Mean Platelet Volume as an Inflammatory Marker in Chronic Sinusitis

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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), haemoglobin (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
INTRODUCTION

Chronic rhinosinusitis (CRS) is a prevalent health condition, causing significant morbidity and resulting in a 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 their role in hemostasis, in recent years it has been shown that platelets can act as inflammatory cells by undergoing chemotaxis, releasing various chemokines and 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 diseases (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), haemoglobin (Hb), haematocrit (Htc), white blood cells (WBC), platelet (PLT), and MPV in patients with CRS without nasal polyps.

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 ethylenediaminetetraacetic acid (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 x10^3/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 patients and 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).
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-1β, 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 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 inflammatory 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 patients 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.

Table 1. Study parameters in chronic sinusitis and control groups

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

Values are presented as mean±SD. WBC, white blood cells; RBC, red blood cells; Hb, haemoglobin; 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).
REFERENCES