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RESEARCH ARTICLE

Place of neutrophil/lymphocyte ratio and platelet/lymphocyte ratio in asthma and its exacerbations

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ABSTRACT

Place of neutrophil/lymphocyte ratio and platelet/lymphocyte ratio in asthma and its exacerbations

Introduction: *Asthma is a chronic respiratory condition marked by inflammation, which has a significant impact on an individual's quality of life. The present study aimed to evaluate the levels of the neutrophil-lymphocyte ratio (NLR) and platelet-lymphocyte ratio (PLR), which are indicators of systemic inflammation in asthma patients, and to investigate the relationship between these parameters and asthma control status, exacerbation frequency, and clinical features.*

Materials and Methods: *This prospective study was conducted on 170 patients diagnosed with asthma who were followed in our clinic between July 2022 and July 2023. Patient demographic data, Asthma Control Test (ACT) scores, pulmonary function tests, NLR, and PLR values were recorded.*

Results: *Asthma was detected to be uncontrolled in 96 of 170 patients, and NLR and PLR values were significantly higher in the uncontrolled asthma group (p= 0.001 and p= 0.005). During the exacerbation period, NLR and PLR levels increased significantly compared to the stable period. According to receiver operating characteristic analysis, the area under the curve for NLR was 0.911 and for PLR was 0.838 in predicting asthma exacerbation. A significant negative correlation was detected between NLR and PLR and ACT score (r= -0.532 and r= -0.456, respectively; p= 0.001). Univariate regression analysis conducted before multivariate analysis showed that NLR, PLR, ACT, FEV_1%, and FEV_1/FVC were significantly associated with asthma control (all p< 0.05).*

Conclusion: *Noninvasive and straightforward hematological inflammation markers, such as NLR and PLR, can be employed as effective and reliable tools to predict the level of asthma control and exacerbation status.*

Key words: *Asthma; uncontrolled asthma; NLR; PLR; exacerbation*

ÖZ

Astım ve alevlenmelerinde nötrofil/lenfosit oranı ve platelet/lenfosit oranının yeri

Giriş: *Astım, inflamasyonla karakterize, bireyin yaşam kalitesi üzerinde önemli etkileri bulunan kronik bir solunum yolu hastalığıdır. Bu çalışmada, astım hastalarında sistemik inflamasyon göstergeleri olan nötrofil/lenfosit oranı (NLO) ve trombosit/lenfosit oranı (TLO) düzeylerinin değerlendirilmesi ve bu parametrelerin astım kontrol durumu, alevlenme sıklığı ve klinik özelliklerle ilişkisinin araştırılması amaçlandı.*

Materyal ve Metod: *Bu prospektif çalışma, Temmuz 2022 ile Temmuz 2023 tarihleri arasında kliniğimizde izlenen ve astım tanısı alan 170 hasta üzerinde gerçekleştirildi. Hastaların demografik verileri, Astım Kontrol Testi (AKT) skorları, solunum fonksiyon testleri ile NLO ve TLO değerleri kaydedildi.*

Bulgular: *Yüz yetmiş hastanın 96'sında astımın kontrolsüz olduğu saptandı ve kontrolsüz astım grubunda NLO ve TLO değerleri anlamlı derecede daha yüksek bulundu (sırasıyla p= 0.001 ve p= 0.005). Alevlenme döneminde NLO ve TLO düzeyleri, stabil döneme kıyasla anlamlı olarak artış gösterdi. ROC analizine göre, astım alevlenmesini öngörmede NLO için AUC değeri 0.911, TLO için ise 0.838 olarak bulundu. NLO ve TLO ile AKT skoru arasında anlamlı negatif korelasyon saptandı (sırasıyla r= -0.532 ve r= -0.456; p= 0.001). Multivaryat analiz öncesinde yapılan univaryat regresyon analizinde, NLO, TLO, AKT ve %FEV_1 değerlerinin kontrollü astım ile güçlü şekilde ilişkili olduğu gösterildi (p< 0.05).*

Sonuç: *NLO ve TLO gibi noninvaziv ve kolay uygulanabilir hematolojik inflamasyon belirteçleri, astım kontrol düzeyinin ve alevlenme durumunun öngörülmesinde etkili ve güvenilir araçlar olarak kullanılabilir.*

Anahtar kelimeler: *Astım; kontrolsüz astım; NLO; TLO; alevlenme*

INTRODUCTION

Asthma is a persistent inflammatory disorder of the lungs, resulting in bronchoconstriction and excess mucus production triggered by various factors in the airways. Multiple factors contribute to the development of this inflammatory response (1). Asthma manifests with symptoms such as breathing difficulties and chest tightness, resulting from airway narrowing and inflammation; the frequency and severity of these symptoms may vary over time (2).

Asthma control is defined as the reduction or absence of asthma symptoms and clinical outcomes with treatment. When this control is achieved, the quality of life improves in the short term, and undesirable conditions, such as disease attacks, drug side effects, and loss of respiratory function, are prevented in the long term. Additionally, the Asthma Control Test (ACT) is often used to assess whether patients' asthma is under control (3).

Airway inflammation in asthma, although symptoms manifest as attacks, is persistent, and the relationship between asthma severity and the intensity of inflammation has not been definitively established. Various tests and methods exist to assess the characteristics of the disease in the diagnosis, monitoring, and treatment of asthma. However, most of these methods are invasive, time-consuming, complex, and costly. For this reason, efforts are underway to develop simpler, faster, and more easily applicable, noninvasive methods.

The neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR), which are based on complete blood counts, have become increasingly the focus of clinical and biological research, with studies on the effects of these parameters on various diseases and treatment processes rapidly increasing (4-6). A meta-analysis revealed a higher NLR in the peripheral circulation of asthma patients compared to the control group (7). In a previous study evaluating NLR and PLR in patients with exacerbations of chronic obstructive pulmonary disease (COPD), these indices were detected to be associated with airflow limitation, length of hospital stay, C-Reactive Protein (CRP) levels, and in-hospital mortality rates, and these ratios were suggested as potential biomarkers for predicting patient prognosis (8).

Although previous studies have investigated the association of NLR and PLR with asthma, evidence regarding their relationships with asthma control status, pulmonary function, exacerbation frequency, and within-patient changes between stable and exacerbation periods in a prospective cohort remains limited. In addition, the clinical utility of these inexpensive and readily available inflammatory markers for the integrated assessment of asthma control and exacerbation risk remains to be further clarified. In the present prospective study, we aimed to investigate the relationships of NLR and PLR with asthma control status assessed by the ACT, pulmonary function parameters, annual exacerbation frequency, and within-patient changes in these biomarkers between stable and exacerbation periods in patients with asthma.

MATERIALS and METHODS

Patients and study design

This prospective study was conducted with 170 patients with asthma who were followed at the Gazi University Department of Chest Diseases between July 2022 and July 2023. Approval for the study was received from the Gazi University Non-Interventional Clinical Research Ethics Committee on May 30, 2022, with decision number 398. The study was carried out following the ethical guidelines set out by the Declaration of Helsinki, with written informed consent obtained from all participants.

Inclusion Criteria

- Being aged 18 and over
- Being diagnosed with asthma according to the GINA Criteria
- Having a complete blood count checked at the time of admission
- Having signed the consent form

Exclusion Criteria

- Not meeting the inclusion criteria
- Not consenting to the procedure
- Having an infection focus
- Having started systemic steroid therapy before the CBC
- Having any chronic respiratory disease other than asthma
- Having rheumatological/hematological or systemic diseases characterized by chronic inflammation

Demographic data (age, sex), smoking status (never smoked, former smoker, active smoker), concomitant diseases [diabetes, hypertension, cardiovascular diseases, gastroesophageal reflux (GER), rhinosinusitis, nasal polyp, obstructive sleep apnea syndrome (OSAS), etc.], medication history, pulmonary function tests (FEV_1%, FVC% and FEV_1/FVC%, MMEF%), prick test results, total IgE level, drug and food allergy status, presence of hypoxia, number of asthma attacks in the last year, and hospitalization history of patients were recorded in the patient record form.

In the present study, patients diagnosed with asthma according to the Global Initiative for Asthma (GINA) criteria were divided into two groups: those with controlled asthma and those with uncontrolled asthma (9). Asthma control was assessed using GINA criteria and ACT. Based on ACT, patients were classified as complete control (ACT >20) and uncontrolled asthma (9). Asthma exacerbation was defined according to the GINA guidelines as an acute clinical condition requiring systemic corticosteroid treatment, characterized by an increase in bronchodilator requirements, marked worsening of symptoms, increased daytime and/or nighttime complaints, and deterioration in pulmonary function tests. Exacerbations reported by patients within the last year were evaluated based on a history of emergency department visits, systemic steroid use, and/or hospitalization (9). The stable period was defined as patients responding to treatment, with resolution of symptoms and reaching their best FEV_1 value at the first follow-up visit, 1–3 months after the exacerbation.

Severe asthma is defined according to the GINA guidelines as a condition in which symptom control is not achieved despite optimal treatment and comorbidity control for at least three months, including high-dose inhaled corticosteroids and long-acting β2-agonists, along with biological therapies when necessary (9).

For patients who experienced an asthma exacerbation during the study period, NLR and PLR values were recorded at the time of exacerbation during routine complete blood count testing. These patients were prospectively re-evaluated during the stable period after clinical recovery (1–3 months later), and NLR and PLR values were re-measured from follow-up complete blood count tests. Thus, paired comparisons of NLR and PLR values between the exacerbation and stable periods were performed within the same patients.

- ✓ To calculate NLR, the absolute number of neutrophils was divided by the absolute number of lymphocytes.
- ✓ To determine PLR, the absolute platelet count was divided by the absolute lymphocyte count.

Statistical Analysis

To assess the distribution of continuous variables, the Kolmogorov-Smirnov test was applied. For variables following a normal distribution, data are presented as mean ± standard deviation, while for non-normally distributed variables, they are shown as median (range). Categorical variables are expressed as counts

and percentages (%). When comparing the groups, statistical tests were selected based on the distribution of the data: Student's t-test for continuous variables with normal distribution and the Mann-Whitney U test for those that did not follow a normal distribution. The Chi-square test was used in the analysis of categorical variables. ROC curve analysis was used to evaluate the diagnostic performance of NLR and PLR in predicting asthma exacerbation severity, and the optimal cut-off thresholds were calculated using the Youden Index. Spearman Correlation Analysis and Pearson Correlation Analysis were employed to evaluate the relationships between the data.

Additionally, to determine the factors affecting asthma control status, univariate logistic regression analyses were performed on the independent variables, and a multivariate logistic regression model was constructed using the variables identified as significant. The model's fit to the data was assessed using the Hosmer-Lemeshow test, and the Nagelkerke R^2 value supported its explanatory power. Statistical significance was set at $p< 0.05$ in all analyses.

RESULTS

A total of 170 patients, with a mean age of 52.8 ± 15.3 years, and 141 (82.9%) females, were included in the study. Patient demographic data and laboratory results are summarized in Table 1. Based on ACT results, 74 patients were classified as having controlled asthma, and 96 patients were classified as having

Table 1. Demographic, clinical, and laboratory characteristics of asthma patients included in the study

	n%, Mean ± SD, med (min-max)
Mean Age (SD)	52.8 ± 15.3
Sex (Female, n%)	141(82.9%)
Duration of smoking (pack-years)	10 ± 15.3
BMI	31.2+14.7
Asthma step treatment	
STEP 1-2	106 (62.4%)
STEP 3	36 (21.2%)
STEP 4	14 (8.2%)
STEP 5	14 (8.2%)
Number of exacerbations (last year)	1 (1-6)
ACT	19.8 ± 5.6
Respiratory Function Test Parameters	
FVC (% predicted)	90.9 ± 20.2
FEV_1 (% predicted)	81.1 ± 25.35
FEV_1 / FVC (%)	73.2 ± 13.15
MMEF25-75 (% expected)	53.72 ± 27.9
Laboratory Results	
HGB (g/L)	13.47 ± 1.6
Leukocyte (10^9/L)	8.9 ± 2.5
Neutrophil (10^9/L)	5.8 ± 1.99
Platelet (10^9/L)	287.7 ± 73.7
Lymphocyte (10^9 /L)	2.1 ± 0.7
NLR	2.9 ± 2.2
PLR	201.2 ± 133.4
Total IgE	114 (1-6040)
Eosinophil (10^9/L)	0.2 (0-2.8)

BMI: Body mass index, ACT: Asthma control test, FVC: Forced vital capacity, FEV_1: The amount of air exhaled in the first second of forced expiration, FEV_1/FVC: The amount of air exhaled in the first second of forced expiration/Forced vital capacity, MMEF25–75: Maximal mid-expiratory flow (25–75%), HGB: Hemoglobin level, NLR: Neutrophil/Lymphocyte ratio, PLR: Platelet/Lymphocyte ratio, IgE: Immunoglobulin E.

uncontrolled asthma. Among the asthma patients, 45.3% (n= 77) had a family history of asthma, 10% (n= 17) had rhinosinusitis, 7.6% (n= 13) had drug allergies, 4.1% (n= 7) had GERD, 2.4% (n= 4) had nasal polyps, and 1.2% (n= 2) had OSAS.

Mean NLR of the patients included in the study was 2.9 ± 2.2, and mean PLR was 201.2 ± 133.36. While NLR value was 3.6 ± 2.9 and PLR value was 199.7 ± 133.5 in uncontrolled asthma cases, these values were measured as 2.1 ± 0.87 and 132.2 ± 42.8, respectively, in controlled asthma cases. NLR and PLR values in uncontrolled asthma cases were substantially greater than those in controlled asthma cases (p= 0.001 and p= 0.005, respectively) (Table 2). Exacerbation was detected in 92 of the patients included in the study. NLR and PLR values in the exacerbation period (4.9 ± 5.1; 246.9 ± 189.5, respectively) were detected to be statistically markedly higher than those in the stable period (3.4 ± 2.7; 191.8 ± 126.9, respectively) (p= 0.001; p= 0.003, respectively).

Fourteen patients in the study had severe asthma. In the non-severe asthma group, mean NLR was 2.7 ± 2.1, and mean PLR was 160.3 ± 99.8. In contrast, the severe asthma group had a mean NLR of 4.2 ± 2.9 and a mean PLR of 229.1 ± 124.2 (p< 0.05).

The discriminatory power of NLR and PLR parameters during the exacerbation period of asthma patients was evaluated by ROC analysis. For NLR, AUC was detected to be 0.911 [95% confidence interval (CI): 0.870–0.953], and the best cut-off value was 3.01 (Youden index: 0.643). At this value, sensitivity was 82.3% and specificity was 82%. For PLR, AUC was detected to be 0.838 (95% CI: 0.782–0.895); the best cut-off value was 165.25 (Youden index: 0.533, sensitivity: 83.3%, specificity: 70%) (Figure 1). The AUC values of NLR and PLR were compared using

Table 2. Comparison of clinical, respiratory, and hematological features of controlled and uncontrolled asthma patients

	Uncontrolled Asthma (n= 96) Mean ± SD, med (min-max)	Controlled Asthma (n= 74) Mean ± SD, med (min-max)	P-value
Mean Age (SD)	52.2 ± 16.7	51.6 ± 13.7	0.212
Sex (Female, n%)	80(83.3%)	61 (82.4%)	0.834
Duration of smoking (pack-years)	10.4 ± 13.03	9.9 ± 11.7	0.932
BMI	31.5 ± 21.2	31 ± 6.5	**0.039**
ACT	15.7 ± 4.8	24.7 ± 0.7	**0.001**
Respiratory Function Test Parameters			
FEV_1(% predicted)	68.9 ± 25.4	91.5 ± 19.5	**0.001**
FEV_1 / FVC (%)	66.1 ± 14.3	79.2 ± 8.5	**0.002**
FVC (% predicted)	84.9 ± 21.5	96.3 ± 17.3	**0.001**
MMEF%	41.2 ± 25.2	65.1 ± 25.8	**0.001**
Laboratory Results			
Leukocyte (10^9/L)	10.1 ± 2.6	7.8 ± 2.4	**0.001**
Neutrophil (10^9/L)	6.9 ± 2.1	4.6 ± 1.9	**0.003**
Platelet (10^9/L)	316.2 ± 80.5	287.9 ± 70.8	**0.015**
Lymphocyte (10^9/L)	2.1 ± 0.8	2.3 ± 0.6	0.084
Eosinophil (10^9/L)	0.2 (0-2.8)	0.18 (0.01-1.0)	**0.018**
NLR	3.6 ± 2.9	2.1 ± 0.87	**0.001**
PLR	199.7 ± 133.5	132.2 ± 42.8	**0.005**
Total IgE	111 (1-6040)	119 (16-391)	0.975

The Chi-Square Test was employed for sex; the T-Test and the Mann-Whitney U-Test were used for other variables.
ACT: Asthma control test, BMI: Body mass index, FEV_1: The amount of air exhaled in the first second of forced expiration, FVC: Forced vital capacity, FEV_1/FVC: The amount of air exhaled in the first second of forced expiration/Forced vital capacity, MMEF25–75: Maximal mid-expiratory flow (25–75%), NLR: Neutrophil/Lymphocyte ratio, PLR: Platelet/Lymphocyte ratio, IgE: Immunoglobulin E.

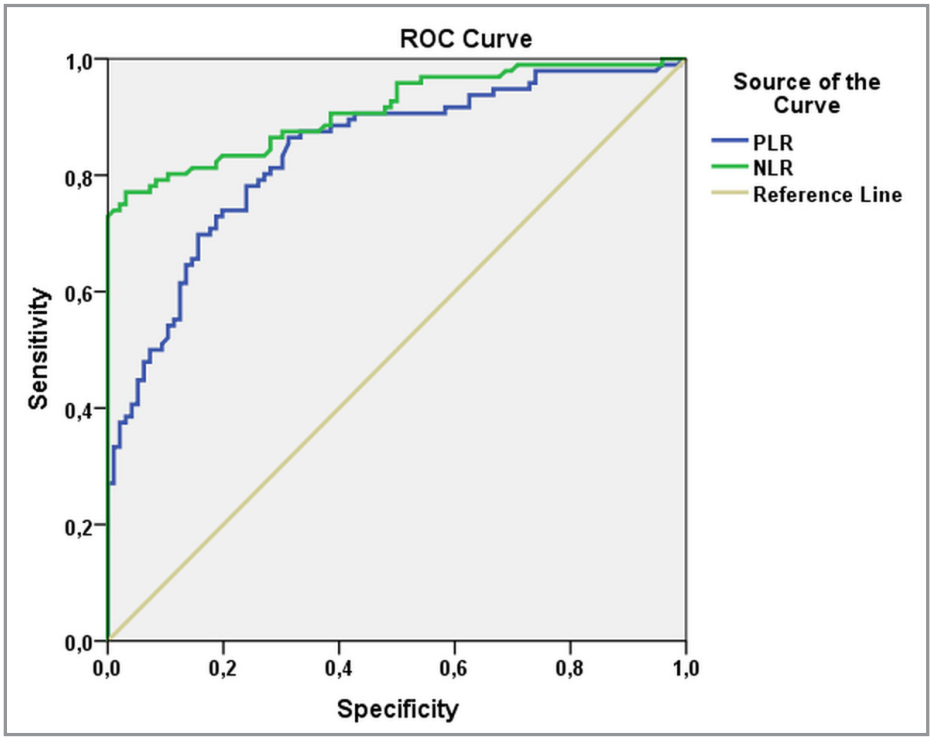


Figure 1. ROC curve for the discriminatory power of NLR and PLR in determining the exacerbation period of asthma patients.

the DeLong test, which demonstrated a statistically meaningful difference between the two parameters (p= 0.001).

In asthmatic patients, the relationships between NLR and PLR and clinical features, laboratory parameters, and respiratory function were examined (Table 3). These parameters were detected to exhibit strong positive relationships, particularly with uncontrolled asthma and the number of exacerbations.

Similarly, significant negative correlations were observed between FEV_1% and NLR (r= –0.187, p= 0.018) and between FEV_1% and PLR (r= –0.183, p= 0.020).

Table 3. Correlation between NLR and PLR and clinical, laboratory, and respiratory functions

	NLR		PLR	
	r	p	r	p
Age	0.113	0.145	0.129	0.095
BMI	0.101	0.193	0.110	0.158
FEV_1%	- 0.187	**0.018**	- 0.183	**0.020**
Uncontrolled asthma	**0.396**	**0.001**	**0.314**	**0.005**
Number of attacks	**0.280**	**0.001**	**0.287**	**0.001**
ACT	- 0.532	**0.001**	**- 0.456**	**0.001**
Total IgE	0.190	0.112	0.102	0.993
Neutrophil	**0.465**	**0.001**	0.010	0.901
Lymphocyte	- 0.356	**0.001**	**- 0.397**	**0.001**
NLR	-	-	**0.589**	**0.001**
PLR	**0.576**	**0.001**	-	-

BMI: Body mass index, FEV_1: The amount of air exhaled in the first second of forced expiration, ACT: Asthma control test, IgE: Immunoglobulin E, NLR: Neutrophil/Lymphocyte ratio, PLR: Platelet/Lymphocyte ratio.

Table 4. Results of univariate and multivariate logistic regression analysis of factors associated with controlled asthma

	Univariate Analysis			Multivariate Analysis		
	OR	**95% CI**	**P-value**	**OR**	**95% CI**	**P-value**
Age	0.990	0.971-1.01	0.338	-	-	-
BMI	1.001	0.980-1.022	0.936	-	-	-
FEV_1%	1.041	1.025-1.058	**0.001**	1.05	0.972-1.140	0.209
FEV_1/FVC	1.114	1.070-1.160	**0.001**	1.17	0.978-1.409	0.086
ACT	3.110	1.978-4.918	**0.001**	-	-	-
Number of attacks	0.660	0.447-1.050	0.084	-	-	-
NLR	0.560	0.411-0.762	**0.001**	0.69	**0.511-0.922**	**0.035**
PLR	0.990	0.985-0.996	**0.001**	0.99	0.966-1.033	0.969
Total IgE	0.999	0.997-1.001	0.281	-	-	-

BMI: Body mass index, FEV_1: The amount of air exhaled in the first second of forced expiration, FEV_1/FVC: The amount of air exhaled in the first second of forced expiration/Forced vital capacity, ACT: Asthma control test, IgE: Immunoglobulin E, NLR: Neutrophil/Lymphocyte ratio, PLR: Platelet/Lymphocyte ratio.

In the present study, binary logistic regression analysis was used to identify the variables influencing asthma control status (Table 4). In the first stage, univariate logistic regression analysis was performed on all independent variables, and variables identified as statistically significant in this analysis (FEV_1%, FEV_1/FVC, NLR, and PLR) were included in the multivariate model. In the logistic regression analysis, when uncontrolled asthma was used as the reference, an increase in NLR level decreased the probability of asthma being controlled (odds ratio= 0.69; 95% CI: 0.511-0.922; p= 0.035). In contrast, FEV_1%, FEV_1/FVC, and PLR did not exhibit statistical significance in the multivariate model (p= 0.209, p= 0.086, p= 0.969, respectively) (Table 4). The overall design of the study and its main findings are summarized in Figure 2.

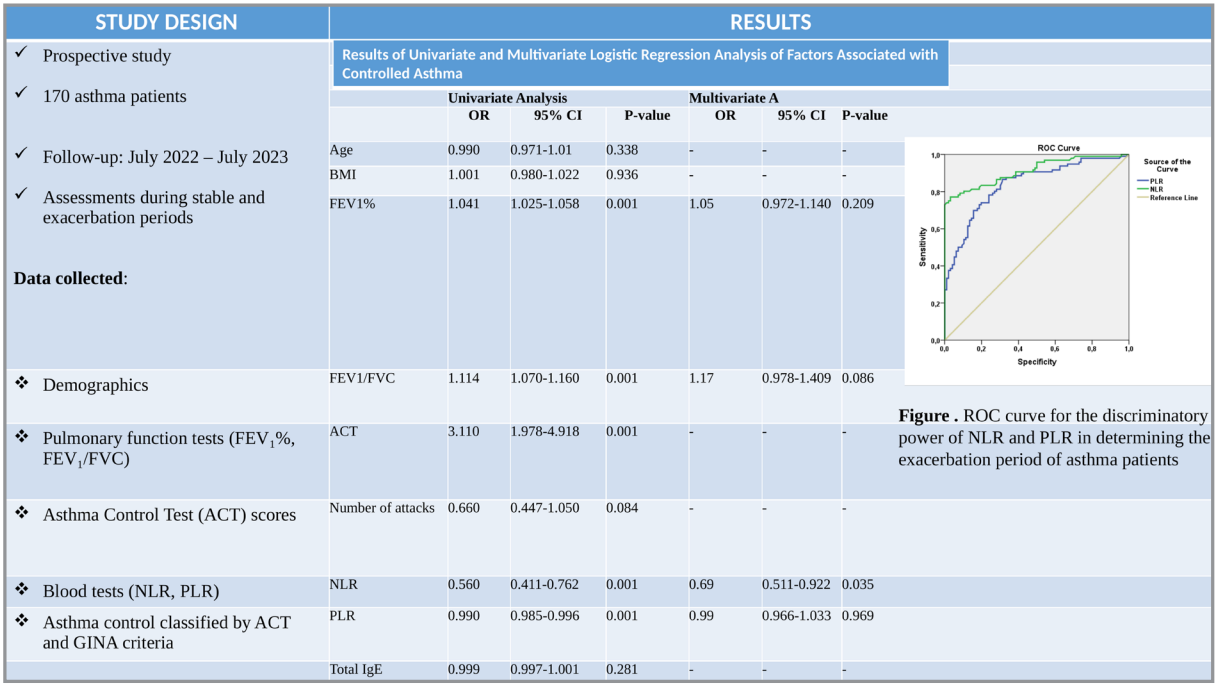


Figure 2. Graphical summary of the study design and main findings.

DISCUSSION

The primary goal of asthma treatment is to manage this condition effectively. Asthma control is not limited to managing symptoms but also encompasses the prevention of future risks. For this reason, researching new prognostic markers that can predict disease progression offers significant contributions to asthma management. Study results indicate that systemic markers of inflammation may be related to the degree of asthma control. The significantly elevated levels of these indices, particularly in patients with uncontrolled asthma and during exacerbations, suggest that these parameters may have the potential to reflect disease activity.

NLR is used to assess systemic inflammation and has been employed to determine the severity and prognosis of conditions such as bacterial pneumonia, hepatitis B, and acute coronary syndrome (10-12). A high NLR, characterized by increased neutrophil and decreased lymphocyte counts, has been detected in severe coronavirus diseases-2019 and has been found helpful in early diagnosis and follow-up (13). Recent studies have revealed that NLR is important as a prognostic marker in COPD exacerbations, and variability in NLR levels is significantly associated with adverse clinical outcomes such as the need for intensive care, the use of mechanical ventilation, and mortality (14). In some previous studies, it was reported that NLR values were significantly higher in COPD patients in exacerbation compared to stable patients (12.4 ± 10.6 vs. 2.4 ± 0.7), and that NLR levels were also significantly increased in patients with frequent exacerbation phenotype (5.93 [3.40–9.28] vs. 4.41 [2.74–6.80]) (15,16). The sensitivity was 80.8% and the specificity was 77.7% at a threshold value of 3.29 for NLR in detecting COPD exacerbation (AUC: 0.894, p= 0.001) (17). Consistent with the literature, NLR levels were seen to be substantially increased during exacerbations in our study (p< 0.001), and this index increased significantly, especially in individuals with a history of frequent exacerbations (p< 0.001). In our study, the most appropriate cut-off value for NLR in predicting asthma exacerbation was determined to be 3.01, with a corresponding AUC value of 0.911 (95% CI: 0.870–0.953). In a study similar to ours, NLR and PLR values were reported to be significantly higher in patients experiencing asthma exacerbations (p= 0.013 and p= 0.002, respectively) (18). In a study conducted by Singh et al., it was found that NLR was significantly higher in asthma patients, and NLR served as a discriminatory marker for asthma diagnosis with high sensitivity (82%) and specificity (90%). Furthermore, a negative correlation was detected between NLR and FEV_1% (r= -0.73, p< 0.001) (19). These results are also consistent with our study; NLR stood out as a discriminatory marker of asthma in ROC analysis, and its negative correlation with FEV_1 supports the relationship between disease severity and inflammation. Similar to the present study, a significant difference was detected between NLR levels in asthma patients grouped according to ACT score (ACT ≥20 and ACT <20) in another study (p= 0.002) (20). This result suggests that systemic inflammation increases as asthma control decreases.

Although thrombocytosis and lymphocytopenia are associated with the degree of systemic inflammation, PLR stands out as a new inflammatory marker that combines both hematological parameters. PLR has been reported to play roles as an independent marker in predicting prognosis in lung cancers, such as small cell and non-small cell lung cancer and is correlated with an elevated mortality risk in patients with myocardial infarction (21-23). A study conducted with patients with acute pulmonary thromboembolism reported that NLR and PLR were significantly associated with an increased risk of mortality, and a threshold value of >151.59 for PLR in ROC analysis was effective in identifying an increased risk of mortality (24). In a study by Karaniz et al., it was reported that platelet count and PLR values were higher in stable COPD patients compared to the control group, and these values also increased during acute exacerbations compared to the stable period (25). Regression analyses in asthmatic patients revealed that PLR was a significant predictor of exacerbations (18). PLR is also considered a biomarker employed to predict mortality, disease severity, and diagnosis in sepsis cases (26). A meaningful association was identified in our study between the exacerbation period and PLR levels, with PLR levels substantially higher during exacerbations compared to the stable phase (p< 0.001). In univariate regression analysis, increases in FEV_1% and ACT scores were detected to be significantly associated with asthma control. These results suggest that achieving asthma control also reduces the risk of exacerbations. Furthermore, increases in NLR and PLR were observed to be associated with asthma becoming uncontrolled. In multivariate regression analysis, only NLR remained a significant independent predictor, while PLR had no significant effect in this

regard. These results highlight the prognostic value of NLR and PLR in the clinical management of asthma, demonstrating the independent role of FEV1% in achieving control and the strong association of ACT score with control at the univariate level.

The findings of the present study suggest a strong association between systemic inflammatory markers and both the level of asthma control and the risk of exacerbations. NLR and PLR values were observed to be significantly higher in patients with uncontrolled asthma and during exacerbations, suggesting that these parameters reflect disease activity. The results also suggest that these indices, derived from common laboratory assessments like complete blood counts, can serve as helpful, cost-effective, and noninvasive biomarkers in the evaluation of asthma. However, the study's limited single-center sample size restricts the generalizability of the results. For this reason, further studies with larger samples and multicenter models are needed to confirm the results and integrate them into clinical practice.

Ethical Committee Approval: This study was approved by the Gazi University Clinical Researches Ethics Committee (Decision no: 398, Date: 30.05.2022).

Peer-review: Externally peer-reviewed.

CONFLICT of INTEREST

The authors declare that they have no conflict of interest.

AUTHORSHIP CONTRIBUTIONS

Concept/Design: All of authors

Analysis/Interpretation: AM, GJ, KT, ZY

Data Acquisition: GJ, KT, ZY

Writing: AM

Clinical Revision: AM, İKO

Final Approval: All of authors

REFERENCES

1. *Boulet LP, FitzGerald JM, Levy ML, Cruz AA, Pedersen S, Haahtela T, et al. Asthma guidelines implementation: A guide to the translation of GINA guidelines into improved care. Eur Respir J 2012; 39: 1220–29. https://doi.org/10.1183/09031936.00184511*
2. *Mims JW. Asthma: Definitions and pathophysiology. International Forum of Allergy & Rhinology 2015; 5 Suppl 1, S2–S6. https://doi.org/10.1002/alr.21609*
3. *Nathan RA, Sorkness CA, Kosinski M, Schatz M, Li JT, Marcus P, et al. Development of the asthma control test: A survey for assessing asthma control. J Allergy Clin Immunol 2004; 113: 59-65. https://doi.org/10.1016/j.jaci.2003.09.008*
4. *Asperges E, Albi G, Zuccaro V, Sambo M, Pieri TC, Calia M, et al. Dynamic NLR and PLR in Predicting COVID-19 Severity: A Retrospective Cohort Study. Infect Dis Ther 2023; 12(6): 1625-40. https://doi.org/10.1007/s40121-023-00813-1*
5. *Platini H, Ferdinand E, Kohar K, Prayogo SA, Amirah S, Komariah M, et al. Neutrophil-to-Lymphocyte Ratio and Platelet-to-Lymphocyte Ratio as Prognostic Markers for Advanced Non-Small-Cell Lung Cancer Treated with Immunotherapy: A Systematic Review and Meta-Analysis. Medicina (Kaunas) 2022; 58(8): 1069.https://doi.org/10.3390/medicina58081069*
6. *Liu J, Ao W, Zhou J, Luo P, Wang Q, Xiang D. The correlation between PLR-NLR and prognosis in acute myocardial infarction. Am J Transl Res 2021; 13(5): 4892-99.*
7. *Lei L, Li J, Liu H, Mo B. Neutrophil-to-Lymphocyte Ratio in Asthmatic Patients and Healthy People: A Meta-analysis. Journal of Archives in Military Medicine 2021; 9(1). https://doi.org/10.5812/jamm.111447*
8. *Liao QQ, Mo YJ, Zhu KW, Gao F, Huang B, Chen P, et al. Platelet-to-Lymphocyte Ratio (PLR), Neutrophil-to-Lymphocyte Ratio (NLR), Monocyte-to-Lymphocyte Ratio (MLR), and Eosinophil-to-Lymphocyte Ratio (ELR) as Biomarkers in Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease (AECOPD). Int J Chron Obstruct Pulmon Dis 2024; 19: 501-18. https://doi.org/10.2147/COPD.S447519*
9. *GINA. Global Strategy for Asthma Management and Prevention (2025 update). Global Initiative for Asthma, 2024, www.ginasthma.org.*
10. *Kuikel S, Pathak N, Poudel S, Thapa S, Bhattarai SL, Chaudhary G, et al. Neutrophil-lymphocyte ratio as a predictor of adverse outcome in patients with community-acquired pneumonia: A systematic review. Health Sci Rep 2022; 5: e630. https://doi.org/10.1002/hsr2.630*
11. *Ekmen MO, Uzman M. The Relationship between Mean Platelet Volume and Neutrophil-Lymphocyte Ratio and Liver Fibrosis in Patients with Chronic Hepatitis B. Medicina (Kaunas) 2023; 59(7): 1287. https://doi.org/10.3390/medicina59071287*
12. *Karadeniz FÖ, Karadeniz Y, Altuntaş E. Systemic immune-inflammation index, and neutrophil-to-lymphocyte and platelet-to-lymphocyte ratios can predict clinical outcomes in patients with acute coronary syndrome. Cardiovasc J Afr 2023; 34: 1-7. https://doi.org/10.5830/CVJA-2023-011*
13. *Kong M, Zhang H, Cao X, Mao X, Lu Z. Higher level of neutrophil-to-lymphocyte is associated with severe COVID-19. Epidemiology and infection 2020; 148: e139. https://doi.org/10.1017/S0950268820001557*

14. *Jiang M, Yang Y, Wang H. Stability of Neutrophil to Lymphocyte Ratio in Acute Exacerbation of Chronic Obstructive Pulmonary Disease and Its Relationship with Clinical Outcomes: A Retrospective Cohort Study. Int J Chron Obstruct Pulmon Dis 2024; 19: 2431-41. https://doi.org/10.2147/COPD.S487063*

15. *Lee SJ, Lee HR, Lee TW, Ju S, Lim S, Go SI, et al. Usefulness of neutrophil to lymphocyte ratio in patients with chronic obstructive pulmonary disease: A prospective observational study. Korean J Intern Med 2016; 31: 891–8. https://doi.org/10.3904/kjim.2015.084*

16. *Lu FY, Chen R, Li N, Sun XW, Zhou M, Li QY, et al. Neutrophil-to-lymphocyte ratio predicts clinical outcome of severe acute exacerbation of COPD in frequent exacerbators. Int J Chron Obstruct Pulmon Dis 2021; 16: 341–9. https://doi.org/10.2147/COPD.S290422*

17. *Taylan M, Demir M, Kaya H, Selimoglu Sen H, Abakay O, Carkanat Aİ, et al. Alterations of the neutrophil–lymphocyte ratio during the period of stable and acute exacerbation of chronic obstructive pulmonary disease patients. Clin Respir J 2017; 11(3): 311-7. https://doi.org/10.1111/crj.12336*

18. *Yumrukuz Şenel M, Karadoğan D, Kaya İ, Telatar TG, Akgün M. Eosinophil level, neutrophil-to-lymphocyte ratio, and platelet-to-lymphocyte ratio as biomarkers of asthma exacerbation. Alergia Astma Immunologia 2025; 30(1): 23-7.*

19. *Shi G, Zhao J.W, Ming L. Clinical significance of peripheral blood neutrophil-lymphocyte ratio and platelet-lymphocyte ratio in patients with asthma. Nan Fang Yi Ke Da Xue Xue Bao 2017; 37: 84–8. https://doi.org/10.3969/j.issn.1673-4254.2017.01.15.*

20. *Güngen A, Aydemir Y. The correlation between asthma disease and the neutrophil to lymphocyte ratio. Res J Allergy Immunol 2016; 1: 1–4.*

21. *Zhao QT, Yuan Z, Zhang H, Zhang XP, Wang HE, Wang ZK, et al. Prognostic role of platelet to lymphocyte ratio in non-small cell lung cancers: A meta-analysis including 3,720 patients. Int J Cancer 2016; 139: 164–70. https://doi.org/10.1002/ijc.30060*

22. *Zhou H, Li J, Zhang Y, Chen Z, Chen Y, Ye S. Platelet-lymphocyte ratio is a prognostic marker in small cell lung cancer-A systemic review and meta-analysis. Front Oncol 2023; 12: 1086742. https://doi.org/10.3389/fonc.2022.1086742*

23. *Dong G, Huang A, Liu L. Platelet-to-lymphocyte ratio and prognosis in STEMI: A meta-analysis. Eur J Clin Invest 2021; 51: e13386. https://doi.org/10.1111/eci.13386*

24. *Mammadova A, Taşkaraca K, Jeyranova G, Orujlu A, Tatlıloğlu M, Duygulu S, et al. Correlation between Platelet-to-Lymphocyte Ratio, Neutrophil-to-Lymphocyte Ratio and Burden of Thrombus with Disease Severity in Patients with Pulmonary Thromboembolism. Hamostaseologie 2026; 46(3): 189-95. https://doi.org/10.1055/a-2506-6705*

25. *Karadeniz G, Aktoğu S, Erer OF, Kır SB, Doruk S, Demir M, et al. Predictive value of platelet-to-lymphocyte ratio in exacerbation of chronic obstructive pulmonary disease. Biomark Med 2016; 10(7): 701-10. https://doi.org/10.2217/bmm-2016-0046*

26. *Shen Y, Huang X, Zhang W. Platelet-to-lymphocyte ratio as a prognostic predictor of mortality for sepsis: Interaction effect with disease severity - A retrospective study. BMJ Open 2019; 9(1): e022896. https://doi.org/10.1136/bmjopen-2018-022896*