

# Comparison of Mean Platelet Volume Values between Patients with Nasal Polyp and Healthy Individuals

## *Nazal Polip Hastalarında Mean Platelet Volüm Değerlerinin Sağlıklı Bireylerle Karşılaştırılması*

Original Investigation  
Özgün Araştırmalar

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### Abstract

**Objective:** Nasal Polyp (NP) and Allergic Rhinitis (AR) are frequently seen in common. It has been reported that there is an increase in the risk of atherosclerosis in allergic patients. In our study, we aimed to evaluate Mean Platelet Volume (MPV) values in patients with nasal polyp, which is used as a marker atherosclerosis.

**Methods:** Seventy-five patients who underwent functional endoscopic sinus surgery (FESS) with a diagnosis of nasal polyp were reviewed. Seventy-five age-matched healthy individuals without AR were employed as control group. Values of white blood cell

(WBC), platelet (PLT), hemoglobin (Hb) and MPV were evaluated.

**Results:** MPV values were found to be low in patients with nasal polyp  $7.89 \pm 1.02$  fL compared to control group  $8.32 \pm 1.42$  fL. This finding was statistically significant.

**Conclusion:** It was found that MPV values are significantly low in patients with NP than control group.

**Key Words:** Nasal polyp, allergic rhinitis, atherosclerosis, mean platelet volume

### Özet

**Amaç:** Nazal Polip (NP) Allerjik Rinit (AR) sıklıkla birlikte görülür. Allerjik hastalarda ateroskleroz riskinde artış olduğu bildirilmektedir. Çalışmamızda aterosklerozun bir belirteci olarak kullanılan Mean Platelet Volume (MPV) değerlerini nazal polip hastalarında incelemeyi amaçladık.

**Yöntemler:** Nazal polip tanısıyla fonksiyonel endoskopik sinüs cerrahisi (FESC) yapılan 75 hasta değerlendirildi. Aynı yaş grubundan AR şikayeti olmayan sağlıklı 75 bireyin verileri kontrol grubu olarak incelendi. Beyaz kan

hüresi (WBC), trombosit (PLT), Hemoglobülin (Hb) ve MPV değerleri ayrı ayrı kaydedildi.

**Bulgular:** MPV değerleri nazal polipli hastalarda  $7,89 \pm 1,02$  fL, kontrol hastalarında  $8,32 \pm 1,42$  fL idi. İstatistiksel olarak anlamlılık tespit edildi.

**Sonuç:** Çalışmamızda sonuç olarak NP hastalarındaki kontrol grubuna oranla MPV değeri düşük tespit edildi.

**Anahtar Kelimeler:** Nazal polip, alerjik rinit, ateroskleroz, mean platelet volüm

### Introduction

Nasal polyps are benign mucosal disorders extending to lumen by proliferating in nasal cavity as a result of mucosal inflammation. Nasal polyps are the most common reason of nasal masses with a prevalence of 1-4% and it is more common in male gender (1, 2). It is a multifactorial disease with unclear etiology. Allergy, chronic infection and mechanic, immunological and biochemical factors are implied in the etiology (2). Mucosal edema is the primary pathology in the development of polyp. Mucosal edema is an inflammation induced by chemical mediators, cytokines and growth factors released from inflammatory cells and endothelial receptors.

Allergic rhinitis generally is associated with clinical presentation in patients with nasal polyp. In a study, it was found that incidence of nasal polyp was 25% in patients with allergy versus 4% in those without allergy (3). In that study, it was reported that frequency of allergy varied from 10% to 54% in patients with nasal polyp.

Nasal Polyp is a multifactorial disorder in which etiology is still unclear; thus, it is intensively investigated. The importance of inflammatory mediators, cytokines, prolonged life span of eosinophils, increased activity of arachidonic acid metabolism and oxidative stress in the etiopathogenesis of nasal polyp were reported in several studies (4-6).



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Knoflach et al. (7) reported that chronic inflammation and alterations in immune system caused an increase in the risk of atherosclerosis in patients with allergic rhinitis. In another study, it was reported that mediators released from mast cells, which had an important role in the etiopathogenesis of allergic rhinitis, asthma and nasal polyp, caused inflammation and fibrosis. As a result, these patients were at high risk for stroke, dilated cardiomyopathy and atherosclerosis (8).

Mean Platelet Volume (MPV), which is related to platelet functions and activation, is also used as a marker of atherosclerosis (9). In many adult studies, MPV is increased in atherosclerotic disorders (10, 11).

Risk of atherosclerosis is increased in NP. In our study study, we aimed to demonstrate how MPV, as a marker of atherosclerosis, is affected in patients with nasal polyp.

## Methods

Seventy-five patients with a diagnosis of nasal polyp who received functional endoscopic sinus surgery (FESS) at Ear-Nose-Throat Department of Mustafa Kemal University, Medicine School were reviewed. Data of 75 age-matched, healthy individual without allergic rhinitis were evaluated as the control group. Patients with unilateral nasal polyp, antrochoanal polyp, inverted papilloma and chronic systemic disease were excluded. Informed consent was obtained from his guardian for the use of patient information, including medical records for publication.

Blood samples were collected by vena puncture into sterile siliconized Vacutainer tubes with 2 mg/mL disodium ethylene diamine tetraacetic acid and stored at -20°C. Total blood count analysis were performed by using an CELL DYN 3700 auto-analyzer (ABBOTT PARK IL, USA). White blood cell (WBC), platelet (PLT), hemoglobin (Hb) and MPV parameters were assessed.

When age and gender distribution was considered, it was found that there were 51 men and 24 women in NP group, whereas 41 men and 34 women in control group. It was found that mean age was 41.2±13.58 (min: 17-max: 70) years in NP group, while 37.65±10.98 (min: 20-max: 65) years in control group. In NP

and control were similar in terms of gender and age (p=0.13 and p=0.08).

## Statistical analysis

SPSS for Windows 13.0 (Statistical Package for Social Sciences) software was used in statistical analysis. Using Kolmogorov-Smirnov test assessed normal distribution of continuous variables. Chi-square test was used to evaluate relationship between nominal variables, while difference in mean values between groups was evaluated by using Student's t test. Linear regression model was used to establish factors influencing MPV. p<0.05 were considered as significant in all statistical analysis.

## Results

Mean duration of symptoms related to nasal polyp was 63.66±44.69 months. Mean number of operation performed due to nasal polyp was 1.35±0.83. 20 patients, 26.66% had concurrent asthma. Thirty eight patients (50.6%) had allergic rhinitis.

Hgb values were found as 13.71±1.47 in patients with nasal polyp and 14.08±1.56 in controls (p=0.45). WBC values were 8.55±1.88 in patients with nasal polyp and 8.39±2.10 in controls. There was no significant difference in WBC values between groups (p=0.454) (Table 1).

PLT values were 261.00±65.62 x 10<sup>3</sup>/μL in patients with nasal polyp, whereas 272.56±64.50 x 10<sup>3</sup>/μL in the control group. No significant difference was found in PLT values (p=0.278). MPV values were 7.89±1.02 fL in patients with nasal polyp and

**Table 1.** Distribution of age and values of WBC, Hgb, PLT and MPV in patients with nasal polyp and controls

	Nasal Polyp Mean±SD	Control Mean±SD	p
Age	41.2 ± 13.5	37.6 ± 10.9	0.08
WBC	8.552±1.885	8.309±2.108	0.454
Hgb	13.71±1.47	14.08±1.56	0.136
PLT	261.00±65.62	272.56±64.50	0.278
MPV	7.89±1.02	8.32±1.42	0.035

MPV: Mean Platelet Volume; WBC: White Blood Cell; Hb: Hemoglobin; PLT: Platelet; SD: Standard Deviation

**Table 2.** Linear regression analysis of factors influencing MPV

	Non-standardized Coefficients		Standardized Coefficients Beta	t	Sig.	95% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
(Constant)	11.139	1.455		7.653	.000	8.235	14.043
WBC	.042	.063	.077	.665	.508	-.083	.167
Hb	-.160	.081	-.230	-1.962	.054	-.322	.003
PLT	-.004	.002	-.285	-2.455	.017	-.008	-.001
Age	-.003	.009	-.037	-.324	.747	-.020	.014
Duration	-.002	.003	-.098	-.841	.403	-.008	.003

MPV: Mean Platelet Volume; WBC: White Blood Cell; Hb: Hemoglobin; PLT: Platelet

8.32±1.42 fL in healthy subjects. There was a significant difference in MPV values between two groups ( $p=0.035$ ) (Table 1).

When correlation test was performed between continuous variables, it was found that MPV was independent from age, Hb, WBC and duration of symptoms ( $r=0.270$ ;  $p=0.000$ ), while it was negatively correlated to PLT ( $r=0.417$ ;  $p=0.000$ ) (Table 2).

## Discussion

Allergic rhinitis, chronic inflammation and several immunological and biochemical factors play role in the etiology of nasal polyp. We aimed to determine how MPV values, which are found to be high in patients with atherosclerosis, are changed in patients with nasal polyp. We found that MPV values are low in nasal polyp. There are studies reporting incidence of nasal polyp as 25% in patients with allergy and the frequency of allergic rhinitis as 10-54% in patients with nasal polyp (3). It was reported that rate of allergic rhinitis is about 10-30% in general population and raises up to 45% in children (12). In our study, allergic rhinitis was seen in 50.6% of NP patients and this result was in agreement with literature.

Biochemical mediators and free radicals that are increased in blood of the patients with nasal polyp also affect the development of atherosclerosis, stroke and heart diseases (5, 8). Although there are studies about the relationship between atherosclerosis and nasal polyp or MPV, there is no study focusing directly on the relationship between nasal polyp and MPV according to our knowledge (7, 8, 10, 11).

Most frequent symptom is the nasal congestion in allergic rhinitis which is also one of the most important factors in the development of nasal polyp. Other symptoms are itching of nose, sneezing, rhinorrhea and itchy eyes. Nasal congestion causes NP and chronic rhinosinusitis in a long-term by stimulating IgE receptors in mast cells and increasing the release of biochemical mediators (leukotriene, prostaglandin, interleukin-4, tumor necrosis factor- $\alpha$  etc.) (13-16). In several studies, it was suggested that increased leukotriene and mast cells played an active role in angiogenesis and caused an increase in the risk of atherosclerosis in patients with allergy (7, 8).

Since allergy is an important factor in etiopathogenesis of both nasal polyp and asthma, it was reported that incidence of asthma was high among patients with nasal polyp (17). In our study, 26.6% of the patients had asthma. Mean number of operations performed due to nasal polyp was 1.35±0.83 in patients with nasal polyp, whereas it was 2.00±1.25 in NP patients with asthma. Recurrence of nasal polyp is more commonly observed in patients with asthma despite surgical and medical therapies (17). Number of operations was higher in asthmatic patients with nasal polyp than non-asthmatic patients with nasal polyp in our study. Fairweather D et al. (8) reported that mast cells which had a key role in allergic rhinitis and chronic inflammatory diseases such as asthma also had importance in the regula-

tion of inflammation at heart and vessels. In the same study, it was reported that incidence of stroke, atherosclerosis and dilated cardiomyopathy were high in patients with allergic rhinitis and asthma. For this reason, the increased risk of atherosclerosis and cardiac diseases in NP can be expected by the relationship between AR, asthma and NP.

Dağlı et al. (5) reported that amount of anti-oxidant was lower in patients with nasal polyp while the amount of free radicals, product of oxidation, were significantly higher. Authors suggested that oxidative stress had a major role in the etiopathogenesis of nasal polyp and atherosclerosis (18, 19, 20).

In parallel to our study, Ulaşlı et al. (21) found that MPV was higher in patients with chronic obstructive pulmonary disease than controls. However, in a study with asthmatic children, Tuncel et al. found no significant difference in MPV values between patient and control groups (22).

## Conclusion

As mentioned above, there may be an increased risk of atherosclerosis due to the chemical and immunological mechanism in the pathogenesis of nasal polyp. However, in our study MPV values were significantly lower in patients with nasal polyp than controls. Thus the results of our study has shown that MPV may not be an appropriate marker in determining the atherosclerosis risk of NP patients. However there are very few studies regarding this subject and further studies are needed.

## Conflict of Interest

No conflict of interest was declared by the authors.

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

**Ethics committee approval:** Ethics committee approval was received for this study from Gaziantep University in 2012.

**Informed Consent:** Written informed consent was obtained from parents of the patient who participated in this study.

## Author Contributions

Concept - C.Ç., E.Y.; Design - C.Ç., E.Y.; Supervision - E.A., C.Ç.; Funding - C.Ç.; Materials - C.A., M.I.G.; Data Collection and/or Processing - C.Ç., E.A., M.I.G.; Analysis and/or Interpretation - E.Y.; Literature Review - C.Ç., E.A., C.A.; Writing - C.Ç., E.Y.; Critical Review - E.A., E.A., C.A., C.Ç.

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