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# The importance of neutrophil lymphocyte ratio in patients with psoriasis

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**Abstract:** Objective: The aim of this study is to assess the neutrophil lymphocyte ratio (NLR) as an inflammatory marker in patients with psoriasis and to compare it with healthy subjects and to evaluate the correlation with the severity of the disease. Methods: 104 psoriasis patients and 70 healthy persons were included as the control group. The laboratory results were recorded retrospectively from the patients' files and controls. NLR was calculated by the division of the neutrophil count to the lymphocyte count in the hemogram test. The dermatologic examinations and psoriatic area severity index (PASI) scoring were performed by the same dermatologist. Results: Leukocyte, neutrophil, NLR levels of the psoriasis patients were significantly elevated compared to those of the control group ( $p < 0.05$ ,  $p < 0.01$  and  $p < 0.01$  respectively). There were no correlation between NLR and PASI score ( $p > 0.05$ ) in the patient group. Conclusions: NLR, an emerging marker of inflammation, is higher in patients with psoriasis.

**Keywords:** Psoriasis, Neutrophil Lymphocyte Ratio, Hemogram.

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## 1. Introduction

Psoriasis is a chronic, proliferative, inflammatory and relapsing skin disease. Underlying pathophysiologic mechanism of psoriasis was not fully understood until now, but it is believed to be a systemic inflammatory disease. Especially, T-cell dependent inflammatory and autoimmune processes especially have an important role in its pathogenesis along with the combination of genetic, environmental and immunologic factors [1].

Currently, systemic inflammation can be evaluated by using various biochemical and hematological markers; however, most of these markers are usually expensive. Therefore simple and inexpensive methods are needed as indicators for inflammation. Neutrophil lymphocyte ratio (NLR) obtained by dividing neutrophil count to lymphocyte count, is considered as an inflammatory marker due to being readily available and being a cost effective method [2]. There are several studies assessing NLR in

various diseases including ulcerative colitis and hepatic cirrhosis, familial mediterranean fever, cardiovascular diseases and malignancies [3-7]. NLR has not been evaluated in patients with psoriasis yet.

The aim of this study is to assess the utility of NLR in psoriatic patients retrospectively, and to evaluate the correlation of laboratory findings with the severity of the disease (*Psoriasis Area Severity Index [PASI]*).

## 2. Methods

In our study, the records of 104 patients (67 females, 37 males) who were diagnosed with psoriasis clinically and/or histopathologically were evaluated. The control group consisted of 70 healthy individuals (42 females, 28 males). The patients who had an active infection, malignancy and history of immunosuppressive medication and children who were under the age of 16 were excluded from the study. The local ethics committee approved the

study. The same dermatologist for each participant performed dermatological examinations and PASI scoring. The laboratory results such as leukocyte, neutrophil, lymphocyte, NLR, were recorded respectively from the patients' files.

All data were expressed as mean  $\pm$  standard deviation. Student-T test was used for comparing the parametric data and Chi-square test was used for comparing the non-parametric data. Pearson correlation analysis was applied to assess the correlation of parametric tests. A p value of less than 0.05 was considered as statistically significant.

### 3. Results

The mean age was  $39.6 \pm 15.8$  years (16-83) in the study group and it was  $37.7 \pm 13.4$  years (16-71) in the control group. Leukocyte and neutrophil levels of the psoriasis patients were significantly higher compared to those of control group ( $p < 0.05$ ,  $p < 0.01$  respectively). No significant difference was noted in lymphocyte counts between the groups ( $p > 0.05$ ). NLR was significantly higher in the patients group than that of the control group ( $p < 0.01$ ) (Figure 1).

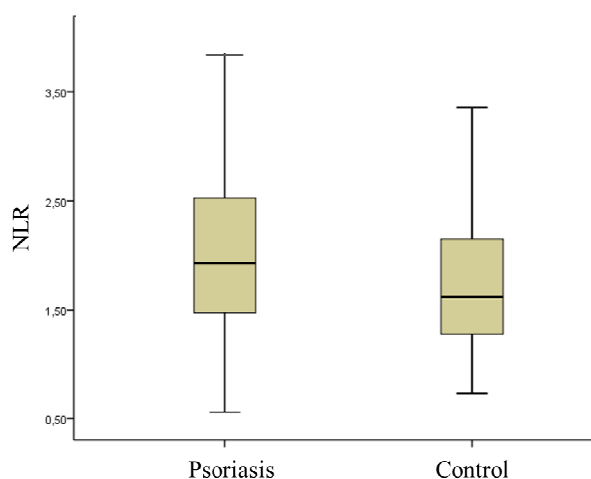


Figure 1. NLR psoriasis and control groups.

Table 1. Demographic characteristics and laboratory values of patient and control groups.

	Psoriasis	Control	P
Age (Median)	38,50	36,50	
(Min; Max)	(Min:14; Max 83)	(Min:16; Max 71)	0,407
Gender (M/F)	37/67	28/42	0,632
PASI (Median)	5,05		
(Min; Max)	(Min 0,5; Max 36,6)		
Leucocyte (/mm <sup>3</sup> )	7649 $\pm$ 2275**	6793 $\pm$ 1717	0,009
Neutrophil (/mm <sup>3</sup> )	4643 $\pm$ 2041**	3786 $\pm$ 1530	0,003
Lymphocyte (/mm <sup>3</sup> )	2247 $\pm$ 578	2171 $\pm$ 548	0,388
NLR	2,19 $\pm$ 1,11*	1,80 $\pm$ 0,72	0,011
Hb (g/dl)	14,35 $\pm$ 1,76	14,69 $\pm$ 1,92	0,238
Hct (%)	43,55 $\pm$ 4,23	43,70 $\pm$ 4,79	0,825
Platelet (/mm <sup>3</sup> )	271000 $\pm$ 62421	262830 $\pm$ 54800	0,350

PASI: Psoriasis area and severity index, NLR: Neutrophil lymphocyte ratio, Hb: Hemoglobin, Hct: Haematocrit

\*:P<0,05; \*\*:P<0,01

The mean PASI score was  $7.66 \pm 6.73$  (1-37) in all of the psoriatic patients. There was no correlation between the NLR and PASI scores ( $p > 0.05$ ) in the patients group. In addition, no significant difference was noted in the other blood parameters [hemoglobin (Hb), haematocrit (Hct) and platelet counts between the groups] ( $p > 0.05$ ) (Table 1).

### 4. Discussion

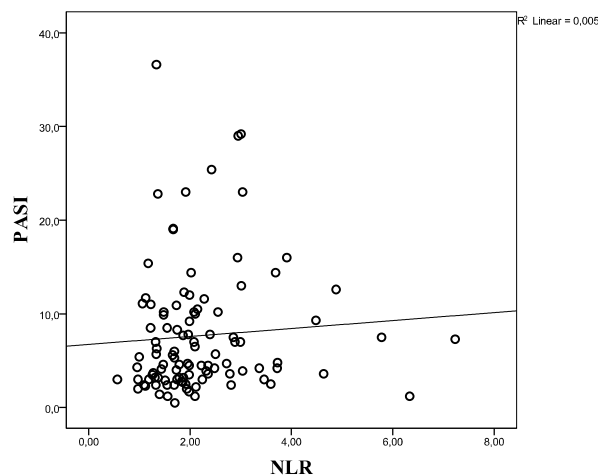
Psoriasis is one of the most common chronic inflammatory skin diseases and it affects 1-3% of the world's population. Psoriatic patients constitute 6-8% of the patients applying to dermatology clinics. Its incidence is similar in both genders; however onset of the disease is earlier in females compared to that of the males. Pathophysiological aspects of psoriasis are not clear yet, but the disease is defined as an immune mediated inflammatory disease (IMID) because the development of it is mediated by immune mechanisms [8]. An interactive network of inflammatory cytokines, chemokines, dendritic cells, and type 1 T cells or natural killer T cells potentially drives pathogenic inflammation in psoriasis vulgaris. Proinflammatory cytokines are released by TH1 cells, including TNF- $\alpha$ , IL-2 and INF, which induce the inflammatory cascade. In the skin, activated keratinocytes produce other cytokines, including IL-6, IL-8 and TGF- $\alpha$  and  $\beta$ . This process leads to persistent inflammation in psoriasis [9].

Currently there are no universally recognized laboratory markers indicating the disease activity. Therefore researchers are still seeking an objective laboratory parameter for psoriasis. Most of the previous studies are considered as complicated, they consist of expensive parameters (cytokines, adhesion molecules, etc.) and require an experienced team. Thus it is obvious that there is a need a simpler and cheaper method as an indicator for inflammation. NLR which is obtained by dividing neutrophil to lymphocyte count, is a basic and cost-effective blood test both for the health care system of the patient, and that high levels of NLR is especially important indicator for ongoing inflammation [2]. There are a lot of studies in the literature which demonstrate high NLR in diseases including chronic inflammatory disease and malignancies except psoriasis [10-14]. The study of Muhamed Suliman et al. emphasized that NLR is a simple and inexpensive method in order to evaluate inflammatory status in patients with acute coronary syndrome [15]. Celikbilek et al. also found that NLR levels were significantly higher in the patients with ulcerative colitis, an inflammatory and chronic systemic disease, when compared to the controls. Another study was stated that NLR is an inflammation criterion in end-stage renal failure patients [16]. Uslu et al demonstrated high NLR in the patients with FMF. In addition they suggested it as a useful marker that can predict the development of amyloidosis in the same study [5]. Similarly, Ma et al. showed that the prognosis after the surgery was worse in gastric cancer

patients with high preoperative NLR [12]. Common characteristic of the last two studies is that, besides inflammation, a high NLR can also indicate bad prognosis.

In the present study, NLR was calculated and assessed in both the patient and the control groups, and it is found that NLR was higher in the patient group than the healthy controls. To the best of our knowledge, this is the first study that investigates NLR in psoriatic patients. Therefore, a high NLR support the fact that NLR can be used as a biochemical and hematological marker in order to assess the inflammatory status of several systemic diseases and also psoriasis.

Currently, PASI is the most widely also used scoring method for the measurement of severity of psoriasis in clinically. It combines the severity (erythema, induration and desquamation) and percentage of affected area [17]. There was no significant correlation between NLR and PASI scores in this study (Figure 2).



**Figure 2.** There was no correlation between NLR and PASI. (PASI: Psoriasis area and severity index, NLR: Neutrophil lymphocyte ratio.)

Even though higher NLR is not correlated with the severity of the disease, these results suggest us that the inflammation is still an ongoing process in the background and NLR can serve as an alternative marker for the assessment of the patients with mild clinical form of psoriasis. In the literature there are also some studies which demonstrate that systemic inflammatory markers (cytokines, adhesion molecules, etc., except NLR) are not always correlated with the activity of the disease in the literature. A study showed that cytokines such as TNF- $\alpha$ , IL-6, IL-8, IL-17 were higher in psoriatic patients; however, no association could be demonstrated with the severity and activity of the disease [18]. Czech *et al.* did not observe a decrease in E-selectin levels following the clinical improvement and they did not demonstrate any correlation between the PASI score and E-selectin levels [19]. Likewise, serum neopterin and TNF- $\alpha$  levels were higher in the psoriatic patients in another study, however no correlation was noted with the PASI score [20]. In the light of these findings, they proposed that systemic inflammatory

markers could be raised in the course of diseases, yet they may not have any correlations with PASI, which is a clinical index like our study.

## 5. Conclusion

NLR is an important parameter of systemic inflammation as it is an inexpensive, easily calculated and noninvasive simple hemogram test. It is also routinely obtained from each patient in daily practice. Therefore, the present study evaluated NLR in the psoriatic patients for the first time and demonstrated significantly high levels of NLR, which was expected. However, we did not find any correlations between the PASI scores and NLR. All of these findings suggest that inflammation is still ongoing in the background and it can contribute as an alternative marker for the assessment of psoriatic patients with low PASI scores. The patients with a high NLR should be closely and carefully monitored even if their PASI scores are low. The small sample size and retrospective nature were two important limitations of our study. Therefore further large-scale prospective studies are needed to cross-validate our findings in the psoriatic patients.

## Conflict of Interest

No conflict of interest was declared by the authors.

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