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The Relationship Between Nasal Polyps, Mean Platelet Volume, Neutrophile/Lymphocyte Ratio and Platelet Count

Ferit Akil[1], Umur Yollu[2]*, Fatih Turgut[3] and Muhammed Ayral[1]

[1]Otolaryngology Department, Diyarbakir Selahaddin Eyyubi Public Hospital, Diyarbakir, Turkey

[2]Otolaryngology Department, Gumushane Public Hospital, Gumushane, Turkey

[3]Otolaryngology Department, Istanbul University Cerrahpasa Medical School, Istanbul, Turkey

*Corresponding author: Umur Yollu, Gumushane Devlet Hastanesi KBB Poliklinigi, 29000 Merkez/ Gumushane/Turkey Tel: +905052606678; Fax: +902124143000; Email: umuryollu@hotmail.com

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ABSTRACT

Introduction: Nasal polyps, characterized by chronic mucosal inflammation of the nose and paranasal sinuses, are one of the most common reasons of chronic nasal congestion.

Objective: This study investigated the relationship of nasal polyps with MPV (mean platelet volume) and NLR (neutrophile to lymphocyte ratio).

Methods: 112 patients and 42 controls were included in this study. Group 1 consisted of males only, Group 2 consisted of females only and Group 3 consisted of both sexes. In all groups, WBC (white blood cell count), RBC (red blood cell count), rdw (red cell distribution width), platelet count, MPV, pdw (platelet distribution width) and NLR parameters from CBC (complete blood count) were compared between patients and controls.

Results and Conclusion: For the Group 1; platelet count ($p<0.016$) and MPV ($p<0.041$) parameters were significantly different between patients and controls. WBC and MPV were higher in nasal polyp patients, whereas platelet count was higher in controls. In Group 2; platelet count ($p<0.033$) and NLR ($p<0.030$) were significantly lower in patients than the control group. In group 3; platelet count ($p<0.001$) and NLR ($p<0.003$) were significantly lower in patients than the control group, whereas MPV ($p<0.026$) was significantly higher in patients.

conclusion: Platelet count and NLR were significantly lower in patients than the controls, whereas MPV was significantly higher in nasal polyp patients.

Keywords: Nasal polyps; Sinusitis; Mean platelet volume; Platelet count; White blood cell count

INTRODUCTION

Nasal polyps are multi-factorial, benign, mucosal protrusions that develop into nasal cavity. They are characterized by chronic mucosal inflammation of the nose and paranasal sinuses. They are observed twice as much in men than in women and incidence in the population is about 1-4%[1]. Nasal polyps are among the common causes of chronic nasal congestion which may cause OSAS (obstructive sleep apnea syndrome) later and OSAS is associated with several cardiovascular diseases, such as congestive heart failure, hypertension, atrial fibrillation, nocturnal arrhythmias, stroke, pulmonary hypertension, and atherosclerosis[2,3]. Mean platelet volume (MPV) is an important indicator of platelet activity. It is known that larger platelets are enzymatically and metabolically more active[4]. Many studies have reported high platelet activity in patients with OSAS[5,6]. Many inflammatory cells and mediators are defined in nasal polyp tissue. Eosinophiles, neutrophiles, lymphocytes and their subgroups, plasma cells, mast cells and macrophages are shown to be present in polyp tissue. These cells usually reside in subepithelial, perivascular and periglandular layers. The types of inflammatory cells and mediators are

of great importance in nasal polyp pathogenesis[7]. Also, many studies in literature accept MPV[8,9] and NLR (neutrophile to lymphocyte ratio) rates[10] as inflammation indicators. Although the relationship between nasal polyps and MPV was investigated in two previous studies[11,12]; we did not encounter any studies on the relationship between NLR and nasal polyps. According to our literature search, our study is the first one to investigate the relationship between NLR and nasal polyps. Furthermore, it contributes to the studies on the relationship of MPV and nasal polyps with a larger patient pool and NLR relation.

MATERIALS AND METHOD

The study protocol was approved by the ethics comitee of the medical school that study performed with a protocol number of 10207/30.

This is a prospective study that investigates CBC (complete blood count) parameters of the patients that consulted tertiary medical center ENT clinic, was operated on because of nasal polyp and treated with corticosteroids between the years of 2013-2014. Patients with significant cardiovascular pathologies, smoking history or bleeding diathesis and aged over 65 and below 18 were not included in the study. Patients with nasal polyp were not categorized according to the size or the side of the polyp. 48 of the patients were females and 64 were males. 18 males and 24 females were included in the control group. Male patients and male controls formed Group 1, female patients and female controls formed Group 2 and patients with nasal polyp and controls regardless of their sexes formed Group 3. In all groups, WBC (white blood cell count), RBC (red blood cell count), RDW (red blood cell distribution width), platelet count, MPV, PDW (platelet distribution width) and NLR parameters from the CBC results were compared between patients and controls.

All of the investigations were statistically analyzed using SPSS program version 19 (IBM Corporation, NY, US). The comparison between the groups was made with Student's t-test and $P < 0.05$ was considered significant.

RESULTS

The statistical analysis for Group 1 (Male Group): Significant differences were present in platelet count ($p<0.016$) and MPV ($p<0.041$) parameters between patients and controls; whereas differences in other parameters were not statistically significant (Table 1). MPV was higher in nasal polyp patients, whereas platelet count was higher in controls.

The statistical analysis for Group 2 (Female Group): Significant differences were present in platelet count ($p<0.033$) and NLR ($p<0.030$); however, other parameters did not have significant differences (Table 2). Platelet count ($p<0.033$) and NLR ($p<0.030$) were significantly lower in patients than the controls.

The statistical analysis for Group 3 (Male+Female Group): Significant differences were present in platelet count ($p<0.001$), NLR ($p<0.003$) and MPV ($p<0.026$); however, other parameters did not have significant differences (Table 3). Platelet count and NLR were significantly lower in patients than the controls, whereas MPV was significantly higher in patients.

DISCUSSION

Nasal polyps cause chronic nasal congestion and OSAS, furthermore causing pulmonary and cardiovascular disorders[2,3]. Nasal polyps contain many inflammatory cells and mediators and these play a crucial role in nasal polyp etiology[7]. In literature, many studies have accepted MPV[8, 9] and NLR scores[10] as indicators of inflammation.

In the current study; with regard to age, there were no significant differences between the patients and the controls in any of the three groups. In group 3; there was no significant difference between the patients and the controls according to their sex ($p<0.304$).

When WBC parameter was examined in the current study, there were no significant differences between the patients and the controls in any of the three groups. In the study by Sagit et al.[11] and Aktas et al.[12] WBC parameter was not different in patients and controls again and both of these studies are supporting our results.

"RDW" is a numerical measure of the size variability of circulating erythrocytes. Disorders related to ineffective erythropoiesis or increased red blood cell destruction cause heterogeneity in size and a higher RDW[13,14]. RDW has been reported as an independent predictor of adverse outcomes in the general population and is believed to be associated with cardiovascular morbidity and mortality in patients with a previous myocardial infarction[15,16]. RBC and rdw scores were not significantly different between patients and controls in any of the three groups.

Platelet count in the studies of Sagit et al.[11] and Aktas et al.[12] was not different between patients with nasal polyps and controls, however unlike these studies; we have observed that the platelet count was significantly lower in patients than in controls

Group 1	Patients (n=64) (Mean ± SD)	Control (n=18) (Mean ± SD)	p value
Age	37.7 ± 9.0	40 ± 14.7	0.573
WBC	6.8 ± 1.4	6.3 ± 1.4	0.373
RBC	5.1 ± 0.3	4.9 ± 0.4	0.264
RDW	14.4 ± 1.3	14.4 ± 1.4	0.936
Platelet count	232.38 ± 39.97 × 1000	271.44 ± 45.14 ×1000	0.016*
MPV	9.11 ± 1.08	8.31 ± 0.57	0.041*
PDW	14.3 ± 0.2	14.0 ± 1.0	0.800
NLR	1.5 ± 0.4	1.8 ± 0.5	0.167
MPV: Mean platelet volume; NLR: Neutrophile to lymphocyte ratio; WBC: White blood cell count; RBC: Red blood cell count; RDW: Red cell distribution width; PDW: Platelet distribution width; * : Statisticallysignificant			

Table 1: CBC results of Group 1 and their coparison.

Group 2	Patients (n=48) (Mean ± SD)	Control (n=24) (Mean ± SD)	p value
Age	44.5 ± 13.4	44.0 ± 19.6	0.933
WBC	8.2 ± 2.7	7.6 ± 1.5	0.515
RBC	4.7 ± 0.3	4.5 ± 0.3	0.333
RDW	16.6 ± 3.2	14.7 ± 1.4	0.071
Platelet count	243.67 ± 21.56 ×1000	279.42 ± 73.44 ×1000	0.033*
MPV	9.35 ± 1.25	8.8 ± 0.97	0.186
PDW	15.1 ± 2.6	13.9 ± 1.7	0.171
NLR	1.65 ± 0.37	2.28 ± 1.26	0.030*
MPV: Mean platelet volume; NLR: Neutrophile to lymphocyte ratio; WBC: White blood cell count; RBC: Red blood cell count; RDW: Red cell distribution width; PDW: Platelet distribution width; *: Statistically significant			

Table 2: CBC results of Group 2 and their coparison.

Group 3 (All Patients)	Patients (n=112) (Mean ± SD)	Control (n=42) (Mean ± SD)	p value
Age	40.4 ± 11.5	42.3 ± 16.7	0.574
WBC	7.9 ± 2.1	7.1 ± 1.5	0.084
RBC	4.9 ± 0.3	4.7 ± 0.4	0.066
RDW	15.3 ± 2.5	14.6 ± 1.3	0.225
Platelet count	237.21 ± 33.56 ×1000	276.67 ± 61.82 ×1000	0.001*
MPV	9.21 ± 1.15	8.59 ± 0.84	0.026*
PDW	14.6 ± 2.8	13.9 ± 1.4	0.300
NLR	1.59 ± 0.43	2.10 ± 1.05	0.003*
MPV: Mean platelet volume; NLR: Neutrophile to lymphocyte ratio; WBC: White blood cell count; RBC: Red blood cell count; RDW: Red cell distribution width; PDW: Platelet distribution width; *: Statistically significant			

Table 3: CBC results of Group 3 and their coparison.

in all three groups. A study by Ulu et al.[17] in which the platelet count was investigated in patients with septal deviation which frequently causes chronic nasal congestion reported that the platelet count was lower in patients than in controls supporting our results.

Increased platelet activity is associated with increased platelet volume, which can be measured by larger mean platelet volume (MPV) and platelet distribution width (PDW). Large platelets are more adhesive and tend to aggregate more than smaller ones[18]. This increase in platelet volume increases the tendency for coronary thrombus formation in acute coronary syndrome patients[19]. MPV is also used as a marker in atherosclerosis[20]. Many clinical studies have shown that increased MPV in patients with OSAS is associated with increased risk of atherosclerosis and cardiac disorders[21,22].

In our study, pdw scores were not different between patients with nasal polyps and controls in any of the three groups. The study by Sagit et al.[11] which investigates the relationship between nasal polyps and pdw did not report a difference between the patients and the controls, further supporting our data.

When MPV scores were examined in the current study, Group 1 and Group 3 had significantly higher MPV scores in patients with nasal polyps than in controls. Although Group 2 patients also had higher MPV scores than contols; the difference didn't reach the statistical significance. In literature, the study by Sagit et al.[11] directly investigating the relationship between nasal polyps and MPV reported a significantly higher MPV score in patients than in controls, whereas the study by Aktas et al.[12] found an MPV score significantly lower in patients than in controls. Our study, especially the significant difference in Group 1 and Group 3 MPV scores, supports the study by Sagit et al. Other studies including patients with OSAS have reported significantly higher MPV scores in patients than in controls[5,6]. Again, the study by Ulu et al.[17] on patients with septal deviation causing chronic nasal congestion reported significantly higher MPV scores in patients than in controls. The study by Cengiz et al.[23] on adenoid hypertrophy patients (which causes pediatric OSAS) reported lower MPV scores in patients. All these results show that the relationship between MPV, nasal congestion and OSAS is not clear yet.

We did not encounter any previous studies investigating the relationship between NLR and nasal polyps; thus we think that our study is the first one in literature. Many studies have shown that neutrophile and lymphocyte counts are important in peripheral inflammation and atherosclerosis[24,25] and that increases in NLR scores are associated with atherosclerotic processes and cardiovascular disorders[26-28]. A study on patients with stroke reported that NLR increase and CRP (C reactive protein) which is an inflammation marker are significantly correlated[29]. The study by Gokhan et al.[30] showed NLR scores increase significantly in ischemic and hemorrhagic stroke. Because OSAS and cardiovascular diseases are frequently observed in patients with nasal polyps in which structure of neutrophiles and lymphocytes play an important role, we have chosen to investigate the relationship between nasal polyps and NLR scores. In our study, we observed that the NLR scores were significantly lower in patients with nasal polyps in Group 2 and Group 3. Although Group 1 patients also had lower NLR scores than contols; the difference didn't reach the statistical significance.

CONCLUSION

Platelet count and NLR were significantly lower in patients than the controls, whereas MPV was significantly higher in nasal polyp patients.

This study is valuable in the sense that it is different from the two studies in literature investigating the relationship between nasal polyps and MPV by using a larger patient pool categorized according to sex, besides it contributes to the investigation of the relationship between nasal polyps and NLR. Furthermore, with the data it puts forth, it emphasizes the need for further research on this topic.

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