ORIGINAL ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2021.2306
Cyprus J Med Sci 2022;7(2):241-244

Assessment of ELR, NLR, MPV, and CRP Levels in Patients With Acne Vulgaris

Munise Daye[1], Selami Aykut Temiz[1], Elif Nur Yıldırım Öztürk[2], Begüm Işık[1]

[1]Department of Dermatology, Necmettin Erbakan University Meram Medical Faculty, Konya, Turkey
[2]Department of Public Health, Necmettin Erbakan University Meram Medical Faculty, Konya, Turkey

ABSTRACT

BACKGROUND/AIMS: Acne vulgaris is a chronic inflammatory disease of the pilosebaceous unit. The relationship between some of the hematological parameters active in inflammation such as the neutrophil/lymphocyte ratio (NLR), the mean platelet volume (MPV), and C-reactive protein (CRP) has been demonstrated. In recent years, eosinophil cells have been shown to be associated with inflammation, and the eosinophil/lymphocyte ratio (ELR) has been shown to be an indicator of inflammation in some diseases. In this study, we aimed to evaluate the relationship between the ELR, NLR, MPV, and CRP levels, which are indicators of systemic inflammation, with acne severity parameters in patients with acne vulgaris.

MATERIALS AND METHODS: A prospective study was planned with patients in our clinic who were diagnosed with acne vulgaris, who required routine blood parameters, and whose global acne score was calculated. The relationship between these parameters, which are an indicator of systemic inflammation and acne severity, was investigated.

RESULTS: In our findings, MPV was found to be the strongest hematological marker for acne severity and inflammation. There was a significant difference between acne severity and ELR, and this difference was higher in the severe acne group.

CONCLUSION: As far as we are aware, there has been no study on ELR levels in acne to date; this is the first study to evaluate this rate. Based on our findings, it is thought that ELR increases with the severity of acne and can be accepted as an indicator. In this context, we believe that there is a need for controlled studies involving the role of eosinophils in blood, tissue, and inflammation in the pathogenesis of acne. It is possible that the role of eosinophils in pathogenesis will explain itch-dominated acne patients and may also lead to the development of new targets for treatment.

Keywords: Acne vulgaris, eosinophil/lymphocyte ratio, neutrophil/lymphocyte ratio

INTRODUCTION

Acne vulgaris can be seen in all age groups. It is a chronic inflammatory disease of the pilosebaceous unit that usually affects about 85% individuals during the adolescent period.[1] In the etiopathology of acne, the increase in sebum production, follicular epidermal hyperprofillation, inflammation and propionibacterium acnes are relevant.[2]

In recent years, the relationship between acne vulgaris and some hematological parameters active in inflammation such as neutrophils, lymphocytes, and platelets has been demonstrated.[3] In addition, it has been shown that parameters such as neutrophil/lymphocyte ratio (NLR), mean platelet volume (MPV), C-reactive protein and (CRP) are accepted as indicators of inflammation and acne vulgaris.[3]

To cite this article: Daye M, Temiz SA, Yıldırım Öztürk EN, Işık B. Assessment of ELR, NLR, MPV, and CRP Levels in Patients With Acne Vulgaris. Cyprus J Med Sci 2022;7(2):241-244

ORCID iDs of the authors: M.D. 0000-0002-6614-1821; S.A.T. 0000-0003-4878-0045; E.N.Y.Ö. 0000-0003-1447-9756; B.I. 0000-0003-1462-3869.

Address for Correspondence: Selami Aykut Temiz
E-mail: aykutmd42@gmail.com
ORCID ID: orcid.org/0000-0003-4878-0045

Received: 31.03.2020
Accepted: 11.01.2021

In recent years, eosinophil cells have also been associated with inflammation, and the eosinophil/lymphocyte ratio (ELR) has been shown to be an indicator of inflammation in some diseases.[4] There is no study in the literature showing the relationship between acne vulgaris and ELR. In this study, we aimed to evaluate the relationship between ELR, NLR, MPV, and CRP levels with acne severity in terms of both their role in inflammation and their role in pathogenesis in patients with acne vulgaris.

MATERIALS AND METHODS

A prospective study was planned with volunteers who were diagnosed with acne vulgaris in our clinic who required routine blood parameters and whose global acne score was calculated. In the sample size calculation made by G power analysis, we planned to include at least 76 cases with a 95% confidence interval, a 5% error margin, and an 80% power. Informed consent was obtained from the patients. Patients with hematological and systemic diseases who used medication for a chronic disease and who were smokers or used alcohol and/or illegal substances were excluded.

ELR, NLR, MPV, and CRP levels were obtained from hematological and biochemical parameters. Global acne score values, and, in accordance with this value, mild, moderate, severe, and very severe acne groups were defined. The study was approved by Local Ethics Committee of Necmettin Erbakan University (date: 2019, number: 1936).

Statistical Analysis

The IBM® SPSS® Statistics Version 16.0 (Chicago, IL, USA) statistical program was used to analyze the data. The relationships between numerical data were evaluated by an independent samples t-test, a One-Way analysis of variance, and a Pearson correlation coefficient in cases where normality assumptions were provided and nonparametric responses of the same tests in cases where normality was not achieved. The relationships between categorical variables were determined by a chi-square test. For statistical significance, cases where p-value was less than 0.05 were considered significant.

RESULTS

Of the 76 cases of individuals aged 16–35, 49 were women. The mean age of the patients was 20.78±5.62 years, and the mean global acne score was 30.54±7.89. According to the global acne score, 6 (7.9%) of the cases had mild acne, 28 (36.8%) had moderate acne, 35 (46.1%) had severe acne, and 7 (9,2%) had very severe acne.

There was no significant difference between the eosinophil/lymphocyte ratio and the CRP levels in independent groups when mild/moderate and severe/very severe acne groups were analyzed according to global acne severity ($p>0.05$); the neutrophil/lymphocyte ratio ($p=0.022$) and the MPV levels ($p=0.007$) were significantly different between the groups (Table 1).

There were no significant differences in the neutrophil/lymphocyte ratio and the CRP levels between the four groups (mild, moderate, severe, very severe) according to their global acne severity ($p>0.05$). However, eosinophil/lymphocyte ratios ($p=0.040$), and MPV levels ($p=0.014$) were significantly different between the groups (Table 2). When paired group comparisons were made, it was found that the difference between severe and very severe acne groups was caused by the eosinophil/lymphocyte ratio ($Z= -2.449$, $p=0.014$). The difference for MPV was found to be due to the MPV ratio between the mild and severe acne groups ($p=0.007$).

DISCUSSION

Systemic inflammation is responsible for comorbidities in many diseases,[5] and these comorbidities are thought to be correlated with the severity of the systemic inflammation.[6] Studies have shown that some hematological parameters active in inflammation such as neutrophil and platelet and values such as the neutrophil/lymphocyte ratio (NLR) and the mean platelet volume (MPV) are indicative of inflammation.[3,6,7] There is also inflammation in the etiopathogenesis of acne vulgaris.[1]

CRP is one of the most well-known inflammatory markers and has been studied in many inflammatory diseases.[8-10] However, in the literature, no significant difference was found between groups with acne vulgaris and control groups in terms of CRP and it could not be associated with disease severity.[8] In our study, in accordance with the literature, no significant difference was found between the severity of acne vulgaris and CRP between the groups.

Neutrophils initiate the first step of defense in systemic inflammation.[11] The NLR value is an important parameter. It is obtained by dividing the total number of neutrophils by the number of lymphocytes. It has been shown that the NLR increases in many diseases with systemic inflammation.[7,11,12] It was found that the rate of NLR in acne inversa was higher compared to the control group.[12] In the literature, changes in the NLR rates after isotretinoin have been investigated in acne vulgaris patients; while some researchers have not observed a significant difference,[13,14] in other studies, it has been shown that NLR is significantly higher in acne cases compared to control groups and that it regresses with effective treatment.[15] In our study, the severity of acne vulgaris was compared to NLR, and there was a significant difference between severe/very severe and mild/moderate acne groups, but there was no significant difference when these acne groups were compared as quads.

Platelets are small discoid cells with an average life of approximately 8–10 days.[16] The MPV value is a marker for the function and activation of platelets.[17] A high MPV value indicates increased platelet production, and a low value indicates decreased production.[18] Increased MPV has been shown in low-grade severe inflammatory conditions such as recurrent aphthous stomatitis, Behcet's disease, psoriasis, and chronic hepatitis B.[19] These measurements showed that the MPV was directly related to the inflammatory grade. It has been observed that MPV values decrease with isotretinoin treatment in patients with acne vulgaris.[20,21] However, it is unclear whether the decrease in MPV value is due to decreased inflammation or bone marrow suppression. In the literature, there is no direct study investigating the relationship between the severity of the acne vulgaris disease and MPV. In our study, a significant difference was found between the acne vulgaris severity and MPV in both pair and quadruple groups. We think that the MPV value can be monitored in acne vulgaris severity follow-up.

Eosinophils are primarily white blood cells that play a very important role in the pathogenesis of allergic reactions.[22] In recent years, the role of eosinophils and the eosinophil/lymphocyte ratio in showing systemic inflammation has been discussed in many studies.[4,22,23] It was reported to be effective in demonstrating stent restenosis.[4] It has been reported

that the ELR is higher in patients with nasal polyposis compared to a control group.[22] Increased ELR was also detected in smokers.[23] There are no studies investigating the role of eosinophils in tissue and whole blood in acne cases in the literature. The role of eosinophils in the pathogenesis of acne is not fully understood. In our study, there was no significant difference between the pairs of severe-very severe and mild-moderate severe groups classified according to global acne severity. However, when the groups of four were compared, a significant difference was found, the difference being that the ELR value in the severe acne group was high. Based on these values, it is thought that ELR increases with the severity of acne and can be accepted as an indicator. In this context, we believe that there is a need for controlled studies involving the role of eosinophils in blood, tissue, and inflammation in the pathogenesis of acne. It is possible that the role of eosinophils in the pathogenesis of acne will lead to a better understanding of itch-dominated acne patients and may also lead to the development of new targets for treatment.

CONCLUSION

According to our findings, MPV was found to be the most powerful hematologic marker for acne severity and inflammation. As far as we are aware, there has been no study of ELR levels in acne to date, and this is the first study to evaluate this rate. In conclusion, we think that the ratio of MPV and ELR may be a follow-up indicator for acne vulgaris severity.

Table 1. Analysis of mild to moderate and severe to very severe acne groups according to global acne severity

Parameters		Global Acne Score		p-value
		Mild-moderate severe	Severe-very severe	
CRP	Mean ± standard deviation	0.87±0.93	1.28±1.45	0.753
	Median (min–max)	0.69 (0.00–4.60)	0.85 (0.10–5.60)	
MPV	Mean ± standard deviation	10.07±0.67	10.49±0.69	**0.007**
	Median (min–max)	10.00 (9.00–11.90)	10.30 (9.30–12.00)	
Eosinophil/Lymphocyte ratio	Mean ± standard deviation	0.08±0.15	0.07±0.03	0.234
	Median (min–max)	0.05 (0.02–0.94)	0.06 (0.03–0.15)	
Neutrophil/Lymphocyte ratio	Mean ± standard deviation	1.59±0.62	1.98±0.70	**0.022**
	Median (min–max)	1.51 (0.14–3.13)	2.06 (0.75–3.53)	

Significant p-values are shown in bold.
CRP: C-reactive protein, MPV: mean platelet volume, min: minimum, max: maximum.

Table 2. Analysis of the groups of mild, moderate, severe, and very severe acne according to global acne severity in four groups

Parameters		Global Acne Score				p-value
		Mild	Moderate	Severe	Very severe	
CRP	Mean ± standard deviation	1.20±1.70	0.81±0.71	1.27±1.54	1.36±1.03	0.740
	Median (min–max)	0.45 (0.27–4.60)	0.80 (0.00–2.56)	0.30 (0.10–5.60)	1.10 (0.10–2.80)	
MPV	Mean ± standard deviation	9.81±0.29	10.13±0.72*	10.55±0.71*	10.17±0.53	**0.014**
	Median (min–max)	9.75 (9.50–10.30)	10.00 (9.00–11.90)*	10.40 (9.30–12.00)*	10.00 (9.70–11.00)	
Eosinophil/Lymphocyte ratio	Mean ± standard deviation	0.06±0.03	0.09±0.17	0.07±0.03**	0.04±0.02**	**0.040**
	Median (min–max)	0.05 (0.02–0.13)	0.05 (0.02–0.94)	0.07 (0.03–0.15)**	0.03 (0.03–0.11)**	
Neutrophil/Lymphocyte ratio	Mean ± standard deviation	1.15±0.62	1.69±0.58	2.03±0.72	1.74±0.61	0.054
	Median (min–max)	1.35 (0.14–1.81)	1.54 (1.05–3.13)	2.07 (0.92–3.53)	1.71 (0.75–2.69)	

The groups marked with *, **, and underscored indicate the groups from which the difference originates. Significant p-values are shown in bold.
CRP: C-reactive protein, MPV: mean platelet volume, min: minimum, max: maximum.

MAIN POINTS

- According to our findings, MPV was found to be the most powerful hematologic marker for acne severity and inflammation.
- As far as we are aware, there has been no study of ELR levels in acne to date, and this is the first study to evaluate this rate. When the groups of four were compared, a significant difference was found, the difference being that the ELO value in the severe acne group was high. Based on these values, it is thought that ELO increases with the severity of acne and can be accepted as an indicator. In this context, we believe that there is a need for controlled studies involving the role of eosinophils in blood, tissue, and inflammation in the pathogenesis of acne.
- It is possible that the role of eosinophils in the pathogenesis of acne will lead to a better understanding of itch-dominated acne patients and may also lead to the development of new targets for treatment.
- In conclusion, we think that the ratio of MPV and ELO may be a follow-up indicator for acne vulgaris severity.

ETHICS

Ethics Committee Approval: The study was approved by the Ethics Committee of Necmettin Erbakan University (date: 2019, number: 1936).

Informed Consent: Informed consent was obtained from the patients.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Conception: M.D., S.A.T., Design: M.D., S.A.T., Supervision: M.D., S.A.T., Analysis and/or Interpretation: M.D., S.A.T., E.N.Y.Ö., B.I., Literature Search: M.D., S.A.T., E.N.Y.Ö., B.I., Writing: S.A.T., E.N.Y.Ö., B.I., Critical Review: M.D., S.A.T.

DISCLOSURES

Financial Disclosure: The author declared that this study had received no financial support.

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

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