



# Comparing Mean Platelet Volume Values in Patients with Recurrent Aphthous Stomatitis and Patients with Behcet's Disease

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## ABSTRACT

**Objective:** Platelets play an important role in the pathogenesis of disorders associated with the local or systemic inflammation. Mean platelet volume (MPV) is a marker for platelet activation, and larger platelets are more activated. In this study, we aimed to investigate MPV values in patients with Behcet's disease, patients with recurrent aphthous stomatitis, and controls.

**Methods:** Patients with Behcet's disease and patients with recurrent aphthous stomatitis who presented to a dermatology outpatients clinic were enrolled in this study. Age, sex, MPV values, vitamin B12, and TSH were retrospectively recorded.

**Results:** A total of 113 patients with recurrent aphthous stomatitis, 87 patients with Behcet's disease, and 71 healthy controls were enrolled in this study. Among them, 74 (65.5%) of the patients with recurrent aphthous stomatitis were females, and 39 (35.5%) were males. Additionally, 50 (63.4%) of the patients with Behcet's disease were females, and 37 (42.5%) were males. Finally, 45 (63.4%) of the controls were females, and 26 (36.6%) were males. There was no statistically significant difference in MPV values in patients with Behcet's disease, patients with recurrent aphthous stomatitis, and control group.

**Conclusion:** MPV is a simple and useful parameter seen in routine complete blood count (CBC) laboratory tests. It is investigated as an inflammation marker. Although in some studies, MPV was high in patients with Behcet's disease, in our study, we did not observe any statistically significant difference in patients with Behcet's disease, patients with recurrent aphthous stomatitis, and control group.

**Keywords:** MPV, recurrent aphthous stomatitis, Behcet's disease

## Introduction

Recurrent oral aphthae (ROA) are among the most common diseases of the oral mucosa and 20% of the population is affected. It is an inflammatory condition whose etiology is not clearly known and appears in the oral mucosa as painful, recurrent, single or multiple ulcers (1, 2). It is thought to occur due to immune-mediated epithelial damage as a result of the disruption of the immune system. The lesions usually appear as white membranes on the ground and as erythematous halo in the periphery. It is mostly seen in non-keratinized oral mucosa surfaces (3). There

are 3 types as minor, major and herpetiform. While minor ulcers are less than 1 cm and heal without a scar, major aphthae are over 1 cm and the healing period can take weeks or months, and they heal by scarring. Herpetiform aphthae consist of a number of small minor aphthae in group (4).

Behcet's disease (BD) is an inflammatory disease that may involve many systems with recurrent oral aphthae, genital aphthae, and ocular findings. Oral ulcer, genital ulcer, ocular involvement, vascular findings, neurological findings, joint findings, urogenital findings, cardiac findings and gastrointestinal findings can be

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seen in BD (5, 6). The disease was first described by Turkish dermatologist Hulusi Behçet in 1937 as “oral recurrent oral aphthae, genital aphthae, and uveitis”, which are 3 symptom complexes (7).

Most of the findings of BD are thought to be due to vasculitis. All small, medium and large vessels, and arterial and venous system can be involved in BD (5). The diagnosis of BD is made according to the diagnostic criteria of the international study group. The BD-related criteria of the International Study Group are recurrent oral aphthae and the positivity of 2 of the followings; genital aphthae, typical ocular findings, typical skin findings, or pathergy test. International diagnostic criteria of Behçet’s disease were revised in 2013 and the scoring system was developed (Table 1) (8). According to the scoring system; ocular lesions, oral and genital aphthae are scored as 2 points each, and central nervous system involvement and vascular lesions are scored as 1 point. If pathergy is applied, it is evaluated as 1 point (Pathergy test is optional and primary scoring system does not include pathergy test). When the pathergy test is used as a score, 1 extra point is required for the diagnosis). If a patient receives a score  $\geq 4$ , he/she is diagnosed with BD.

Platelets are involved in the pathogenesis of local and systemic inflammation. Mean platelet volume (MPV) is indicative of platelet activation; large platelets are more active (9). MPV is used to measure platelet functions and activation (10, 11). MPV values change in inflammatory diseases. Chemokines, cytokines and other inflammatory mediators are secreted from platelets (11). In addition to familial mediterranean fever (FMF), rheumatoid arthritis, asthma, hypertension, diabetes mellitus, myocardial infarction, secondary pulmonary hypertension, acute rheumatic fever, and many inflammatory diseases such as BD and ROA; MPV values were also studied in gastroenteritis such as entamoeba and rotavirus.

## Methods

Our study includes the patients who were admitted to Bezmi Alem Vakıf University Medical Faculty, Skin and Venereal Diseases outpatient clinics due to recurrent oral aphthae and Behçet’s disease between January 2014 and 2016. Age, gender, mean platelet volume values, vitamin B12, TSH, and pathergy values of the patients were retrospectively reviewed and recorded. BD diagnoses were made according to the criteria of the International Study Group and the patients who were followed up were included in the study. As the control group, the patients who were admitted to our outpatient clinics with hair loss or tinea pedis, who did not have systemic disease and who were compatible with our study group patients in terms of age and gender were included in the study.

Our study was conducted in accordance with the principles of World Medical Association Declaration of Helsinki “Ethical Principles for Medical Research Involving Human Subjects” (amended in October 2013).

## Statistical analysis

Statistical analyses were performed using SPSS for Windows 15.0 (Statistical Package for the Social Sciences Inc.; Chicago, IL, USA). Kruskal Wallis test was used in the comparisons and  $p < 0.05$  was considered significant. Mann-Whitney U was used for age compatibility and chi-square test for gender compatibility between the control group and the study groups.

## Results

The study included 113 patients with ROA, 87 patients with BD, and 71 healthy individuals for the control group. In our study, Mann-Whitney U was used in terms of age compatibility between the control group and the study groups; chi-square test was used for gender compatibility, and the result was found to be consistent.

Of the patients with ROA, 74 (65.5%) were female and 39 (35.5%) were male. Fifty (63.4%) of the patients with BD were female and 37 (42.5%) were male. There were 45 (63.4%) female patients and 26 (36.6%) male patients in the control group. The mean age of the patients with ROA was 31.8 years, the mean age of the patients with BD was 39.1 years and the mean age of the control group was found as 38.5. There was no significant difference between the patients with recurrent oral aphthae and BD and the control group in terms of MPV values (Table 2). No significant difference was found in patients with ROA and BD and the control group in terms of vitamin B12 values. There was no statistically significant difference among the three groups in terms of ferritin values.

**Table 1: International Diagnostic Criteria for Behçet’s Disease: Scoring system, 4-point Behçet’s disease diagnosis**

Symptoms/findings	Score
Ocular findings	2
Genital aphtha	2
Oral aphtha	2
Skin lesions	1
Neurological findings	1
Vascular Findings	1
Positive Pathergy Test*	1

\*Pathergy test is optional and primary scoring system does not include pathergy test. When the pathergy test is used as a score, 1 extra point is needed for the diagnosis

**Table 2: MPV values in patients with recurrent oral aphthae, in Behçet’s patients and in the control group**

Patient	MPV (average)	n	Standard deviation	Average
ROA	8.13	113	0.97	7.98
BD	8.53	87	2.02	8.00
Control	8.04	71	1.16	8.00
Total	8.23	271	1.44	8.00

$p=0.493$ , Kruskal Wallis test was used. MPV: mean platelet volume; ROA: recurrent oral aphthae; BD: Behçet’s disease

## Discussion

Thrombocyte activation is considered to be important in diseases with thrombosis, inflammation and endothelial dysfunction in the pathophysiology. MPV is a value used to measure platelet size and is thought to indicate platelet activation (25). It is thought that platelets with large volumes are more active, and more prone to aggregation and endothelial damage (22). It has been suggested that large platelets can store and release more serotonin, beta thromboglobulin and thromboxane A<sub>2</sub> (29, 30). In recent years, MPV has been shown to be a marker of many inflammatory diseases (9, 12-28).

In their study they conducted with children with amebiasis, Çelik et al. (9) found the MPV values higher than healthy control group. In this study, they observed positive correlation between MPV values and leukocyte values. They thought that MPV values increased in low-grade inflammation, that newly produced large-volume platelets were released in the environment in higher amounts, and that MPV values could be found lower in cases of severe inflammation due to the increase in the consumption of large platelets.

MPV values were also investigated in BD and different results were obtained (21-27). In the study of Açıkgöz et al. (21) found that MPV values in patients with thrombosis in BD were higher than in those without thrombosis. They did not find a relationship between other findings and MPV, and between disease activity and MPV. Türkcü et al. (22) did not find a significant difference in terms of MPV values between Behçet patients with active uveitis and BD patients who did not have uveitis. They determined the MPV value to be lower in comparison to the control group.

Balta et al. (25) found in their study that arterial stiffness was higher in BD patients than in the control group, and they found MPV values high in people with arterial stiffness. In this study, MPV values in BD were found to be higher than in the control group. Similarly, Lee et al. (28) also found in their study that the MPV value was low in Behçet's Disease and they did not detect any difference in terms of MPV values between BD patients with and without thrombosis.

Çelik et al. (31) found that MPV values were lower in children with rotavirus gastroenteritis compared to the control group. They thought that low MPV values could be due to increased platelet consumption in case of severe inflammation and impaired thrombopoiesis depending on rapid production.

Özdemir et al. (32) found no difference between pediatric patients with acute rheumatic carditis and control group in terms of MPV values. In this study, there was no statistically significant difference between MPV values before and after treatment.

Nacaroğlu et al. (33) compared the MPV values between pediatric patients who were admitted due to asthma exacerbations and healthy children of the same age group, and they found no significant difference. They found MPV values high in patients with severe resistant asthma during asymptomatic period.

They thought that this may be caused by the presence of more inflammation in the airway in patients with severe persistent asthma.

Mean platelet volume indicates the size of platelets and is also a marker of inflammation. Elevations in MPV values can be seen in diseases such as autoimmune diseases, thrombocytopenia, congestive heart failure, acute pulmonary embolism, and hepatitis B and C; low MPV values can be seen in diseases such as anemia, chronic renal failure, Crohn's disease and ulcerative colitis. The prognosis in Behçet's disease is affected by many factors such as age, male gender, major organ involvement and central nervous system involvement. MPV values may have different results in different periods of the disease. Treatments that are received may affect MPV values. Whether or not the blood is evaluated immediately after it is taken can also affect the MPV values (26).

In our study, we found no significant difference in patients with BD and ROA, and in the control group in terms of MPV values. Due to the retrospective nature of our study, the waiting-period of the blood samples taken is not known. Low number of patients and the fact that the BD patients were not grouped according to the prognosis, the drugs used were not evaluated, and the parameters such as smoking, alcohol use, and body mass index were not evaluated are the limiting factors for our study. Prospective studies with larger patient groups are required.

## Ethics

**Ethics Committee Approval:** Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amended in October 2013).

**Informed Consent:** Due to the retrospective design of the study, informed consent was not taken.

**Peer-review:** Externally peer-reviewed.

## Author Contributions

Concept - Ö.S.K.; Design - D.B.Ö.; Supervision - N.O.; Data Collection and/or Processing - D.B.Ö.; Analysis and/or Interpretation - Ö.S.K.; Literature Search - D.B.Ö.; Writing Manuscript - D.B.Ö.; Critical Review - N.O.

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