J Surg Med. 2019;3(8):561-563.
DOI: 10.28982/josam.599953

Research article
Araştırma makalesi

Journal of Surgery and Medicine
e-ISSN: 2602-2079

Mean platelet volume and platelet distribution width levels in discoid lupus erythematosus patients: A case-control study

Diskoid lupus eritematozus hastalarında ortalama trombosit hacmi ve trombosit dağılım genişliği seviyeleri: Bir olgu-kontrol çalışması

Zeynep Gizem Kaya İslamoğlu [1], Abdullah Demirbaş [2]

[1] Department of Dermatology, Faculty of Medicine, Selcuk University, Konya, Turkey
[2] Konya Numune Hospital, Department of Dermatology, Konya, Turkey

ORCID ID of the author(s)

ZGKİ: 0000-0002-8141-3186
AD: 0000-0002-3419-9084

Corresponding author / Sorumlu yazar:
Zeynep Gizem Kaya İslamoğlu
Address / Adres: Selçuk Üniversitesi Tıp Fakültesi, Dermatoloji Anabilim Dalı, Konya, Türkiye
e-Mail: gizemislamoglu@hotmail.com

Ethics Committee Approval: Ethical committee approval was received from Selçuk University, Faculty of Medicine, Non-interventional Clinical Studies Ethics Committee, 17.04.2019, no: 2019/74.
Etik Kurul Onayı: Etik kurul onayı, Selçuk Üniversitesi Tıp Fakültesi Girişimsel Olmayan Klinik Çalışmalar Etik Kurulu'ndan alındı, 17.04.2019, no: 2019/74.

Conflict of Interest: No conflict of interest was declared by the authors.
Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Financial Disclosure: The authors declared that this study has received no financial support.
Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

Published: 8/12/2019
Yayın Tarihi: 12.08.2019

Abstract

Aim: Platelets (PLT) play an important role in inflammatory reactions and immune responses. This study aims to evaluate PLT and PLT parameters in patients with discoid lupus erythematosus (DLE), which is characterized by inflammation.

Methods: In this case-control study, a total of 125 participants, consisting of 60 DLE patients and 65 healthy controls, were selected to participate. PLT, platelet distribution width (PDW), mean platelet volume (MPV), plateletcrit (PCT), the ratio of neutrophils to lymphocytes (NLR) and the ratio of platelets to lymphocytes (PLR) were studied retrospectively in both groups.

Results: The mean age of the patient group was 47.30 (15.14) years, and the mean age of the control group was 38.08 (13.33) years. There were no statistically significant differences between the PLT, PDW, MPV, PCT, NLR and PLR levels in DLE patients and healthy controls (P=0.365, P=0.988, P=0.160, P=0.851, P=0.898 and P=0.887, respectively).

Conclusion: To the best of our knowledge, there are no reports on PLT, PDW, PCT, NLR, PLR and MPV in patients with DLE. We did not find a significant difference in the DLE group. PLT parameters are low-cost tests that can be used to define inflammation levels in inflammatory diseases. Further prospective studies on this subject will contribute to this work.

Keywords: Platelets, Mean platelet volume, Platelet distribution width, Discoid lupus erythematosus, Inflammation

Öz

Amaç: Trombositler (PLT) inflamatuar reaksiyonlarda ve immün yanıtlarda önemli bir rol oynar. Bu çalışma, inflamasyonla karakterize diskoid lupus eritematozus (DLE) hastalarında PLT ve PLT parametrelerini değerlendirmeyi amaçlamaktadır.

Yöntemler: Bu vaka kontrol çalışmasında, 60 DLE hastası ve 65 sağlıklı kontrol grubu olmak üzere toplam 125 katılımcı seçilmiştir. PLT, trombosit dağılım genişliği (PDW), ortalama trombosit hacmi (MPV), trombosit (PCT), nötrofillerin lenfositlere (NLR) oranı ve trombositlerin lenfositlere (PLR) oranı retrospektif olarak her iki grupta da incelenmiştir.

Bulgular: Hasta grubunun yaş ortalaması 47,30 (15,14), kontrol grubunun yaş ortalaması 38,08 (13,33) idi. DLE hastalarında ve sağlıklı kontrollerde PLT, PDW, MPV, PCT, NLR ve PLR düzeyleri arasında istatistiksel olarak anlamlı bir fark yoktu (sırasıyla P=0,365, P=0,988, P=0,160, P=0,851, P=0,898 ve P=0,887).

Sonuç: Bildiğimiz kadarıyla DLE'li hastalarda hem PLT, PDW, PCT, NLR, PLR, hem de MPV hakkında çalışma yoktur. Çalışmamızda DLE grubunda anlamlı bir fark bulamadık. PLT parametreleri, inflamatuar hastalıklarda inflamasyon seviyelerini tanımlamak için kullanılabilecek düşük maliyetli testlerdir. Bu konuyla ilgili ileriye dönük çalışmalar bu çalışmaya katkıda bulunacaktır.

Anahtar kelimeler: Trombositler, Ortalama trombosit hacmi, Trombosit dağılım genişliği, Diskoid lupus eritematozus, İnflamasyon

How to cite / Atıf için: İslamoğlu ZGK, Demirbaş A. Mean platelet volume and platelet distribution width levels in discoid lupus erythematosus patients: A case-control study. J Surg Med. 2019;3(8):561-563.

Introduction

Lupus erythematosus (LE) is an inflammatory and autoimmune connective-tissue disease that predominately affects the skin. Skin manifestations of LE are divided into LE-specific and LE-nonspecific skin lesions. LE-specific lesions include chronic, subacute and acute types. Discoid lupus erythematosus (DLE) is the most common form of chronic cutaneous lupus erythematosus (LE) [1]. DLE occurs more frequently in women aged in their 40s and 50s [2]. DLE may be present alone or occur in 20% of patients with systemic lupus erythematosus (SLE). DLE generally attacks the head and neck, particularly the scalp and ears. When DLE appears on the trunk, it is associated with an increased risk of progression to SLE [3]. LE is characterized by autoantibodies and immune complexes that are a consequence of loss of immune tolerance. However, the pathogenesis of DLE remains mostly unknown. T helper-1 (Th1) dominated inflammation is thought to play a role in the etiology of DLE [4].

Platelets (PLT) play a role in inflammatory reactions and immune response. Mean platelet volume (MPV) has been identified as a platelet activation marker that significantly affects inflammatory reactions [5]. Platelet distribution width (PDW), that shows the heterogeneity in PLT morphology, is clinically related to PLT activation [6]. Plateletcrit (PCT) is a novel biomarker in inflammatory and vascular diseases such as Crohn's disease, coronary artery disease, deep vein thrombosis and sepsis. The resulting PCT provides more comprehensive information about the total platelet mass than other platelet parameters and is more sensitive [7]. Among other parameters, the ratio of neutrophils to lymphocytes (NLR) and the ratio of platelets to lymphocytes (PLR) are simple markers of systemic inflammatory response. These parameters are commonly evaluated during routine blood tests [8]. Recently, they have been studied, individually or together, in relation to various dermatologic diseases such as psoriasis, rheumatologic diseases of dermatology, cutaneous vasculitis, atopic eczema, pityriasis rosea, Behçet's disease, recurrent aphthous stomatitis and pemphigus vulgaris [5,9-11]. There are no studies in the literature that investigate the relationship between DLE and these inflammatory markers, and to the best of our knowledge, this is the first study to examine the association between these markers and DLE.

This study aims to evaluate the relationship between MPV, PDW, PCT, NLR and PLR levels in patients with DLE compared to healthy controls and to ask: 'Can these markers be a specific indicator in disease?'.

Materials and methods

This study was approved by the Institutional Review Board on 17.04.2019 and numbered: 2019/74. This was a retrospective, case-control study conducted between January 2013 and March 2019. The study group consisted of patients with DLE of the face, scalp, neck and body and included healthy controls who had never experienced DLE. The demographic characteristics and laboratory information for both the sample and the controls were recovered from the health center's database. The data consisted of age, sex, laboratory markers as white blood cell count (WBC; K/uL), platelet count (PLT, K/uL), PCT, MPV (K/uL), neutrophil count (NE; K/uL), lymphocyte count (LY; K/uL), neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR).

The diagnosis of DLE in the patient group involved a combination of physical examination, histology and antibody serology. Patients with dermatological diseases other than DLE or who had an active infection, malnutrition, anemia, thrombocytopenia, immunodeficiency, chronic inflammatory skin disease, rheumatologic, hematologic, cardiac diseases, systemic lupus erythematosus or who used medication were excluded. The healthy control group comprised subjects chosen from the database who had no DLE or any other active infection, no systemic or dermatological-inflammatory disease and no history of medication use.

Statistical analysis

The data obtained for the study were analyzed using SPSS (Statistical Package for Social Sciences) for Windows 22.0. Number, percentage, mean and standard deviation were used as descriptive statistical methods for the evaluation of the data. The power of the test was calculated with G*Power 3.1 program. A sample size of 70 people, 35 in each group, was needed for 80% power and 0.05 type-1 error at 95% confidence interval (df=39; t=1.668). The t-test was used to compare the quantitative continuous data between the two independent groups. The relationship between variables was tested by chi-square analysis. The findings were evaluated at a 95% confidence interval and at a 5% significance level.

Results

Sixty patients with DLE and 65 healthy controls were evaluated in this study. The median age of the patient and control groups were 47.30 (15.14) years and 38.08 (13.33) years, respectively. The mean age of the patient group (47.3) was higher than the mean age of the control group (38.1) ($t_{(123)}$=3.620; P<0.001). Twenty (33.3%) patients were male and 40 (66.7%) were female; 33 (50.8%) control group participants were male and 32 (49.2%) were female. Women were significantly more common in the DLE group (x^2=3.884; P=0.036). The proportion of men in the control group was higher than in the patient group (Table 1). We did not find any significant differences between the groups according to the WBC, MPV, PLT, NLR, PLR, PDW, PCT values (P=0.481, P=0.160, P=0.365, P=0.898, P=0.887, P=0.988 and P=0.851, respectively). The laboratory findings are summarized in Table 2.

Table 1: The distribution of gender according to the groups

		Patients		Controls		X^2
		n	%	N	%	*P*-value
Gender	Male	20	%33.3	33	%50.8	3.884
	Female	40	%66.7	32	%49.2	0.036

Table 2: Average of laboratory parameters in groups

Groups	Patients (n=60)		Controls (n=65)		*P*-value
	Mean	SD	Mean	SD	
WBC	7.884	3.534	7.536	1.474	0.481
Neutrophil	4.536	2.783	4.480	1.295	0.884
Lymphocyte	2.570	1.519	2.330	0.562	0.253
NLR	2.071	1.446	2.044	0.838	0.898
Platelet	250.855	65.487	260.200	48.807	0.365
PLR	119.289	82.092	117.702	34.288	0.887
MPV	8.707	1.569	8.383	0.867	0.160
PDW	16.452	2.702	16.446	0.728	0.988
PCT	0.218	0.053	0.217	0.041	0.851

SD: Standard deviation

Discussion

DLE is the most common form of chronic cutaneous erythematosus. The lesions have a tendency to cause secondary atrophy or scarring. Most patients with DLE do not have significant systemic disease, yet DLE has relapsing‑remitting courses. [1]. PLT activation has been observed in patients with SLE; this PLT activation can make up the decrease in the PLT count consumed in SLE [12,13].

Complete blood count parameters can be calculated easily in routine and low-cost laboratory tests and provide very important markers of systemic inflammation [14]. In particular, PDW and MPV levels have been examined in recent studies. They have become popular and vital markers of PLT activation. In a study, Kim et al. [15] found higher PDW and MPV values in patients with psoriasis, a chronic inflammatory skin disease like DLE. In another study with lichen planus, Özlü et al. [16] found higher PDW levels and lower MPV levels in the patient group when compared to a control group. Studies with SLE showed lower MPV values and higher PDW values in patients and a positive relationship between PDW and disease activity [17,18]. In these studies, the decreased MPV values were explained by the consumption of large activated PLTs in extravascular sites of inflammation [19]. In our study, we did not find a significant difference between PDW and MPV levels in DLE patients and the healthy control group. This can be explained by the low rate of systemic association in patients with DLE and some differences in the pathogenesis, especially cutaneous inflammatory infiltrates that are dominated by Th1, but not Th17 in DLE cells in contrast to systemic lupus erythematosus.

Few dermatological studies have examined NLR and PLR in patients with psoriasis. Two of these studies reported a significant increase in NLR among patients relative to the control subjects [5,20]. Other studies have investigated the use of NLR and PLR with diabetes mellitus, acute coronary syndrome, ulcerative colitis, end-stage renal disease, tuberculosis, rheumatoid arthritis, cirrhosis, and familial Mediterranean fever [21,22]. There was no significance in PLR and NLR in our study.

In addition to the other studies mentioned, PCT has been recognized as a systemic inflammatory response marker. There has been no study that considers the relationship between PCT and dermatological diseases. In one study of an inflammatory disease, PCT was significantly elevated in patients with Crohn's disease compared with healthy controls [7].

There were some limitations to our study. First, this was a retrospective study and some of the patients' characteristics, such as their smoking history and dietary habits, were inadequate for evaluating their co-effects on the PLT indices and other factors. Second, as the study was retrospective, we could not investigate the relationship with disease severity. Third, the numbers of patients and controls were relatively small. Multi-center, prospective studies with larger sample sizes should be conducted in the future.

Conclusion

Our study provides the first report that the PLT and PLT parameters did not show a significant difference in insulating DLE patients. Further prospective works are needed to better understand the relevance of these findings.

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This paper has been checked for language accuracy by JOSAM editors.
The National Library of Medicine (NLM) citation style guide has been used in this paper.

Suggested citation: Patrias K. Citing medicine: the NLM style guide for authors, editors, and publishers [Internet]. 2nd ed. Wendling DL, technical editor. Bethesda (MD): National Library of Medicine (US); 2007-[updated 2015 Oct 2; cited Year Month Day]. Available from: http://www.nlm.nih.gov/citingmedicine