Mean Platelet Volume as an Inflammatory Marker in Chronic Sinusitis

Sema Koç, Ahmet Eyibilen, Ahmet Serhat Erdoğan

Gaziosmanpasa University, School of Medicine Department of Otorhinolaryngology, Tokat, Turkey

Eur J Gen Med 2011;8(4):314-317

Received: 13.10.2011

Accepted: 14.12.2011

ABSTRACT

Aim: *Chronic rhinosinusitis (CRS) is characterized by persistent inflammation of the nasal and paranasal sinus mucosa. The pathogenesis of chronic sinusitis is not yet clearly understood. Recently, mean platelet volume (MPV) has been known as a simple inflammatory marker in inflammatory diseases. The aim of this study was to investigate the levels of hematological parameters such as red blood cells (RBC), haemoglobine (Hb), haematocrit (Htc), white blood cells (WBC), platelet (PLT), and mean platelet volume (MPV) in patients with CRS without nasal polyposis.*

Method: *After overnight fasting, peripheral venous blood samples were taken from patients with CRS and control groups. We measured the complete blood count (CBC) parameters in a blood sample collected in etilendiamintetraasetik asit (EDTA). Laboratory data were screened via hospital's computerised database.*

Result: *CRS group consisted a total of 90 patients, 34 (38%) male and control group consisted 90 patients, 44 (49%) male. WBC, RBC, Hb and Htc levels were similar in patient and control groups. However, PLT level was borderline higher in CRS group compared to control group (284±87 vs 253±59, P=0.06) and MPV level was significantly higher in CRS group compared to control group (8.0±0.9 vs 7.3±0.9, P<0.001).*

Conclusion: *As CRS is a chronic inflammatory disorder, we believe that platelets have a role in CRS. If MPV value is an indicator of inflammation, increased MPV values may be associated with CRS.*

Key words: *Chronic rhinosinusitis, platelet, mean platelet volume*

Correspondence: *Sema Koc, MD*
Gaziosmanpasa University School of Medicine Department of Otorhinolaryngology, Tokat/Turkey
Tel: +905054983511
E-mail: drsemakoc@gmail.com

Kronik Sinüzitte Antiinflamtuar Olarak Ortalama Trombosit Hacmi

Amaç: *Kronik rinosinuzit paranazal sinüs ve nazal mukozanın kronik inflamasyonuyla karakterize bir hastalıktır. Kronik rinosinuzitin etyopatogenezi henüz tam olarak bilinmemektedir. Özellikle son zamanlarda kronik inflamasyonda plateletlerin önemli fonksiyonları olduğu ve mean platelet volume (MPV)'ün bazı inflamatuar hastalıklarda inflamatuar belirteç olarak kullanılabileceği bildirilmiştir. Bu çalışmanın amacı kronik rinosinuzit hastalarında eritrosit, hemoglobin, hemotokrit, lökosit, platelet ve MPV gibi hematolojik parametreleri araştırmaktır.*

Metod: *Kronik rinosinuzit hastaları ve sağlıklı kontrol grubundan 12 saat açlık sonrası etilendiamintetraasetik asit (EDTA)'li tüplere kan alındı. Alınan kanlarda tam kan sayımı yapıldı. Hasta ve kontrol grubunun verileri kaydedildi.*

Bulgular: *Çalışmaya 90 kronik rinosinuzit hastası (34 (% 38) erkek, 56 (% 62) kadın) ve 90 kontrol grubu (44 (% 49) erkek, 46 (%51) kadın) dahil edildi. Lökosit, eritrosit, hemoglobin ve hemotokrit değerleri kronik rinosinuzit grubu ve kontrol grubunda benzer idi. Fakat platelet düzeyi kronik rinosinuzit grubunda kontrol grubuna göre sınırda yüksek idi (284±87 vs 253±59, P=0.06) ve MPV düzeyi kronik rinosinuzit grubunda kontrol grubuna göre belirgin yüksek idi (8.0±0.9 vs 7.3±0.9, P<0.001).*

Sonuç: *Kronik inflamatuar bir hastalık olan kronik rinosinuzit etyopatogenezinde plateletlerin rolü olabilir ve kronik rinosinuzitte düzeyi artan MPV inflamasyonun bir belirteci olabilir.*

Anahtar kelimeler: *Kronik rinosinüzit, trombosit, ortalama trombosit hacmi*

INTRODUCTION

Chronic rhinosinusitis (CRS) is a prevalent health condition, causing significant morbidity and resulting in great financial cost. CRS is characterized by sinonasal mucosal inflammation lasting more than 12 weeks (1). Patients may experience nasal obstruction, smell loss, a sensation of facial or forehead heaviness, rhinorrhea and headache. The pathogenesis of chronic sinusitis is not yet clearly understood. There are studies reporting that deterioration of normal epithelial function as a result of inflammation can cause mucostasis and microbial colonization (2).

Inflammation stimulates platelets. Although platelets are primarily known for pivotal role in hemostasis, in recent years it has been shown that platelets can act as inflammatory cells by undergoing chemotaxis, releasing various chemokines ve cytokines. Large platelets have more granules, and so inflammatory cytokine and chemokine releases are more prominent (4). Mean platelet volume (MPV) is readily measured by clinical hematology analyzers and is an indicator of platelet activation. An increase in platelet size as a result of platelet activation has been shown to be associated with numerous inflammatory disease (5-9).

To the best of our knowledge, there is no study evaluating the relationship between CRS and MPV. The aim of this study was to investigate the levels of hematological parameters such as red blood cells (RBC), haemoglobine (Hb), haematocrit (Htc), white blood cells (WBC), platelet (PLT), and MPV in patients with CRS without nasal polyposis.

MATERIALS AND METHODS

Patients with CRS all had symptoms of nasal obstruction, headache, and nasal discharge for more than 3 months. The diagnosis of CRS was supported by the clinical history, endoscopic examination, and computed tomographic scan of the paranasal sinuses, which showed opacification of the paranasal sinuses. Patients with chronic underlying diseases (including cardiovascular disorders, malignancy, asthma, cystic fibrosis, metabolic disease, renal or liver disease or gross immunodeficiency) were excluded from study. The controls were healthy volunteers. None of the controls had suffered from sinusitis, rhinitis, or chronic illnesses during the previous year. Blood samples were drawn after a fasting period of 12 h from patients with CRS and control groups. We measured the complete blood count (CBC) parameters in a blood sample collected in etilendiamintetraasetik asit (EDTA). Laboratory data were screened via hospital's computerised database. The reference values for MPV ranged between 7.0 and 11.0 fL and for platelet 150-400 103 /μL.

RESULTS

Chronic rhinosinusitis group consisted a total of 90 patients, 34 (38%) male and control group consisted 90 patients, 44 (49%) male. There were no significant differences between patientsand control groups in terms of age and gender. As seen in Table 1, WBC, RBC, Hb and Htc levels were similar in patient and control groups. However, PLT level was borderline higher in CRS group compared to control group (284±87 vs 253±59, p=0.06)

***Table 1**. Study parameters in chronic sinusitis and control groups*

	Chronic sinusitis	*Control*	*p value*
WBC (/µL)	*7000±1700*	*7000±2000*	*ns*
RBC (106/µL)	*4.7±0.5*	*4.6±0.5*	*ns*
Hb (g/dL)	*13.2±1.5*	*13.3±1.3*	*ns*
Htc (%)	*40±4*	*41±6*	*ns*
PLT (103/µL)	*284±87*	*253±59*	*ns*
MPV (fL)	*8.0±0.9*	*7.3±0.9*	*<0.001*
Age, y	*42±13*	*44±16*	*ns*
Male, n (%)	*34 (38)*	*44 (49)*	*ns*

Values are presented as mean±SD,
WBC, white blood cells; RBC, red blood cells; Hb, haemoglobine; Htc, haematocrit; PLT, platelet; MPV, mean platelet volume

and MPV level was significantly higher in CRS group compared to control group (8.0±0.9 vs 7.3±0.9, p<0.001).

DISCUSSION

In this study, the values of WBC, RBC, Hb and Htc levels were similar in patient and control groups. However, PLT level was borderline higher in CRS group compared to control group and MPV level was significantly higher in CRS group compared to control group.

The pathogenesis of CRS is less well understood and is believed to be multifactorial. Multiple inflammatory, infectious, host or structural factors, biofilms, and superantigens variably contribute to trigger and sustain the persistent inflammation in CRS. In a few cases of CRS, important underlying conditions cause the pathogenesis, such as sinonasal anatomic anomalies, cystic fibrosis, primary ciliary dyskinesia. However, the majority of cases of CRS are currently considered to be idiopathic (11). CRS is characterized by persistent inflammation of the nasal and paranasal sinus mucosa. CRS without nasal polyps represented a predominant neutrophilic inflammation and TH1 milieu in the stroma (12). While factors affecting the chronic inflammation and edema development in CRS are not clearly revealed, cytokines like IL-1α, IL-1ß, IL-6, interferon-α, TNF, and IL-8 have been reported to have important roles in the inflammatory response (13).

Platelets are known for a long time to have important roles in hemostasis. There are various studies, which have reported that immune cells like polymorphonuclear leukocytes have important roles in chemotaxis; phagocytosis of microorganisms like bacteria, virus and parasites; vascular permeability increase in the inflammation; and PLTs have important roles in the secretions of some inflammatory cytokines (14). When PLTs are activated, they have changes in their shapes and sizes. PLT function and size correlate because larger PLTs contain more granules and and are metabolically and enzymatically more active (15). MPV which is a machine-calculated measurement of the average size of platelets is associated with platelet activation. Increased MPV levels have been associated with Crohn's disease, rheumatoid arthritis, familial Mediterranean fever, ulcerative colitis, acute pancreatitis, acute ischemic stroke, diabetes and myocardial infarction. Recently, MPV has been known as a simple inflammatory marker in inflammatory diseases (5-10).

Yazıcı et al. (16) found significantly higher baseline MPV, PLT and platelet mass (PLM) values in ankylosing spondylitis subjects than in controls, and both inflammatory markers and platelet function parameters were markedly reduced by the anti-TNF-alpha therapy. Gasparyan et al. (17) evaluated retrospectively the laboratory parameters, including MPV and PLT, in 400 rheumatoid arthritis, an inflammator disease, patients and in 360 healthy controls. They reported that platelet count and MPV levels were higher in rheumatoid arthritis patients than those in the control group. Tozkoparan et al. (14) reported that MPV values were higher in patiets with tuberculosis than the control group. They also reported that MPV levels could be an additional inflammatory marker in tuberculosis therapy concomitant with laboratory, radiographic and clinical findings. Karabudak et al. (18) found that levels of inflammation markers, such as MPV, C-reactive protein and ceruloplasmin were higher then those in the controls in another inflammatory disease, namely psoriasis.

The results of our study were similar to those of the studies given above. In our trial, MPV level was significantly higher in CRS group compared to control group and PLT level was borderline higher in CRS group compared to control group. As CRS is a chronic inflammatory disorder, we believe that platelets have a role in CRS. If MPV value is an indicator of inflammation, increased MPV values may be associated with CRS. Further prospective studies are needed to establish the role of platelets in CRS and pathophysiology its clinical significance.

REFERENCES

1. *Wood AJ, Douglas RG. Pathogenesis and treatment of chronic rhinosinusitis. Postgrad Med J 2010;86:359-64.*
2. *Lee S, Lane AP. Chronic rhinosinusitis as a multifactorial inflammatory disorder. Curr Infect Dis Rep 2011;13:159-68.*
3. *Herd CM, Page CP. Pulmonary immune cells in health and disease: platelets. Eur Respir J 1994;7:1145-60.*
4. *Bath PM, Butterworth RJ. Platelet size: measurement, physiology and vascular disease. Blood Coagul Fibrinolysis 1996;7:157-61.*
5. *Yuksel O, Helvaci K, Basar O, et al. An overlooked indicator of disease activity in ulcerative colitis: mean platelet volume. Platelets 2009;20:277-81.*
6. *Endler G, Klimesch A, Sunder-Plassmann H, et al. Mean platelet volume is an independent risk factor for myocardial infarction but not for coronary artery disease. Br J Haematol 2002;117:399-404.*
7. *Mimidis K, Papadopoulos V, Kotsianidis J, et al. Alterations of platelet function, number and indexes during acute pancreatitis. Pancreatology 2004;4:22-7.*
8. *Kisacik B, Tufan A, Kalyoncu U, et al. Mean platelet volume (MPV) as an inflammatory marker in ankylosing spondylitis and rheumatoid arthritis. Joint Bone Spine 2008;75:291-4.*
9. *Tuncel T, Uysal P, Hocaoglu AB, Erge DO, Karaman O, Uzuner N. Change of mean platelet volume values in asthmatic children as an inflammatory marker. Allergol Immunopathol (Madr). 2011 May 26. [Epub ahead of print]*
10. *Eloy P, Poirrier AL, De Dorlodot C, Van Zele T, Watelet JB, Bertrand B. Actual concepts in rhinosinusitis: a review of clinical presentations, inflammatory pathways, cytokine profiles, remodeling, and management. Curr Allergy Asthma Rep 2011;11:146-62.*
11. *Fokkens W, Lund V, Mullol J. EPOS 2007: European position paper on rhinosinusitis and nasal polyps. Rhinology 2007;45:1-139.*
12. *Cao PP, Li HB, Wang BF, et al. Distinct immunopathologic characteristics of various types of chronic rhinosinusitis in adult Chinese. J Allergy Clin Immunol 2009;124:478-84.*
13. *Yoon BN, Choi NG, Lee HS, Cho KS, Roh HJ. Induction of interleukin-8 from nasal epithelial cells during bacterial infection: the role of IL-8 for neutrophil recruitment in chronic rhinosinusitis. Mediators Inflamm 2010;2010:813610. Epub 2010 Jun 20.*
14. *Tozkoparan E, Deniz O, Ucar E, Bilgic H, Ekiz K. Changes in platelet count and indices in pulmonary tuberculosis. Clin Chem Lab Med 2007;45:1009-13.*
15. *Vizioli L, Muscari S, Muscari A. The relationship of mean platelet volume with the risk and prognosis of cardiovascular diseases. Int J Clin Pract 2009;63:1509-15.*
16. *Yazici S, Yazici M, Erer B, et al. The platelet functions in patients with ankylosing spondylitis: anti-TNF-alpha therapy decreases the mean platelet volume and platelet mass. Platelets 2010;21:126-31.*
17. *Gasparyan AY, Stavropoulos-Kalinoglou A, Toms TE, Douglas KM, Kitas GD. Association of mean platelet volume with hypertension in rheumatoid arthritis. Inflamm Allergy Drug Targets 2010;9:45-50.*
18. *Karabudak O, Ulusoy RE, Erikci AA, Solmazgul E, Dogan B, Harmanyeri Y. Inflammation and hypercoagulable state in adult psoriatic men. Acta Derm Venereol 2008;88:337-40.*