European Journal of Therapeutics
pISSN: 2564-7784
eISSN: 2564-7040

Eur J Ther. 2026;32(5):531–540.
https://doi.org/10.58600/eurjther3033

Original Research

Association of Monocyte/HDL and Neutrophil/Lymphocyte Ratios with SYNTAX II Scores in Emergency Department STEMI Patients

Fulya Keskin Elmas [1 *], Hakan Oğuztürk [2,3], Habibe Selmin Özensoy [2], Safa Dönmez [2,3], Gülhan Kurtoğlu Çelik [2,4], Atik Aksoy [5], Ömer Faruk Tamer [5]

[1] Department of Emergency Medicine, Kara Mustafa Paşa State Hospital, Merzifon, Türkiye
[2] Department of Emergency Medicine, Ankara Bilkent City Hospital, Ankara, Türkiye
[3] Department of Emergency Medicine, Health Science University Faculty of Medicine, Ankara, Türkiye
[4] Department of Emergency Medicine, Yıldırım Beyazıt University Faculty of Medicine, Ankara, Türkiye
[5] Department of Cardiology, Ankara Bilkent City Hospital, Ankara, Türkiye

Received: 2026-01-20 **Accepted:** 2026-04-26 **Published Online:** 2026-05-15

Corresponding Author
Fulya Keskin Elmas, MD
Address: Department of Emergency Medicine, Kara Mustafa Paşa State Hospital, Merzifon, Türkiye
E-mail: fulya005@gmail.com

© 2026. The copyright of this article is retained by the author(s).

OPEN ACCESS

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

This license permits the free sharing and adaptation of the work for non-commercial purposes, provided that appropriate attribution is given to the original author(s) and to its initial publication in this journal.

ABSTRACT

Objective: Coronary artery disease (CAD) is a leading cause of morbidity and mortality and may present as ST-segment elevation myocardial infarction (STEMI) in emergency departments. This study aimed to evaluate the relationship between inflammation and oxidative stress markers-monocyte/High-Density Lipoprotein Ratio (MHR) and Neutrophil/Lymphocyte Ratio (NLR) and the SYNTAX II score, a validated indicator of CAD complexity and prognosis in STEMI patients.

Methods: Our study was conducted retrospectively as a cross-sectional study including 342 patients aged 18 years and older who were diagnosed with ST-elevation myocardial infarction (STEMI) based on electrocardiographic findings and underwent angiography at the Emergency Medicine Clinic of Ankara Bilkent City Hospital between July 1, 2022, and July 1, 2023, either via the 112 ambulance system or as outpatients. Laboratory test results obtained within the first 24 hours after admission and before angiography were used. Angiography images were obtained from the Hospital Information Management System and interpreted by cardiologists. The Syntax score was calculated by cardiologists using an online calculator, and the data was recorded. The Syntax II score was calculated by us using an online calculator by adding the Syntax score and additional patient-related parameters.

Results: Of the cohort, 83.3% (n=285) were male, with a mean age of 57.16 years. Elevated SYNTAX II scores were significantly associated with age ($p<0.001$), smoking ($p=0.011$), diabetes ($p=0.014$), hypertension ($p<0.001$), COPD ($p<0.001$), and cerebrovascular disease ($p=0.015$). Higher scores also correlated with increased 30-day mortality ($p=0.007$). NLR values demonstrated a significant positive correlation with SYNTAX II scores ($p=0.035$). MHR was associated with recurrent emergency admissions within six months ($p=0.048$) but not directly with SYNTAX II.

Conclusion: NLR may be a cost-effective and straightforward marker for assessing CAD complexity in STEMI patients in emergency settings. However, the prognostic role of MHR remains inconclusive and warrants further prospective validation.

Keywords: acute coronary syndrome, emergency department, monocyte/high-density lipoprotein ratio (MHR), neutrophil/lymphocyte ratio (NLR), syntax score

INTRODUCTION

Cardiovascular diseases (CVD) are non-communicable yet preventable conditions that pose a significant threat to public health globally. According to the World Health Organization (WHO), the number of deaths from CVD worldwide reached 17.9 million in 2019 [1]. Acute coronary syndrome (ACS) is a clinical condition that triggers ischemia (reduced blood flow) in the myocardial tissue, typically caused by atherosclerosis (hardening of the arteries) [2,3]. The traditional classification of acute myocardial infarction (AMI) is based on the presence or absence of persistent ST-segment elevation on the electrocardiogram (ECG), distinguishing between ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction (NSTEMI). Despite differing ECG presentations, both conditions share the same pathophysiological foundation and are usually caused by acute thrombosis in the coronary atherosclerotic plaq [4].

Main Points

- In this study, the relationship between coronary artery disease (CAD) complexity and inflammatory and oxidative stress markers neutrophil/lymphocyte ratio (NLR) and monocyte/high-density lipoprotein ratio (MHR) evaluated using the SYNTAX II score in patients with ST-elevation myocardial infarction (STEMI) was examined.
- NLR showed a positive correlation with higher SYNTAX II scores, suggesting that it may be a simple and cost-effective marker for assessing CAD severity in acute clinical settings.
- Although MHR showed no significant relationship with the SYNTAX II score, it was found to be associated with recurrent emergency department visits within six months.
- Elevated SYNTAX II scores were associated with advanced age, smoking, diabetes mellitus, hypertension, chronic obstructive pulmonary disease, cerebrovascular disease, and increased 30-day mortality.
- Although NLR appears promising from a prognostic standpoint, prospective studies are needed to more clearly establish the role of MHR in the assessment of CAD.

The monocyte/HDL ratio (MHR) can indicate inflammation and oxidative stress. Additionally, it is associated with the presence and prognosis of cardiovascular diseases and can be used to predict the risk and severity of atherosclerosis in STEMI [5]. The neutrophil/lymphocyte ratio (NLR) can be interpreted as a relative indicator of the host's immune response capacity. Various studies have used it alongside other inflammatory markers, and it has been identified as an indicator of inflammatory status [6]. NLR is useful in predicting mortality in coronary artery disease [7]. NLR, especially with cardiac markers and scoring systems, holds promise in diagnosing and prognosis [8].

Coronary angiography (CAG) remains the gold standard for diagnosing and treating coronary artery diseases (CAD). Consequently, some scoring systems based on angiographic images have been developed. The Syntax II (SYNergy between PCI with TAXUS and Cardiac Surgery) score evaluates the severity [9].

Given the pivotal role of inflammation in the pathogenesis and progression of STEMI, there is a growing interest in identifying rapid, accessible biomarkers that reflect disease severity and aid early risk stratification in the emergency department (ED). Among these, MHR and NLR have emerged as promising indices of systemic inflammation and oxidative stress. The SYNTAX II score, widely used to assess CAD complexity, provides an opportunity to evaluate the clinical relevance of these hematological indices. However, data on their relationship in STEMI patients are scarce. Therefore, this study aimed to explore the associations between NLR, MHR, and SYNTAX II scores in patients presenting to the ED with STEMI. We hypothesize that these readily available biomarkers could support early risk assessment and potentially enhance clinical decision-making in acute coronary.

MATERIALS AND METHODS

Study Design and Population

This study was designed as a retrospective, single-center investigation. The hospital where the study was conducted is equipped to perform coronary angiography 24/7 and can receive transfers from surrounding provinces and districts via air and ground ambulance. Patients aged 18 and over diagnosed with STEMI via ECG and who underwent angiography in a tertiary care hospital's ED between July 1, 2022, and July 1, 2023, were included. Patient information was obtained by the hospital information technology department after ethics committee

approval. Patients' personal information was kept confidential. Data was recorded on the data form. Cardiologists calculated the SYNTAX II score.

Ethical Statement

Before the study, ethical approval was obtained from the Clinical Research Ethics Committee of Ankara Bilkent City Hospital (Decision No: E2-23-4585, Date: 2023-07-19). The researchers conducted the study under the Declaration of Helsinki. Since the study was retrospective, the patients did not obtain informed consent forms.

Exclusion Criteria

Patients with NSTEMI or unstable angina pectoris (USAP), those who had previously undergone coronary artery bypass grafting (CABG), patients with coronary angiography (CAG) and stent placement, those who had heart valve surgery, patients with congenital cardiac anomalies, pregnant women, and those whose data were inaccessible were excluded from the study.

Data Collection

The Monocyte-to-HDL cholesterol (MHR) and Neutrophil-to-Lymphocyte Ratio (NLR) were calculated using biochemical parameters obtained within the first 24 hours following hospital admission. Coronary angiographic images were retrieved from the Hospital Information Management System and evaluated by a single experienced cardiologist for the calculation of SYNTAX II scores.

Scoring System

Syntax II Score: The SYNTAX II score combines the anatomical SYNTAX angiographic score with clinical factors to aid the heart team in making objective decisions between CABG and PCI based on long-term prognosis. It is designed to triage patients with multivessel disease [9].

Score Calculation

Cardiologists calculated each patient's Syntax II score using the online Syntax score calculator (https://www.syntaxscore.org/calculator/start.htm). The results were recorded on patient forms.

Data Selection

A data collection form was created for the patients. Blood test results, coronary angiography reports, and images were reviewed and obtained from the Hospital Information Management System. The following patient information was noted: age, gender, STEMI subgroups, smoking status, comorbidities, monocyte count, HDL level, white blood cell (WBC) count, NLR, 30-day mortality, and whether there was a repeat ED visit within six months.

Statistical Analyses

Data entry and statistical analysis were performed using SPSS 25.0 software. Initially, parameters to be compared were evaluated as nominal, dichotomous, ordinal, or numerical. The decision to use parametric or non-parametric tests for numerical data was based on the normality of distribution. Normality was assessed using histograms, Q-Q plots, and the Shapiro-Wilk test. For the resulting p-value, <0.050 was considered statistically significant. Means and 95% confidence intervals were provided for normally distributed data. Medians (25-75%) were reported for non-normally distributed numerical data. For other nominal, dichotomous, or categorical data, non-parametric tests such as Chi-square, McNemar, Fisher's exact test, Cochran's Q, or Marginal homogeneity tests were chosen and applied based on the number of groups and whether the data were dependent or independent. The reference value for the Syntax II score was taken as the median value of 29.05.

RESULTS

A total of 973 patients who presented to the emergency department (ED) and underwent coronary angiography between July 1, 2022, and July 1, 2023, were initially screened. After applying exclusion criteria, 342 patients diagnosed with STEMI were included in the final analysis (Figure 1).

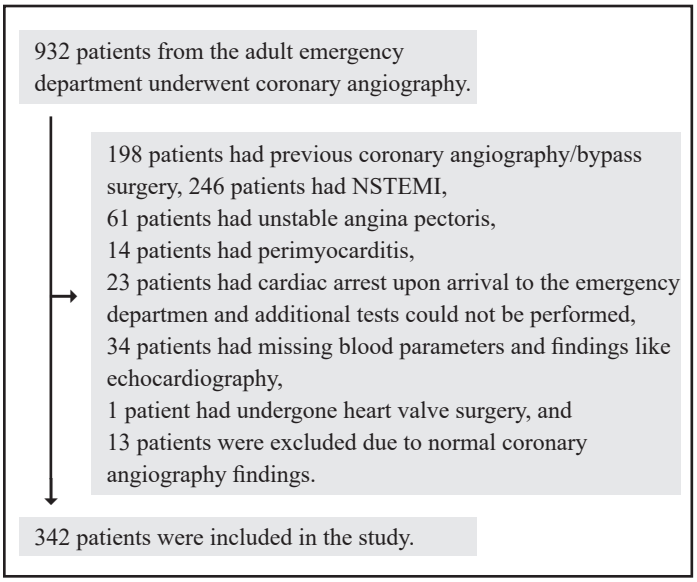

Figure 1. Flow chart of patients included in the study

Patient Characteristics

Among the study population, 83.3% (n = 285) were male and 16.7% (n = 57) were female. The mean age was 58.7 ± 11.6 years. The mean Syntax II score was 30.74 ± 11.52, and the median (range 25-75%) was 29.05 (21.125-38.4). The reference value for the Syntax II score was taken as the median value of 29.05. Syntax II scores ≤ 29.05 were considered low, and Syntax II scores > 29.05 were considered high. The mean Monocyte/HDL ratio (MHR) was 0.014 ± 0.008, and the mean Neutrophil/Lymphocyte ratio (NLR) was 8.16 ± 7.12 (Table 1).

Comparison Based on SYNTAX II Score

A significantly higher proportion of female patients were in the high SYNTAX II score group (84.2%) compared to the low score group (15.8%) ($p < 0.001$). The high-score group was significantly older (mean: 64.2 ± 11.3 vs. 53.2 ± 9.2 years, $p < 0.001$). Comorbidities, including diabetes mellitus ($p = 0.014$), hypertension ($p < 0.001$), chronic obstructive pulmonary disease ($p < 0.001$), and cerebrovascular disease ($p = 0.015$), were more prevalent in patients with higher scores. Interestingly, current smoking was more common in the low-score group ($p=0.011$) (Table 2).

Laboratory analysis revealed that patients with higher SYNTAX II scores had significantly lower hemoglobin and glomerular filtration rate (GFR) levels (both $p < 0.001$) and substantially higher urea, creatinine, troponin, and HDL cholesterol levels (all $p < 0.001$) (Table 3).

Associations with Mortality and ED Revisit

All patients who died within 30 days (n = 8) were in the high SYNTAX II score group ($p = 0.007$). The median SYNTAX II score among deceased patients was 49.95 compared to 28.6 in survivors ($p < 0.001$). However, there were no statistically significant differences in NLR ($p = 0.606$) or MHR ($p = 0.909$) between those who died and those who survived (Table 4). No significant association was observed between the SYNTAX II score and repeat ED visits within six months ($p = 0.879$) (Table 4).

Relationship Between NLR, MHR, and SYNTAX II Score

Patients in the high SYNTAX II score group had significantly higher NLR values (8.04 ± 4.6) compared to those in the low score group (7.07 ± 3.68; $p = 0.035$). In contrast, MHR values did not differ significantly between the two groups ($p = 0.308$) (Table 4).

Emergency Department Revisit Analysis

There was no significant difference in SYNTAX II or NLR values between patients who revisited the ED within six months and those who did not ($p = 0.833$ and $p = 0.671$, respectively). However, patients who revisited had significantly higher MHR values (0.0145 vs. 0.0125; $p = 0.048$) (Table 4).

DISCUSSION

The monocyte/HDL ratio (MHR) and neutrophil/lymphocyte ratio (NLR) are contemporary biomarkers used to indicate inflammation and oxidative stress. They have been investigated in relation to the presence and prognosis of cardiovascular diseases [4,7]. Our study emphasizes the significance of potential connections between these two parameters and the Syntax II score, discussing them in the context of various variables and non-variable parameters.

Table 1. Distribution of Demographic and Clinical Variables in the Study Group

Variables		N (%)	Mean ± SD	Median (25–75%)
Sex	Male	285 (83.3)	-	-
	Female	57 (16.7)	-	-
Age	Total	-	58.71 ± 11.67	58.5 (51–66)
	Male	-	57.16 ± 10.86	57 (50–63)
	Female	-	66.49 ± 12.57	68 (57.5–76.5)
Syntax II Score		-	30.74 ± 11.52	29.05 (21.125–38.4)
Monocyte / HDL Ratio		-	0.014 ± 0.008	0.01264 (0.00891–0.0169)
Neutrophil / Lymphocyte Ratio		-	8.16 ± 7.12	6.545 (4.647–9.935)
Syntax II Score ≤ 29.05		171 (50)	-	-
Syntax II Score > 29.05		171 (50)	-	-

Table 2. Baseline Clinical Characteristics According to Syntax II Score Groups

Variables		Syntax II Score ≤ 29.05	Syntax II Score > 29.05	p
		N (%)	N (%)	
Sex	Male	162 (56.8)	123 (43.2)	**<0.001†**
	Female	9 (15.8)	48 (84.2)	
Cigarette		83 (62.9)	49 (37.1)	**0.011†**
Diabetes Mellitus		35 (38.9)	55 (62)	**0.014†**
Hypertension		52 (38)	85 (62)	**<0.001†**
Hyperlipidemia		7 (46.7)	8 (53.3)	0.792†
Asthma		6 (54.5)	5 (45.5)	0.759†
COPD[a]		1 (6.7)	14 (93.3)	**<0.001†**
SVO[b]		0 (0)	7 (100)	**0.015‡**
Malignancy		6 (40)	9 (60)	0.428†
PAD[c]		0 (0)	5 (100)	0.061‡
Hypothyroidism		4 (30.8)	9 (69.2)	0.157†
Other		16 (33.3)	32 (66.7)	**0.013†**

† Pearson Chi Square test, ‡ Fisher Exact Test

[a]Chronic Obstructive Pulmonary Disease, [b]Cerebrovascular Disease, [c]Peripheral Artery Disease

Tablo 3. Comparison with Age, Laboratory parameters and Syntax II Score threshold value (29.05).

Variables	Syntax II Score ≤ 29.05		Syntax II Score > 29.05		p	95% CI
	Mean ± SD	Median (25-75%)	Mean ± SD	Median (25-75%)		
Age, years	54 (47–60)	53.24 ± 9.22	63 (57–71)	64.19 ± 11.31	**<0.001†**	**(-13.14 – -8.75)** †
HDL	38.67 ± 8.31	38 (33–43)	42.19 ± 10.44	42 (35–48)	**<0.001***	(-5.53 – -1.51)
Monocyte / HDL Ratio	0.0128 ± 0.0047	0.0125 (0.00957–0.01516)	0.0122 ± 0.0055	0.01173 (0.00794–0.01625)	0.308*	-0.0023
Neutrophil / Lymphocyte Ratio	7.07 ± 3.68	6.115 (4.285–8.835)	8.04 ± 4.6	6.715 (4.9–10.2275)	**0.035***	(-1.848– -0.067)

* Mann-Whitney *U* test; Median(25-75%), †Independent Sample T-test; Mean ± SD, -NLR: There was 1 outlier value in the group with a Syntax II Score ≤ 29.05 and 3 outliers in the other group, disrupting the distribution. These values were excluded from the study.

-MHO: There were 16 extreme values in the group with Syntax II Score ≤ 29.05 and 11 in the other group, which disrupted the distribution. These values were excluded from the study.

Table 4. According to Patients' 30-day Mortality and Re-admission to the Emergency Department within six months, Comparison of Syntax II Score, Monocyte/HDL Ratio and Neutrophil/Lymphocyte Ratio with

Variables	30-day mortality			Re-admission to the emergency department within 6 months		
	Yes	No	P	Yes	No	p
	Median (25-75%)	Median (25-75%)		Median (25-75%)	Median (25-75%)	
Syntax II Score	49.95 (46.75-60.725)	28.6 (20.9-37.675)	**<0.001**	29.3 (20.1-42.5)	29 (21.5-38.1)	0.833
Monocyte / HDL Ratio	0.01073 (0.00879-0.02736)	0.01269 (0.00891-0.0169)	0.909	0.0145 (0.01-0.01919)	0.0125 (0.00868-0.01656)	**0.048**
Neutrophil / Lymphocyte Ratio	6.615 (2.35-9.972)	6.545 (4.677-9.935)	0.606	6.5 (4.37-9.46)	6.7 (4.75-9.95)	0.671

Mann-Whitney *U* test; Median (25-75%)

In a study by Thrane et al. [10] on STEMI, which included 19,613 patients, 74% were male. Similarly, Fabris et al. [11] reported that among 2,425 STEMI patients, the average age was 66 ± 12.5 years, and 74.3% were male. Male gender is a standalone risk factor for developing coronary artery disease (CAD), consistently identified as a significant risk factor in many studies [12,13]. Our study yielded similar results.

Studies on the Syntax II score have found a higher proportion of women in groups with higher Syntax scores [8,12,13]. While our study observed a higher overall proportion of male patients, the higher Syntax II score group had a higher proportion of female patients, aligning with other studies. This suggests that women with severe STEMI are more prevalent. Although women have a lower incidence of CAD, it tends to be more complicated when it occurs, necessitating careful examination. In contrast, Salvatore et al. [14] found no significant gender differences between high and low Syntax II score groups, with a higher percentage of males in both groups. This discrepancy could be due to differences in sample sizes and associated risk factors.

Nurkoç's study on CAD found significant associations between high Syntax II scores and the presence of DM, smoking, and HT [14]. Other studies on STEMI also reported significant associations between high Syntax II scores and DM, HT, COPD, PAH, and smoking [15]. Our study, consistent with the literature, found significant associations between COPD and CVD with the Syntax II score. DM and HT are significant risk factors for CAD and are often linked with more extensive coronary lesions. Many studies have found associations between DM and HT presence and higher Syntax scores, similar to our study. However, unlike the literature, we found that non-smokers had higher Syntax II scores. While smoking is a significant risk factor for CAD development [16], this does not imply that non-smokers have less complex coronary lesions. The literature does include studies showing significant associations between smoking and Syntax scores. More research and analysis on the relationship between smoking and Syntax scores are needed.

Nurkoç's study on CAD did not find significant differences in monocyte, HDL, LDL, or TG levels between high and low Syntax II score groups [14]. Other studies on HDL have also shown inconsistent results. Yesin et al.'s [17] study on STEMI reported significant differences in LDL, HDL, and GFR between high and low Syntax II score groups. In our study, we found that patients with higher HDL levels also had higher Syntax scores, which could be attributed to regional differences and lifestyle factors. Numerous studies on these multiple parameters show varied results.

Various studies in the literature indicate that MHR and NLR can be significant for both the severity of CAD and mortality. Aydın et al.'s [18] study found a weak correlation between Grace score and NLR, with significant differences in hospital mortality rates between low NLR and other groups. Soylu et al. [19] suggested that low NLR could predict lower in-hospital mortality in NSTEMI patients. Açıkgöz et al. [20] found that MHR was an independent predictor of hospital mortality, long-term mortality, and major adverse cardiac events in STEMI patients. Güçlü et al. [21] found that NLR and MHR did not independently predict mortality in NSTEMI patients. Caimi et al. [22] reported no significant connection between NLR and mortality in ACS patients. Similarly, our study did not find significant statistical associations between MHR, NLR, and mortality.

Beydilli et al. [23] found significantly elevated NLR in ACS patients. Kurtul et al. [24] demonstrated that NLR was independently associated with the severity of CAD in NSTEMI patients and found a significant correlation between Syntax score and NLR. Ji et al.'s [25] study found both MLR (monocyte/lymphocyte ratio) and NLR to be independent risk factors for CAD and determinants of lesion severity, with positive correlations with the Syntax score. However, unlike our study, Rostami et al. [26] did not find a significant connection between NLR and the Syntax score. The literature generally supports a correlation between NLR and the severity of CAD, and we found a significant relationship between NLR and the Syntax II score. We propose that NLR, a low-cost and universal marker, could be used for risk stratification in CAD patients. However, further studies are needed to determine its predictive value for mortality and 6-month ED revisits.

Numerous studies have shown that the monocyte/HDL ratio correlates with CAD severity. Çağdaş et al. [27] found a strong correlation between MHR, NLR, and the Syntax II score. We anticipated a relationship between MHR and CAD severity, as evaluated using the Syntax II scoring system. However, our study did not find a significant relationship between MHR and the Syntax II score. Our data cast doubt on the utility of MHR for assessing STEMI severity and extent, which does not support our initial hypothesis. One reason could be the heterogeneity of circulating monocytes, which have different

inflammatory potentials, meaning monocyte counts may not fully reflect their activation status. Another reason could be related to HDL subtypes, whose anti-atherogenic properties vary, and it is unclear which subtypes dominate. Our study used a simple MHR without evaluating HDL subtypes or monocyte subtypes. We also could not compare patients on statins with those not on statins to account for HDL effects. Our findings did not support the hypothesis that elevated MHR is associated with STEMI severity and extent. The lack of data on monocyte subtypes and HDL subtypes is a significant limitation of this study. Future research should include these data and control for unmeasured environmental factors that could influence observed relationships. The patient population or sample group may have unique characteristics different from the general population. Factors like age, gender, ethnicity, and other genetic and environmental variables might affect the relationship between the Syntax score and MHR. Xu et al. [28] found that MHR predicted high Syntax scores only in men, with no link found in women. Sucato et al. [29] observed higher average MHR values in South Asian patients compared to Caucasians. These studies support our view that MHR is influenced by various factors. Similar to our study, Li et al. [30] found no significant relationship between MHR and the Syntax score. Large multicenter studies are needed to explore the relationship between MHR and CAD, including scope and outcome prediction. Although our study did not find MHR significant for mortality and STEMI severity, we found it useful for predicting 6-month ED revisits.

Limitions

One limitation of our study is its single-center and retrospective nature. Environmental factors that could influence our parameters, such as exercise and dietary habits, were not investigated, restricting our study. Our study included only STEMI patients, making it inapplicable to all ACS patients. Given the retrospective design and the single-center setting, the findings may have limited generalizability and should be interpreted with caution. The calculation of the Syntax II score is based on the interpretation of coronary angiography images by cardiologists, with some parameters relying on subjective and visual estimates, which could affect our results.

CONCLUSIONS

Our study found a statistically significant relationship between the NLR and Syntax II score, suggesting that NLR can be used as a simple, inexpensive, and easy marker to predict the severity of STEMI. However, the MHR was not statistically significant about the Syntax II score, indicating the need for additional studies to evaluate its utility in predicting CAD severity and mortality. Conversely, the Syntax II score proved to be a valid indicator of mortality and prognosis. In conclusion, while NLR is useful for predicting CAD severity and the Syntax II score is valid for assessing mortality and prognosis, further research is needed to determine the utility of MHR in these contexts.

Funding: This research received no external funding.

Conflict of Interest: The authors declare that they have no conflicts of interest.

Informed Consent: Informed consent was waived due to the retrospective nature of the study.

Ethical Approval: Prior to the study, ethical committee approval was obtained from the Ankara Bilkent City Hospital Clinical Research Ethics Committee (Decision No: E2-23-4585, Date: 2023-07-19).

Author Contributions:

Conception: K.E,F; O,H; Ö,H.S
Design: K.Ç,G; D,S; K.E,F
Supervision: O,H; K.Ç,G; D,S
Data Collection and/or Processing: T,Ö.F; A,A; K.E,F
Analysis and/or Interpretation: Ö,H.S; D,S; K.E,F;
Literature review: K.Ç,G; T,Ö.F; A,A
Writing: K.E,F; Ö,H.S
Critical Review: O,H; Ö,H.S

Data Availability Statement: Transparency and the reproducibility of results are key strengths in our research. However, to protect the confidentiality of our property, raw data is not publicly shared. Instead, the methodology and the amount of analysis are explained step-by-step. This allows researchers to apply our other methods and compare their own findings to our study.

Author Statement Regarding the Use of Artificial Intelligence-Enhanced Tools: The author describes the preparation process of this article in a limited comprehensive and usable manner using AI-assisted methods. All analyses, interpretations and conclusions are solely the authors' own. English language editing for this manuscript was performed using Grammarly software.

REFERENCES

[1] World Health Organization Available from https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1

[2] Makki N, Brennan TM, Girotra S (2015) Acute Coronary Syndrome. J Intensive Care Med. 30(4):186-200. https://doi.org/10.1177/0885066613503294

[3] Grech ED, Ramsdale DR (2003) Acute coronary syndrome: unstable angina and non-ST segment elevation myocardial infarction. BMJ. 326(7401):1259-61. https://doi.org/10.1136/bmj.326.7401.1259

[4] Mitsis A, Gragnano F (2021) Myocardial Infarction with and without ST-segment Elevation: a Contemporary Reappraisal of Similarities and Differences. Curr Cardiol Rev. 17(4):e230421189013. https://doi.org/10.2174/1573403X16999201210195702

[5] Cao J, Li R, He T, Zhang L, Liu H, Wu X (2023) Role of combined use of mean platelet volume-to-lymphocyte ratio and monocyte to high-density lipoprotein cholesterol ratio in predicting patients with acute myocardial infarction. J Cardiothorac Surg. 18(1):172. https://doi.org/10.1186/s13019-023-02268-4

[6] Gibson PH, Cuthbertson BH, Croal BL, Rae D, El-Shafei H, Gibson G, Jeffrey RR, Buchan KG, Hillis GS (2010) Usefulness of neutrophil/lymphocyte ratio as predictor of new-onset atrial fibrillation after coronary artery bypass grafting. Am J Cardiol. 105(2):186-91. https://doi.org/10.1016/j.amjcard.2009.09.007

[7] Sasmita BR, Zhu Y, Gan H, Hu X, Xue Y, Xiang Z, Huang B, Luo S (2021) Prognostic value of neutrophil-lymphocyte ratio in cardiogenic shock complicating acute myocardial infarction: A cohort study. Int J Clin Pract. 75(10):e14655. https://doi.org/10.1111/ijcp.14655

[8] Islam MM, Satıcı MO, Eroglu SE (2024) Unraveling the clinical significance and prognostic value of the neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte ratio, systemic immune-inflammation index, systemic inflammation response index, and delta neutrophil index: An extensive literature review. Turk J Emerg Med. 24(1):8-19. https://doi.org/10.4103/tjem.tjem_198_23

[9] Farooq V, Klaveren D, Steyerberg EW, Meliga E, Vergouwe Y, Chieffo A, Kappetein AP, Colomba A, Holmes DR, Mack M, Feldman T, Morice MC, Stahle E, Onuma Y, Morel M, Garcia HM, Anne van G, Dawkins KD, Mohr FW, Serruys PW (2013) Anatomical and clinical characteristics to guide decision making between coronary artery bypass surgery and percutaneous coronary intervention for individual patients: development and validation of SYNTAX score II. Lancet. 381(9867):639-50. https://doi.org/10.1016/S0140-6736(13)60108-7

[10] Thrane PG, Olesen KKW, Thim T, Gyldenkerne C, Mortensen MB, Kristensen SD, Maesng M (2023) Mortality Trends After Primary Percutaneous Coronary Intervention for ST-Segment Elevation Myocardial Infarction. J Am Coll Cardiol. 82(10):999-1010. https://doi.org/10.1016/j.jacc.2023.06.025

[11] Fabris E, Boldrin C, Gregorio C, Pezzato A, Gagno G, Giannini F, Perkan A, Sinagra G (2024) The Prognostic impact of treatments evolution in STEMI. Int J Cardiol. 394:131352. https://doi.org/10.1016/j.ijcard.2023.131352

[12] Kappert K, Böhm M, Schmieder R, Schumacher H, Teo K, Yusuf S, Sleight P, Unger T (2012) Impact of sex on cardiovascular outcome in patients at high cardiovascular risk: analysis of the Telmisartan Randomized Assessment Study in ACE-Intolerant Subjects With Cardiovascular Disease (Transcend) and the Ongoing Telmisartan Alone and in Combination With Ramipril Global End Point Trial (Ontarget). Circulation. 126(8):934-41. https://doi.org/10.1161/CIRCULATIONAHA.111.086660

[13] D'Agostino RB, Sr., Vasan RS, Pencina MJ, Wolf PA, Cobain M, Massaro JM, Kannel WB (2008) General cardiovascular risk profile for use in primary care: the Framingham Heart Study. Circulation. 117(6):743-53. https://doi.org/10.1161/CIRCULATIONAHA.107.699579

[14] Nurkoç SG (2023) Yüksek SYNTAX II skoru olan koroner arter hastalarında plazma aterojenik indeksinin rolü. Turk J Clin Lab 14(4):729-35. https://doi.org/10.18663/tjcl.1328053

[15] Rencuzogullari I, Çağdaş M, Karakoyun S, Karabağ Y, Yesin M, Gürsoy MO, Artaç I, İlis D, Efe SÇ, Tural K, Tanboğa IH (2018) Association of Syntax Score II with Contrast-induced Nephropathy and Hemodialysis Requirement in Patients with ST Segment Elevation Myocardial Infarction Undergoing Primary Percutaneous Coronary Intervention. Korean Circ J. 48(1):59-70. https://doi.org/10.4070/kcj.2017.0058

[16] Wilson K, Gibson N, Willan A, Cook D (2000) Effect of

smoking cessation on mortality after myocardial infarction: meta-analysis of cohort studies. Arch Intern Med. 160(7):939-44. https://doi.org/10.1001/archinte.160.7.939

[17] Yesin M, Çağdaş M, Kalçık M, Rencüzoğulları İ, Karabağ Y, Gürsoy MO, Karakoyun S (2018) The relationship between fragmented QRS complexes and syntax II scores in patients with ST-segment elevation myocardial infarction. J Electrocardiol. 51(5):825-9. https://doi.org/10.1016/j.jelectrocard.2018.06.008

[18] Aydın İE, Gökhan Ş, Şener A, Tanriverdi F, Günaydin GP, Çelik GK (2018) Akut Koroner Sendromlu Hastalarda Nötrofil/Lenfosit Oranı ve Monosit Sayımının Değerlendirilmesi. Ank. Med. J. 18(3):345-54. https://doi.org/10.17098/amj.461436

[19] Soylu K, Gedikli Ö, Dagasan G, Aydin E, Aksan G, Nar G, İnci S, Yılmaz Ö (2015) Neutrophil-to-lymphocyte ratio predicts coronary artery lesion complexity and mortality after non-ST-segment elevation acute coronary syndrome. Rev Port Cardiol. 34(7-8):465-71. https://doi.org/10.1016/j.repc.2015.01.013

[20] Açıkgöz SK, Açıkgöz E, Şensoy B, Topal S, Aydoğdu S (2016) Monocyte to high-density lipoprotein cholesterol ratio is predictive of in-hospital and five-year mortality in ST-segment elevation myocardial infarction. Cardiol J. 23(5):505-12. https://doi.org/ 10.5603/CJ.a2016.0026

[21] Guclu K, Celik M (2020) Prognostic Value of Inflammation Parameters in Patients With Non-ST Elevation Acute Coronary Syndromes. Angiology. 71(9):825-30. https://doi.org/ 10.1177/0003319720936500

[22] Caimi G, Lo Presti R, Canino B, Ferrera E, Hopps E (2016) Behaviour of the neutrophil to lymphocyte ratio in young subjects with acute myocardial infarction. Clin Hemorheol Microcirc. 62(3):239-47. https://doi.org/10.3233/CH-151968

[23] Beydilli I, Eren ŞH, Korkmaz İ, Kukul Güven FM, Oğuztürk H (2010) Akut Koroner Sendromlu Hastalarda Yüksek Duyarlıklı C-Reaktif Protein, Lökosit Düzeyleri ve Nötrofil/Lenfosit Oranının Önemi. 22(1):61-8.

[24] Kurtul S, Sarli B, Baktir AO, Demirbas M, Saglam H, Doğan Y, Sahin O, Akpek M, Odabas H, Arinc H, Kaya MG (2015) Neutrophil to lymphocyte ratio predicts SYNTAX score in patients with non-ST segment elevation myocardial infarction. Int Heart J. 56(1):18-21. https://doi.org/10.1536/ihj.14-175

[25] Ji H, Li Y, Fan Z, Zuo B, Jian X, Li L, Liu T (2017) Monocyte/lymphocyte ratio predicts the severity of coronary artery disease: a syntax score assessment. BMC Cardiovasc Disord. 17(1):90. https://doi.org/10.1186/s12872-017-0507-4

[26] Rostami A, Tajlil A, Separham A, Sohrabi B, Pourafkari L, Roshanravan N, Aslanabadi N, Ziaee M, Mashayekhi S, Ghaffari S (2021) Association between Neutrophil-to-Lymphocyte Ratio and the Systemic Inflammatory Immunologic Index and the Angiographic SYNTAX Score and the TIMI Flow Grade in Acute STEMI: A Cohort Study. J Tehran Heart Cent. 16(4):147-55. https://doi.org/10.18502/jthc.v16i4.8600

[27] Çağdaş M, Karakoyun S, Yesin M, Rencüzoğulları İ, Karabağ Y, Uluganyan M, Gürsoy MO, Artaç İ, İliş D, Atalay E, Çağdaş ÖS (2018) The Association between Monocyte HDL-C Ratio and SYNTAX Score and SYNTAX Score II in STEMI Patients Treated with Primary PCI. Acta Cardiol Sin. 34(1):23-30. https://doi.org/10.6515/ACS.201801_34(1).20170823A

[28] Xu W, Guan H, Gao D, Pan J, Wang Z, Alam M, Lian J, Zhou J (2019) Sex-specific association of monocyte count to high-density lipoprotein ratio with SYNTAX score in patients with suspected stable coronary artery disease. Medicine (Baltimore). 98(41):e17536. https://doi.org/10.1097/MD.0000000000017536

[29] Sucato V, Coppola G, Testa G, Amata F, Martello M, Siddique R, Galassi AR, Novo G, Corrado E (2021) Evaluation of remnant cholesterol levels and Monocyte-to-HDL-cholesterol ratio in South Asian patients with acute coronary syndrome. Nutr Metab Cardiovasc Dis. 31(7):2144-50. https://doi.org/10.1016/j.numecd.2021.04.007

[30] Li Q, Lin X, Bo X, Li F, Chen S, Miao X, Zhao D, Liu J, Fan Q (2023) Monocyte to high-density lipoprotein cholesterol ratio predicts poor outcomes in ischaemic heart failure patients combined with diabetes: a retrospective study. Eur J Med Res. 28(1):493. https://doi.org/10.1186/s40001-023-01451-6

How to Cite;

Keskin Elmas F, Oguzturk H, Ozensoy HS, Donmez S, Kurtoglu Celik G, Aksoy A, Tamer OF (2026) Association of Monocyte/HDL and Neutrophil/Lymphocyte Ratios with SYNTAX II Scores in Emergency Department STEMI Patients. Eur J Ther. 32(5):531–540. https://doi.org/10.58600/eurjther3033