9
Previous cerebrovascular disease		
Yes	7	6.4
COPD		
Yes	8	7.3
Ejection fraction		
Mean±SD	46.68±11.52	
Median (min-max)	50.0 (20-65)	
Mitral stenosis		
None	103	93.6
1st	3	2.7
2nd	3	2.7
3rd	1	0.9
Mitral regurgitation		
None	15	13.6
1st	75	68.2
2nd	19	17.3
3rd	1	0.9
Aortic stenosis		
None	102	92.7
1st	5	4.5
2nd	1	0.9
3rd	2	1.8
Aortic regurgitation		
None	89	80.9
1st	18	16.4
2nd	2	1.8
3rd	1	0.9
Tricuspid regurgitation		
None	28	25.5
1st	70	63.6
2nd	11	10.0
3rd	1	0.9
Rhythm		
Sinus rhythm	102	94.4
AF	6	5.6
Total days in intensive care unit		
Mean±SD	3.98±3.21	
Median (min-max)	3.0 (1-22)	
Total hospital stays		
Mean±SD	6.97±5.71	
Median (min-max)	4.0 (1-32)	
Coronary angiogram results		
Medical	3	2.7
PCI	65	59.1
CABG	25	22.7
Maximal medical treatment	17	15.5
1-month mortality		
Yes	18	16,4
1-month contrast nephropathy		
Yes	16	14.5
1-month new AF/VT/block events		
Yes	13	11.8
1-month cerebrovascular events		
Ischemic	6	5.5
Hemorrhagic	1	0.9
1-month recurrent MI events		
Yes	13	11.8
1-month DVT/PE		
Yes	1	0.9
1-month gastrointestinal/ genitourinary bleeding		
Yes	10	9.1

HT: Hypertension, DM: Diabetes mellitus, PAD: Peripheral artery disease, CAD: Coronary artery disease, CABG: Coronary bypass surgery, PCI: Percutaneous coronary intervention, COPD: Chronic obstructive pulmonary disease, AF: Atrial fibrillation, MI: Myocardial infarction, DVT: Deep vein thrombosis, PE: Pulmonary embolism, SD: Standard deviation, min-max: Minimum-maximum, VT: Ventricular tachycardia

Table 2. Data on laboratory parameters

	Minimum	Maximum	Mean	SD
Lactate (0.5-1.6 mmol/L)	0.30	14.00	2.51	2.27
pH (7.35-7.45)	6.91	7.58	7.37	0.09
Ionized calcium (1.12-1.29 mmol/L)	0.83	1.37	1.12	0.08
HDL-C (mg/dL)	14.00	81.00	47.44	10.79
LDL-C (mg/dL)	22.00	239.00	122.01	36.41
Total cholesterol (mg/dL)	13.00	330.00	194.02	48.31
Triglycerides (mg/dL)	39.00	396.00	132.18	77.89
Sodium (136-146 mmol/L)	128.00	144.00	137.61	3.19
Potassium (3.5-5.1 mmol/L)	3.13	6.29	4.32	0.51
Urea (2-43 mg/dL)	20.00	172.00	52.41	24.75
Creatinine (0.67-1.17 mg/dL)	0.35	2.92	1.03	0.39
Calcium (8.8-10.6 mg/dL)	0.79	10.70	9.07	1.12
ALT (0-50 U/L)	3.00	120.00	22.29	19.91
AST (0-50 U/L)	11.00	425.00	47.50	62.96
Glucose (74-106 mg/dL)	54.00	599.00	184.00	105.66
Albumin (35-52g/L)	23.50	71.00	39.05	5.34
C-reactive protein (0-5 mg/dL)	0.90	140.00	17.64	28.15
WBC (10^9/L)	3.70	21.30	10.16	3.26
Platelet (10^9/L)	81.00	401.00	252.04	63.20
Hb (g/dL)	6.30	16.60	12.74	2.05

ALT: Alanine aminotransferase, AST: Aspartate aminotransferase, LDL-C: Low-density lipoprotein cholesterol, HDL-C: High-density lipoprotein cholesterol, WBC: White blood cell, Hb: Haemoglobin, SD: Standard deviation

Table 3. Analysis of lactate's predictive value in distinguishing 1-month mortality by age groups and all patients

Variables	AUC	%95 CI	Cut-off	Sensitivity (%)	Specificity (%)	p
Lactate	0.785	0.651-0.919	≥2.25	72.2	72.8	**<0.001**
Lactate (65-74 age group)	0.884	0.739-1.000	≥2.25	66.7	75.0	**0.029**
Lactate (75-84 age group)	0.924	0.838-1.000	≥2.65	85.7	84.8	**<0.001**
Lactate (≥85 age group)	0.611	0.352-0.871	≥1.95	62.5	56.5	0.355

AUC: Area under the curve, 95% CI: Confidence interval

Table 4 compares the clinical outcomes between two groups of patients according to lactate levels: <2.25 mmol/L and ≥2.25 mmol/L. When the length of stay in the intensive care unit was evaluated, the mean stay was longer in the group with lactate levels ≥2.25 mmol/L (4.47±3.77 days vs. 3.72±2.87 days); however, this difference was not statistically significant (p=0.287). Similarly, no significant difference was observed between the two groups in the distribution of CAG outcomes, including medical therapy, PCI, CABG, and optimal medical therapy (p=0.914) (Table 4).

In the evaluation of 1-month mortality, a clear and statistically significant association was found between lactate levels and mortality. The 1-month mortality rate was 6.9% in patients with lactate levels <2.25 mmol/L, whereas it increased to 34.2% in those with lactate levels ≥2.25 mmol/L (p<0.001) (Table 4).

When other early complications were evaluated, the incidence of contrast-induced nephropathy within 1 month did not differ significantly between the two groups (p=0.420). Similarly, no significant differences were observed in the incidence of new-onset AF, VT, or atrioventricular block (p=0.763), cerebrovascular events within 1 month (p=1.000), recurrent MI (p=0.753), deep vein thrombosis/pulmonary embolism (p=1.000), or gastrointestinal/genitourinary bleeding (p=0.310) (Table 4).

Table 4. Comparison of various clinical variables with lactate groups

	Lactate		
Variables	**<2.25 mmol/L n=72**	**≥2.25 mmol/L n=38**	**p**
Total days in intensive care unit			
Mean±SD	3.72±2.87	4.47±3.77	0.287[a]
Coronary angiogram results			
Medical	2 (2.8)	1 (2,6)	0.914[c]
PCI	44 (61.1)	21 (55.3)	
CABG	15 (20.8)	10 (26.3)	
Maximal medical treatment	11 (15.3)	6 (15.8)	
1-month mortality			
No	67 (93.1)	25 (65.8)	**<0.001[b]**
Yes	5 (6.9)	13 (34.2)	
1-month contrast nephropathy			
No	63 (87.5)	31 (81.6)	0.402[b]
Yes	9 (12.5)	7 (18.4)	
1-month new AF/VT/block events			
No	64 (88.9)	33 (86.8)	0.763[c]
Yes	8 (11.1)	5 (13.2)	
1-month cerebrovascular events			
No	67 (93.1)	36 (94.7)	1.000[c]
Ischemic	4 (5.6)	2 (5.3)	
Hemorrhagic	1 (1,4)	0 (0)	
1-month recurrent MI events			
No	64 (88.9)	33 (86.8)	0.753[c]
Yes	8 (11.1)	5 (13.2)	
1-month DVT/PE			
No	71 (98.6)	38 (100)	1.000[c]
Yes	1 (1.4)	0 (0)	
1-month gastrointestinal/genitourinary bleeding			
No	67 (93.1)	33 (86.8)	0.310[b]
Yes	5 (6.9)	5 (13.2)	

[a]: Independent t-test, [b]: Pearson chi-square test, [c]: Fisher's exact test, p<0.05 statistically significant
CABG: Coronary bypass surgery, PCI: Percutaneous coronary intervention, AF: Atrial fibrillation, VT: Ventricular tachycardia, MI:Myocardial infarction, DVT: Deep vein thrombosis, PE: Pulmonary embolism, SD: Standard deviation

Overall, lactate levels ≥2.25 mmol/L were strongly and significantly associated with short-term mortality, whereas no significant association was observed with intensive care unit length of stay or other early complications.

Table 5 presents the univariate and multivariable logistic regression analyses performed to identify factors associated with 1-month mortality. In the univariate analysis, lactate level (OR=1.53; 95% CI: 1.18-1.98; p=0.001), EF (OR=0.94; 95% CI: 0.90-0.98; p=0.009), fasting glucose level (OR=1.01; p=0.013), and WBC count (OR=1.25; 95% CI: 1.08-1.45; p=0.004) were significantly associated with mortality. Although age and creatinine levels approached statistical significance, hemoglobin and C-reactive protein (CRP) levels were not associated with mortality (Table 5).

In the multivariable logistic regression analysis adjusted for age, EF, creatinine, hemoglobin, fasting glucose, CRP, and WBC levels (Table 6), only lactate levels (OR=1.35; 95% CI: 1.04-1.76; p=0.023) and fasting glucose levels (OR=1.01; p=0.010) were identified as independent predictors of mortality. Age, EF, creatinine, hemoglobin, CRP, and WBC levels were not independently associated with mortality in the multivariable model. The model's -2 log likelihood was 67.047, and the Nagelkerke R^2 value was 0.416, indicating moderate-to-good explanatory ability for mortality (Table 6).

Table 5. Univariate binary logistic regression

Variables	OR	95% CL	Wald	p
Lactate	1.53	1.18-1.98	10.353	0.001
Age	1.05	0.99-1.12	2.746	0.097
EF	0.94	0.90-0.98	6.904	0.009
Creatinine	2.64	0.83-8.34	2.720	0.099
Haemoglobin	0.94	0.74-1.19	0.277	0.599
Glucose	1.01	1.00-1.01	6.192	0.013
C-reactive protein	1.00	0.99-1.02	0.106	0.745
White blood cell	1.25	1.08-1.45	8.505	0.004

OR: Odds ratio, EF: Ejection fraction, CL: Confidence limit

Table 6. Multivariable binary logistic regression

Variables	Adjusted OR	95% CL	Wald	p
Lactate	1.35	1.04-1.76	5.200	0.023
Age	1.08	0.97-1.20	2.005	0.157
EF	0.97	0.91-1.02	1.489	0.222
Creatinine	2.06	0.53-8.04	1.088	0.297
Haemoglobin	0.89	0.64-1.23	0.536	0.464
Glucose	1.01	1.00-1.01	6.627	0.010
C-reactive protein	0.99	0.97-1.02	0.201	0.654
White blood cell	1.12	0.91-1.38	1.216	0.270

-2 Log Likelihood: 67,047, Nagelkerke R^2:0,416, OR: Odds ratio, EF: Ejection fraction, CL: Confidence limit

DISCUSSION

Although no significant associations were observed between elevated lactate levels and intensive care unit length of stay, contrast-induced nephropathy, recurrent events, deep vein thrombosis/pulmonary embolism, cerebrovascular events, gastrointestinal bleeding, or genitourinary bleeding, a significant association was found with 1-month mortality.

Lactate is a metabolite produced through anaerobic metabolism and is easily measured in the blood.[9] Blood lactate levels increase in conditions associated with tissue hypoxia and impaired perfusion. The most well-known causes of elevated blood lactate levels are sepsis and septic shock; however, other recognized causes include severe trauma, traumatic brain injury, severe asthma attacks, liver failure, and kidney failure.[5,9,10] More than simply an indicator of hypoxia, lactate may reflect the overall hemodynamic burden and systemic stress response in elderly patients with ACS. During acute myocardial ischemia, impaired coronary perfusion can lead to localized anaerobic metabolism, reduced cardiac output, microcirculatory dysfunction, and sympathetic overactivation.

Lactate is also used to monitor cardiovascular diseases. In MI, the anaerobic pathway is accelerated because of coronary stenosis, resulting in increased lactate production.[11,12] Various studies have investigated lactate monitoring in patients with MI complicated by cardiogenic shock. These studies have shown that lactate monitoring provides valuable information for predicting patient prognosis. An initial lactate level above 2.0 mmol/L has been associated with a poor prognosis, whereas a lactate level below 3.1 mmol/L at 8 hours has been associated with a favorable prognosis.[13-15] In patients with MI without advanced heart failure, lactate levels above 2.5 mmol/L have also been associated with a poor prognosis.[12]

When studies involving the elderly population are examined, a study of older patients admitted to the emergency department reported an association between elevated lactate levels and short-term mortality regardless of infection, with lower mortality observed in patients with lactate levels below 2 mmol/L.[16] Similarly, a study evaluating early mortality after hip fracture in patients aged ≥65 years found that mortality was higher among patients with lactate levels above 2 mmol/L.[17] In the present study, the lactate cut-off value associated with mortality in elderly patients with NSTEMI was 2.25 mmol/L. Notably, lactate remained independently associated with 1-month mortality after adjustment for age, EF, creatinine, hemoglobin, glucose, CRP, and WBC count in the multivariable analysis, supporting its validity as a prognostic marker in this population.

In our study, no significant association was observed between lactate levels and events that may occur after angiography or MI. This finding may be explained by the fact that the study population consisted of frail elderly patients with preexisting cardiovascular disease who routinely received intravenous fluid support after MI to reduce the risk of contrast-induced nephropathy.

Interestingly, lactate did not demonstrate significant discriminatory ability in patients aged ≥85 years. The relatively small sample size in this subgroup may have reduced the statistical power; however, biological and clinical factors may also have contributed to this finding. Patients in this age group are often frailer, have multiple comorbidities, receive multiple medications, and have reduced physiological reserve. All of these factors can influence lactate metabolism and mortality independently of acute ischemic coronary events. Furthermore, non-cardiovascular causes of death are more common in the oldest patients, which may have reduced the prognostic specificity of admission lactate levels for cardiovascular outcomes. Therefore, although admission lactate appears to be a useful marker in patients aged 65-84 years, its prognostic performance in patients aged ≥85 years should be interpreted with caution and validated in larger prospective studies specifically designed for this age group.

Admission lactate levels should be considered an easily obtainable adjunctive biomarker rather than a replacement for established risk stratification tools. Because lactate testing is inexpensive, rapidly available, and routinely performed in emergency departments, it may help identify elderly patients with NSTEMI who are at increased short-term risk before a comprehensive clinical evaluation is completed. However, its prognostic value should ideally be interpreted in conjunction with established clinical, laboratory, and angiographic findings rather than in isolation.

Study Limitations

The primary limitation of our study is that only admission lactate levels were available for analysis. Previous studies have shown that, in patients with acute MI and cardiogenic shock, serial lactate measurements and lactate clearance at 6-8 hours provide stronger prognostic information than a single measurement. SYNTAX and Gensini scores were not calculated from the patients' CAG findings. In addition, validated ACS risk scores, such as GRACE and TIMI, as well as Killip class and frailty assessments, were not routinely available in our retrospective database. As a result, we were unable to assess the incremental prognostic value of lactate beyond these established risk stratification tools. Another limitation is that the relatively small sample size and single-center design may limit the generalizability of our findings. In addition, detailed information on the causes of death was unavailable. Because mortality was assessed as all-cause mortality, we were unable to distinguish among cardiac, non-cardiac, and procedure-related deaths. Consequently, the observed association between admission lactate levels and mortality should be interpreted as reflecting overall short-term mortality rather than specifically cardiovascular mortality.

CONCLUSION

Admission lactate levels were significantly associated with 1-month mortality in elderly patients with NSTEMI. Although lactate appears to have potential value for early prognostic assessment, its role should be interpreted with caution because of the retrospective, single-center design of the study. Larger prospective studies are needed to validate these findings.

Ethics Committee Approval: The ethics committee approval was obtained by Gaziantep City Hospital Non-Interventional Clinical Research Ethics Committee at its meeting numbered 2026/27, decision number 444/2026 and dated: 18.02.2026.

Informed Consent: Due to the retrospective design of the study, written informed consent was not obtained from the patients.

Authorship Contributions: Concept: E.P., Design: E.P., Data Collection or Processing: E.P., Ş.Ç., Analysis or Interpretation: E.P., Literature Search: E.P., Writing: E.P.

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REFERENCES

1. Collet JP, Thiele H, Barbato E, et al. 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *Eur Heart J*. 2021;42:1289-1367.
2. Chang SS, Lu CR, Chen KW, et al. Prognosis between ST-elevation and non-ST-elevation myocardial nfarction in older adult patients. *Front Cardiovasc Med*. 2022;8:749072.
3. Allen LA, O'Donnell CJ, Camargo CA Jr, Giugliano RP, Lloyd-Jones DM. Comparison of long-term mortality across the spectrum of acute coronary syndromes. *Am Heart J*. 2006;151:1065-1071.
4. Ren L, Ye H, Wang P, Cui Y, Cao S, Lv S. Comparison of long-term mortality of acute ST-segment elevation myocardial infarction and non-ST-segment elevation acute coronary syndrome patients after percutaneous coronary intervention. *Int J Clin Exp Med*. 2014;7:5588-5592.
5. Proia P, Di Liegro CM, Schiera G, Fricano A, Di Liegro I. Lactate as a metabolite and a regulator in the central nervous system. *Int J Mol Sci*. 2016;17:1450.
6. de Souza DC, Jabornisky R, Kissoon N. Utility of lactate levels in the diagnosis and prognosis of septic shock. *Pediatr Emerg Care*. 2024;40:736-745.
7. Jansen TC, van Bommel J, Schoonderbeek FJ, et al. Early lactate-guided therapy in intensive care unit patients: a multicenter, open-label, randomized controlled trial. *Am J Respir Crit Care Med*. 2010;182:752-761.
8. Gür A, Ulutaş Z, Turgut K, Güven T, Yücel N, Ermiş N. The effect of lactate levels on prognosis in patients with ST-segment elevation myocardial infarction. *Ann Med Res*. 2020;27:1924-1929.
9. Lewis CT, Naumann DN, Crombie N, Midwinter MJ. Prehospital point-of-care lactate following trauma: A systematic review. *J Trauma Acute Care Surg*. 2016;8:748-755.
10. Li H, Ren Q, Shi M, Ma L, Fu P. Lactate metabolism and acute kidney injury. *Chin Med J (Engl)*. 2025;138:916-924.
11. Ouyang J, Wang H, Huang J. The role of lactate in cardiovascular diseases. *Cell Commun Signal*. 2023;21:317.
12. Mavrić Z, Zaputović L, Zagar D, Matana A, Smokvina D. Usefulness of blood lactate as a predictor of shock development in acute myocardial infarction. *Am J Cardiol*. 1991;67:565-568.
13. Rossini R, Ferlini M. Arterial lactate assessment in cardiogenic shock: it is high time to beat the clock. JACC. *Cardiovasc Interv*. 2020;13:2217-2219.
14. Thiele H, Zeymer U, Neumann FJ, et al. Intraaortic balloon support for myocardial infarction with cardiogenic shock. *N Engl J Med*. 2012;367:1287-1296.
15. Fuernau G, Desch S, de Waha-Thiele S, et al. Arterial lactate in cardiogenic shock: prognostic value of clearance versus single values. JACC *Cardiovasc Interv*. 2020;13:2208-2216.

16. del Portal DA, Shofer F, Mikkelsen ME, et al. Emergency department lactate is associated with mortality in older adults admitted with and without infections. *Acad Emerg Med*. 2010;17:260-268.

17. Olcay HÖ, Emektar E, Öztürk ZS, Akkan S, Çevik Y. Association of serum lactate levels measured in the emergency department with 30-day mortality in older patients with unilateral hip fractures. *Ann Geriatr Med Res*. 2024;28:301-306.