The relationship between tinnitus and mean platelet volume

Tinnitus ve ortalama trombosit hacmi arasındaki ilişki

MPV & tinnitus

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Öz

Amaç: Bu çalışmanın amacı tinnitus ile ortalama trombosit hacmi(OTH) arasındaki ilişkiyi araştırmaktır. Materyal ve Metod: 40 tinnituslu hasta ile 40 kulak patolojisi veya kardiyovasküler hastalığı olmayan sağlıklı birey kontrol grubu olarak çalışmaya dahil edildi. Hastaların değerlendirilmesi detaylı hikaye, tam baş boyun muayenesi, laboratuar kan testleri, OTH, platelet distribution width (PDW) ve platelet count (PC) içermekteydi. Ardından sonuçlar karşılaştırıldı. Bulgular: Gruplar yaş ve cinsiyet bakımından benzerdi (p=0.068, p=0.649). Ortalama OTH değerleri tinnitus grubu ve kontrol grubunda benzerdi (p=0.522). Ayrıca ortalama PDW ve PC değerleri de gruplarda benzer olarak bulundu (p=0.311, p=0.402). Tartışma: Tinnituslu hastalarla sağlıklı bireylerin OTH değerleri arasında anlamlı bir farklılık bulunmadı. OTH değerleri tek başına tinnitus patogenezinde önemli bir rol oynamıyor gibi görünmektedir.

Anahtar Kelimeler

Tinnitus; Ortalama Trombosit Hacmi(OTH); Platelet Distribution Width (PDW) and Platelet Count (PC)

Abstract

Aim: The aim of this study is to investigate the relationship between tinnitus and mean platelet volume (MPV). Material and Method: 40 subjects with tinnitus and 40 healthy subjects as control group with no evidence of ear pathology or cardiovascular diseases were included in the study. The evaluation of the subjects included a detailed history, otorhinolaryngological examination, assessment of laboratory blood parameters, MPV, platelet distribution width (PDW) and platelet count (PC). Then the subjects were compared. Results: The groups were similar in terms of age and gender (p=0.068, p=0.649). The mean MPV values in tinnitus group and control group were similar (p=0.522). Also, the mean PDW and PC values in tinnitus group and control group were similar (p=0.311, p=0.402). Discussion: We found that there was no significant difference in MPV values of patients with tinnitus compared to the control group. MPV values alone do not seem to play a major role in the pathogenesis of tinnitus.

Keywords

Tinnitus; Mean Platelet Volume(MPV); Platelet Distribution Width (PDW) and Platelet Count (PC)

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Introduction

Tinnitus is the perception of sound in ear or head in the absence of external stimulus [1]. Tinnitus affects approximately 17% of general population, and 33% of elderly population [2]. Tinnitus may be classified into two main groups as subjective and objective tinnitus. Subjective tinnitus is also named as nonpulsatile tinnitus whereas objective tinnitus is named as pulsatile tinnitus. Non–pulsatile or subjective tinnitus is the most common form of tinnitus [3].

The most common cause of subjective tinnitus is otological disorders. Otological disorders are acoustic trauma, presbiacusis, otosclerosis, otitis, Meniere's disease, and sudden hearing loss. Drugs, neurological and infectious pathologies are the other causes of subjective tinnitus [4].

Recently many studies about the neurobiological etiology of tinnitus have been conducted. In animal models, it had been shown that tinnitus is generated from the imbalance of excitatory and inhibitory impulses to the auditory neurons. It is declared that this imbalance occurs in the whole auditory system [5].

Mean platelet volume(MPV) is a parameter that reflects the activation and function of platelets. In previous studies, it had been shown that MPV was increased in cardiovascular diseases, diabetes mellitus, hypertension, hypercholesterolemia, obese and smokers [6]. Also, an increase in MPV was reported in vascular diseases such as atherosclerosis, venous or arterial thrombosis, and thromboembolism. On the other hand, an inverse relationship was shown between MPV and the activity of inflammatory bowel diseases, rheumatoid arthritis, and ankylosing spondylitis [7]. In a recent study about the relationship between MPV and hearing loss, MPV was increased in patients with sensorineural hearing loss [7].

There is no previous study about the relationship of MPV and tinnitus. In this study, we aimed to investigate the relationship between MPV and tinnitus.

Material and Method

Study population

40 subjects who referred to the otorhinolaryngology department of Mustafa Kemal University in 2014 with tinnitus were included in the study. The exclusion criteria for the subjects were as follows: pneumonia, diabetes mellitus, hypertension, liver or renal dysfunction, obstructive sleep apnea syndrome, coronary artery disease, chronic obstructive pulmonary disease (COPD), inflammatory bowel diseases, severe anemia or hematological diseases, medication (anticoagulants, anti-inflammatory agents, systemic corticosteroids) and smoking history [7]. The control group included 40 healthy subjects with no evidence of ear pathology or cardiovascular diseases. The evaluation of the subjects included a detailed history, otorhinolaryngologic examination, assessment of laboratory blood parameters. Ethics committee approval was obtained from Mustafa Kemal University and the study was conducted adhering to the Declaration of Helsinki. Informed consent was obtained from all of the participants.

Laboratory evaluation

Venous blood samples were collected into tubes containing calcium ethylen ediamine tetra acetic acid (EDTA). To avoid platelet swelling, measurement of the blood samples were done within 30 min after sampling. MPV, platelet distribution width (PDW) and platelet count (PC) was measured with an automated blood cell counter (Mindray BC-6800, Autohematolgy Analyzer China) in our hospital's central laboratory.

Statistical analysis

Statistical analysis was performed using the SPSS (Statistical Package for the Social Sciences) 16.0 Evaluation for Windows. Descriptive statistics were stated as mean ± SD (standard deviation). Average distribution of continues variables were tested with Kolmogorov-Smirnov test. Chi-square test was used for comparisons between categorical variables, and Mann-Whitney U tests were used for continuous variables when comparing the groups. The statistically significant level was accepted as a p value <0.005.

Results

Demographic properties

The mean age of the patients with tinnitus and the control group were 37.52 ± 10.24 and 33.80 ± 7.52 years respectively. 60% of tinnitus group and 65% of a control group were females. The groups were similar in terms of age and gender (p=0.068, p=0.649).

Laboratory evaluation

The mean MPV was 9.43 ± 1.10 in tinnitus group and 9.91 ± 1.36 in the control group. The mean MPV in tinnitus group and control group were similar (p=0.522) (Figure 1).

The mean PDW was 16.13 ± 0.75 in tinnitus group and 19.80 ± 22.74 in the control group. The mean PDW in tinnitus group and control group were similar (p=0.311) (Figure 2).

The mean PC was 278.525 ± 66.735 in tinnitus group and 267.225 ± 52.366 in the control group. The mean PC in tinnitus group and control group were similar (p=0.402) (Figure 3).

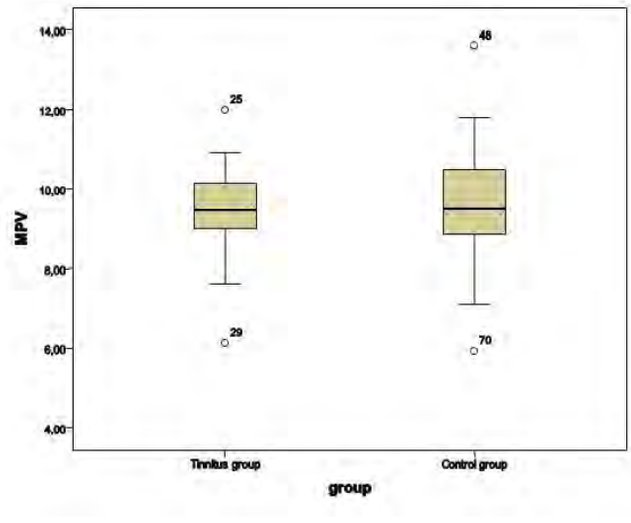

Figure 1. The mean MPV values of tinnitus group and control group

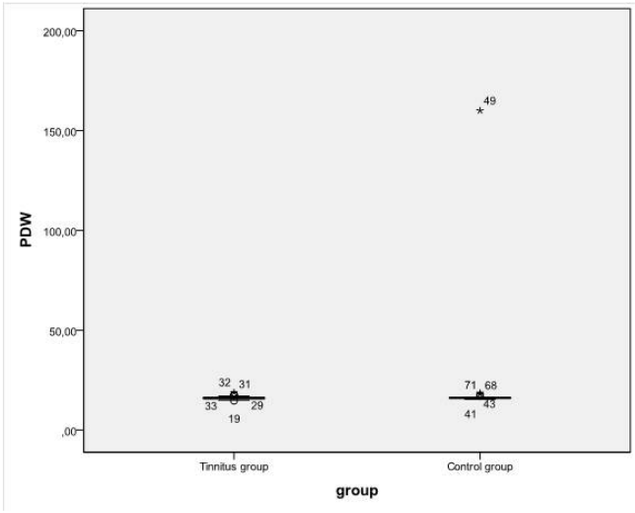

Figure 2. The mean PDW values of tinnitus group and control group

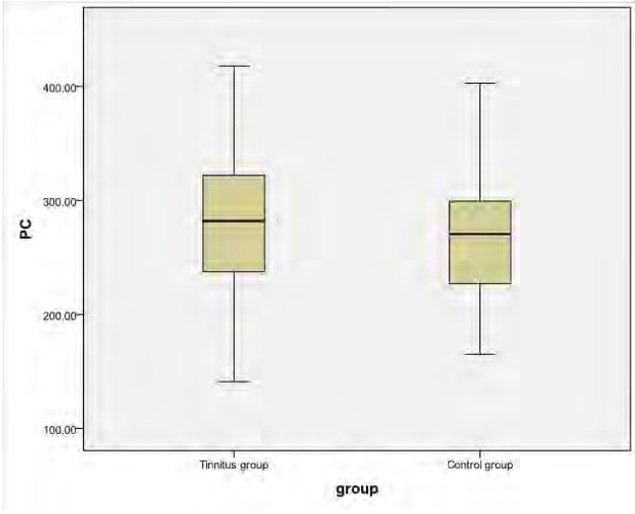

Figure 3. The mean PC values of tinnitus group and control group

Table 1. Demographic and laboratuvary features of the groups

	Tinnitus group (n=40) mean±SD	Control group (n=40) mean±SD	p values
Age, years	37.52± 10.24	33.80± 7.52	0.068
Sex (F/M)	24/16	26/14	0.649
MPV, fL	9.43± 1.10	9.91± 1.36	0.522
PDW, fL	16.13± 0.75	19.80± 22.74	0.311
PC, 10^3/µL	278.52± 66.73	267.22± 52.36	0.402

MPV= mean platelet volume, PDW= platelet distribution width, PC=platelet count, p<0.05 showing statistically significance

Discussion

Mean platelet volume (MPV) is one of a platelet indices parameter and can be measured by readily available routine blood count. It has been used as a marker of platelet activity and function. Its relationship with the pathogenesis of some diseases have been investigated and reported as a prognostic factor in some cardiovascular disorders. In previous studies, increased MPV have been observed in patients with cardiovascular risk factors, such as diabetes mellitus [8], hypertension [9], obesity [10] and smoking [11]. Chu et al. have suggested that increased MPV is associated with mortality due to acute myocardial infarction and restenosis following coronary angioplasty [6]. O'Malley et al. have argued that increased MPV and decreased PC are characteristic laboratory findings in ischemic stroke [12]. In another study, increased MPV have also been reported to be associated with the severity of cerebral damage and mortality [13,14].

There are limited numbers of studies investigating MPV changes in disorders of ear, nose, and throat. In a study, decreased MPV values were detected in patients with nasal polyps [15]. In another study, investigating the relationship between MPV and sensorineural hearing loss, significantly increased MPV values were found in patients with hearing loss. Researchers speculated that ischemia and atherosclerosis might be important in the pathogenesis of idiopathic sudden hearing loss [7].

Tinnitus is a common health problem among older adults. Vascular risk factors are thought to be important in the pathogenesis of tinnitus. In this study, we aimed to investigate the relationship between MPV and tinnitus. The current study showed that there was no significant changes in MPV values of study group compared to control group.

Some researchers have speculated that there is a link between MPV with disease activity and treatment efficacy in chronic inflammatory disorders, such as systemic lupus erythematosus, rheumatoid arthritis, and Crohn's disease [16], whereas some others argue for such a connection [17,18]. In another study Hilal et al. suggested that a single MPV determination was not a reliable indicator for diagnosis of pulmonary embolism and its severity [19].

In conclusion, we found that there was no significant difference in MPV values of patients with tinnitus compared to healthy subjects. MPV values alone do not seem to play an important role in the pathogenesis of tinnitus.

The limitation of the study is the number of cases we studied. Further, more detailed studies with larger numbers exploring the relationship between platelet indices and tinnitus will be beneficial to the literature.

Human studies

'All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.'

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None

Competing interests

The authors declare that they have no competing interests.

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