## Original Research

# Platelet Count and Mean Platelet Volume in Psoriasis Patients

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## Abstract

**Objectives:** Psoriasis is a chronic inflammatory, immune-mediated disease, and platelets have an important role in the pathomechanisms of psoriasis. Recent studies showed that MPV (mean platelet volume) could be used as a marker of platelet activation. In this study, we aimed to investigate the MPV level and platelet count in psoriasis patients and its association with disease severity.

**Methods:** We designed a case-control study with 28 psoriasis patients and age and sex-matched 30 healthy controls. Haematologic parameters and sedimentation rates compared between groups. These parameters also correlated with PASI (Psoriasis Area and Severity Index) score.

**Results:** MPV and platelet count were significantly higher in patients with psoriasis than controls (p=0.012, p=0.015). Also, platelet count was showed positive correlation with PASI scores (r=0.424, p=0.025). The sedimentation rate was not statistically different between groups.

**Conclusion:** There are many conflicting results about the correlation of haematologic parameters and psoriasis. We found that MPV and platelet counts higher in the psoriasis group, which suggests that platelets play an important role in the pathomechanism of psoriasis and may be helpful in assessing treatment outcomes.

**Keywords:** Mean platelet volume; psoriasis; platelet; psoriasis area and severity index.

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Platelets are known to play an important role in inflammation and inflammatory diseases.[1] MPV (mean platelet volume) is accepted as a marker in platelet activation.[2] Psoriasis is an immune-mediated chronic systemic disease. The relation of platelet activation with the pathophysiology of psoriasis has also been described.[3] Activated platelets are thought to exert this effect by enhancing the migration of leukocytes into the skin and increasing cytokine release. In addition, the use of MPV has been suggested as a predictor[4] for MPV, cardiovascular risk, and marker[5] for ankylosing spondylitis and rheumatoid arthritis. In recent studies, the relationship between MPV, platelet count and other hematological parameters and psoriasis has been investigated, but different results have been found. In this study, we compared the platelet count and MPV levels of psoriasis patients with the healthy control group and examined whether these values correlated with PASI (Psoriasis Area Severity İndex).

## Methods

This case-control study included 28 psoriatic patients and age and gender-matched 30 healthy control subjects. Non-

smokers and non-obese patients without any systemic disease (such as cardiac diseases, diabetes mellitus, hypertension and hyperlipidemia), who were admitted to our clinic in the last year and diagnosed with psoriasis by a dermatologist were included in our study. The control group included nonsmoker and nonobese volunteers who had a similar diet and lifestyle without any known diseases. Patients with fasting total cholesterol>240 mg/dL, triglyceride>160mg/dL, plasma glucose>110 or patients who used drugs affecting platelets for the last two weeks (acetylsalicylic acid, antiepileptics, heparin, non-steroidal anti-inflammatory drugs) were not included in the study groups. After 12 hours of fasting, peripheral venous blood samples were taken, hemogram parameters were transferred in an EDTA tube and studied in our hospital laboratory. Demographic features, hemogram parameters, sedimentation rate and PASI values of psoriasis patients were recorded. A voluntary consent form was obtained from the ethics committee and participants for this study.

## Statistical Analysis

SPSS (15.0 for Windows) program was used for statistical analysis. Descriptive statistics and categorical variables were given as numbers and percentages, mean, standard deviation, minimum and maximum for numerical variables. For intergroup comparison of independent numerical variables, Student's t-test was used when the condition of normal distribution was met, Mann-Whitney U test was used when the normal distribution condition was not met. The ratio of the categorical variables between groups was compared using Chi-square analysis. In situations where conditions were not met, the Monte Carlo simulation test was used. Relationships between numerical variables were examined with Spearman Correlation Analysis since the parametric test condition was not achieved among numerical variables. The statistical alpha significance level was accepted as $p<0.05$.

## Results

In our study, a statistically significant difference was not detected between mean ages and gender of 28 psoriatic patients (including 17 (60%) female patients) and 30 control subjects ($p>0.05$) (Table 1). Median (4.85), minimum (1.16), maximum (13.8), mean ($\pm$SD (5.5$\pm$3.4) PASI values of psoriatic patients were minimum, maximum, mean value$\pm$SD was. Mean MPV values, as indicated (Fig. 1). Mean MPV values (Fig. 1) and platelet counts of psoriatic patients were statistically higher than those of the control group ($p=0.012$, and $p=0.015$, respectively). Although sedimentation rate averages were higher in the psoriasis group, this difference was not statistically significant (Table 1).

In patients with psoriasis, the number of platelets increased as PASI increased (Fig. 2). In the Spearman correlation analysis, a statistically significant correlation was found between the PASI level of the psoriasis group and the number of platelets ($p=0.025$). MPV level was not related to other
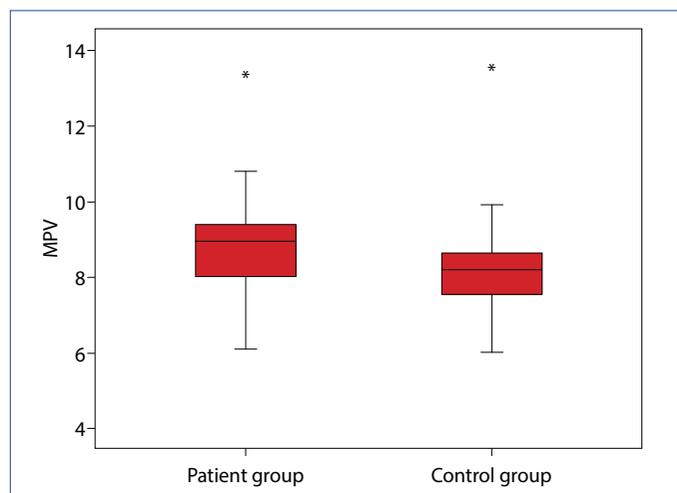


**Figure 1.** Comparison of the MPV values between psoriasis and control groups.

**Table 1.** Comparison of the patient, and control groups concerning demographic characteristics, platelet counts, sedimentation rates and mean MPVs

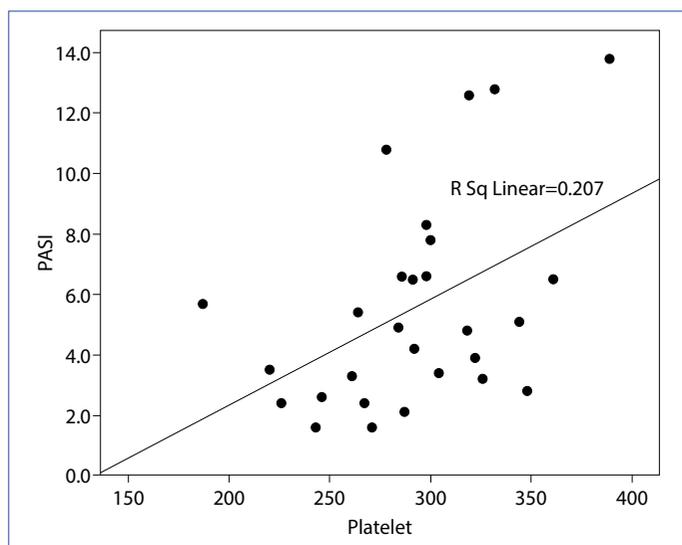| | Patient Group (n=28) | | Control Group (n=30) | | |
| --- | --- | --- | --- | --- | --- |
| | n | % | n | % | p |
| Gender | | | | | |
| Female | 17 | 60.7 | 18 | 60 | 0.956 |
| Male | 11 | 39.3 | 12 | 40 | |
| | Mean±SD | Min-Max | Mean±SD | Min-Max | |
| Age | 45.4±16.3 | 18-72 (43) | 43.2±13.6 | 17-79 (42) | 0.574 |
| Platelet counts ($10^3$/mm³) | 291.5±44.5 | 187-389 (291.5) | 265±36.5 | 168-370 (281.1) | 0.015 |
| Sedimentation rate (mm/sa) | 14.9±13.4 | 1-48 (12.5) | 11.2±12.9 | 1-70 (9.5) | 0.275 |
| MPV (fl) | 8.9±1.3 | 6.12-13.4 (8.94) | 8.2±1.4 | 6-13.6 (8.2) | 0.012 |

MPV: Mean platelet volume

**Figure 2.** Distribution map of the correlation between PASI and platelet counts in the regression analysis.

**Table 2.** Evaluation of the correlation between PASI, MPV levels and other parameters in the psoriasis group

| | PASI | | MPV | |
|---|---|---|---|---|
| | r | p | r | p |
| MPV (fl) | -0.030 | 0.881 | | |
| Sedimentation rate (mm/sa) | 0.229 | 0.241 | -0.084 | 0.671 |
| Age (year) | 0.180 | 0.359 | -0.071 | 0.721 |
| White blood cell count ($10^3/mm^3$) | 0.101 | 0.610 | -0.253 | 0.194 |
| Neutrophil count ($10^3/mm^3$) | 0.305 | 0.115 | 0.006 | 0.975 |
| Red blood cell count ($10^6/mm^3$) | -0.294 | 0.128 | -0.033 | 0.866 |
| Hemoglobin (g/dL) | -0.004 | 0.984 | 0.235 | 0.228 |
| Hematocrit (%) | -0.171 | 0.384 | -0.104 | 0.599 |
| MCV (fl) | -0.225 | 0.249 | 0.187 | 0.340 |
| RDW (%) | 0.037 | 0.852 | -0.077 | 0.698 |
| Platelet count ($10^3/mm^3$) | 0.424 | 0.025 | -0.201 | 0.306 |

MPV: Mean platelet volume, MCV: Mean corpuscular volume, RDW: Red blood cell distribution width

evaluated hemogram parameters, including PASI and sedimentation rate (Table 2).

## Discussion

To date, many markers related to psoriasis have been studied. Despite this, a precise biomarker has not been identified. Because of its complex pathogenesis and its association with other pathologies as diabetes mellitus and metabolic syndrome, a consensus has been reached suggesting that psoriasis is a systemic disease.[6]

In previous studies, platelets and platelet activation markers (PDW (platelet distribution width, platelet-lymphocyte ratio, p-selection and MPV) have been investigated in pa-

tients with psoriasis and among them psoriasis were found to be mostly related to MPV.[7] A significant correlation has been in the literature between MPV levels and cardiovascular diseases, systemic lupus erythematosus, systemic sclerosis and rheumatoid arthritis.[8,9] Since controversial results have been reported in the literature, in our study, we excluded all conditions (smoking, obesity, systemic diseases, drugs) potentially affecting platelet counts aiming to attain more reliable data in the patient and the control groups. We detected a higher MPV levels and platelet counts in psoriatic patients when compared with the healthy population.

In their study with 20 male psoriatic patients, Karabudak et al. found higher MPV values in psoriatic patients, but they did not compare platelet counts. In their study Canpolat et al. with 106 patients, including psoriatic and psoriatic arthritis patients (in their study 10), they detected higher MPV level in these patients compared to the control group and did not find any intergroup difference bas for PASI and MPV. In our study, there was no significant correlation between MPV level and PASI values, but we found a statistically significant correlation between MPV values and platelet counts. This situation may have occurred due to our smaller sample size. Canpolat et al. obtained different results because they included smokers in their study. Indeed, smoking is known to increase MPV and platelet counts. In a retrospective study conducted by Ünal et al.[11] with 320 psoriatic patients, they found higher leukocyte, neutrophil, platelet counts, MPV, values, neutrophil/lymphocyte ratio and platelet/lymphocyte ratio higher than the control patients. Unlike previous studies, they found an inverse correlation between MPV and PASI. Similar to our study, they found comparable sedimentation rates in both the patient and control groups.

Saleh et al.[12] did not find any statistically significant difference in MPV levels in their study performed with 25 psoriatic and 25 control patients. Instead, they found CD62 (P-selection) levels higher in the psoriasis group and also a positive correlation with PASI values. The reason why MPV is different from other studies, and our study may be the small number of patients. Vijayashree et al.[7] found that MPV levels were statistically significantly higher in 50 psoriatic patients and when compared with 50 age-matched control patients. However, they found higher platelet counts in the control group. This may be because they did not exclude thrombocytopenic drug users in the psoriasis group and the presence of thrombocytopenia in three patients.

Our study shows that MPV and platelet counts are high in psoriatic patients, and platelet counts are associated with PASI. Since platelet counts and MPV levels are the pa-

rameters examined on the hemogram, their being easily available cheap tests make them easier to use in our daily practice. Detection of higher MPV and platelet counts in psoriatic patients supports the role played by platelets in the etiopathogenesis of psoriasis and also reveals systemic inflammatory characteristics of psoriasis. This relationship should be supported by studies with larger patient populations.

**Disclosures**

**Ethics Committee Approval:** Approved by Katip Çelebi University ethic comittee, 2015 number 218.

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**Conflict of Interest:** The authors have no conflict of interest.

**Authorship Contributions:** Concept – S.S.; Design – E.C.; Supervision – I.A.; Materials – S.S.; Data collection &/or processing – E.O.; Analysis and/or interpretation – E.O.; Literature search – F.S.A.; Writing – E.O.; Critical review – I.A.

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