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Mean Platelet Volume (MPV) is correlated with body mass index

Obezlerde Ortalama Platelet Hacmi (MPV), vücut kitle indeksi ile koreledir

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SUMMARY

Objective: Obesity is a common health problem all over the world, leading to significant chronic diseases such as diabetes mellitus, hypertension, and coronary artery disease. Platelets are one of the blood components that play a role in a number of important pathways such as inflammation and endothelial activation other than hemostasis. They become more metabolically active as their volume increases. In many studies the increase in MPV has negative effects on the acute coronary syndrome, stent thrombosis, and cerebrovascular events. In this study, it was aimed to evaluate whether there is a correlation between body mass index (BMI) used in the definition and classification of obesity and mean platelet volume (MPV).

Method: Seventy-two patients who presented to the internal medicine outpatient clinic due to obesity and had no hypertension, diabetes mellitus and hyperlipidemia were included in the study. After the basal demographic characteristics of the patients were recorded, the transthoracic echocardiographic examination was performed to exclude possible cardiac pathologies. Examples of routine biochemistry and blood parameters were obtained and analyzed

Results: The mean age of the patients was 45.06 (± 10.69) years, and the mean BMI was determined as 43.4 kg / m2 (± 5.3). Transthoracic echocardiographic examinations were found within normal limits. The mean platelet volume was 8.57 fL (± 1.22), and there was a positive correlation between BMI and MPV (p: 0.004, r: 0.319). No significant correlation was found with other parameters.

Conclusions: Increase in body mass index is correlated with an increase in MPV values. MPV increase may play a role in the etiopathogenesis of chronic diseases associated with BMI increase in obesity patients.
Keywords: Obesity. Body mass index, Mean platelet volume

ÖZET

Amaç: Obezite, tüm dünyada giderek yaygınlaşan, diabetes mellitus, hipertansiyon ve koroner arter hastalığı gibi önemli kronik hastalıklara yol açan bir sağlık problemidir. Trombositler, hemostaz dışında inflamasyon ve endotel aktivasyonu gibi bir çok önemli yolakta rol oynayan kan bileşenlerinden biridir. Hacimleri artıkça metabolik olarak daha aktif olurlar. Yapılan bir çok çalışmada MPV artışının; akut koroner sendrom, stent trombozu ve serbrovasküler olay seyrinde olumsuz etkilerinin olduğu görülmüştür. Bu çalışmada obezite tanım ve sınıflandırmasında kullanılan vücut kitle İNDEKSİ (VKİ) ve ortalama trombosit hacmi (MPV) arasında korelasyonun olup olmadığının değerlendirilmesi amaçlanmıştır.

Yöntem: Obezite nedeni ile dahiliye polikliniğine başvuran ve hipertansiyon diabetes mellitus ve hiperlipidemi saptanmayan 78 hasta çalışmaya dahil edilmiştir. Hastaların bazal demografik özellikleri kayıt edildikten sonra olası kardiyak patolojileri dışlamak için transtorasik ekokardiyografik inceleme yapılmıştır. Rutin biyokimya ve kan parametleri için örnekler alınıp incelenmiştir.

Bulgular: Hastaların ortalama yaşları 45.06 (±10.69) yıl olup, ortalama VKİ 43.4 kg/m^2 (±5.3) olarak tespit edilmiştir. Transtorasik ekokardiyografik incelemeleri normal sınırlarda tespit edilmiştir. Ortalama trombosit hacimleri 8.57 fL(±1.22) olup VKİ ile MPV arasında pozitif korelasyon saptanmıştır (p:0.004, r:0.319). Diğer parametler ile anlamlı korelasyon tespit edilmememiştir.
Sonuç: Vücut kitle İNDEKSİ artışı MPV değerindeki artış ile koroledir. Obezite hastalarında VKİ artış ile birlkte görülen kronik hastalıkların etyopatogenizde MPV artışı rol oynayabilir.
Anahtar sözcükler: Obezite, Vücut kitle indeksi, MPV

INTRODUCTION

Platelets are cell nucleus and DNA-free, inflammation, coagulation together therewith, and mediators that play a role in the atherosclerotic process, including hosting granules and which cells have dimensions of approximately 7 to 10 fl. There are von Willebrand factor, platelet-derived growth factor (PDGF), calcium, serotonin, ADP and ATP in alpha granules they contain. Despite genomic structures and nucleus less nature, platelets are closely associated with systemic inflammation, localized inflammation, and endothelial activation and coordination via their molecules they contain in their granules [1-2]. As the cell size increases, enzymatic and corresponding prothrombotic activity is increased. MPV increases in activated platelets and is an easy to detect marker [3]. Data is showing the relationship with many diseases in the studies performed with MPV. When atrial fibrillation is cerebrovascular patients are examined when determining the positive correlation between MPV to the severity of the acute ischemic stroke, but also the relationship with MPV increase the risk of ischemic stroke relative to atrial fibrillation shown [4]. Increased MPV in patients with myocardial infarction who is taking thrombolytic treatment is found to be associated with worse clinical outcomes and high rate of thrombolytic treatment failure. Furthermore increased MPV in patients who underwent primary PCI is found to be associated with a high incidence of major cardiovascular events and high mortality rates in 3-6-12 months and 2 years follow-ups [5]. In patients with stable coronary artery disease, except for acute events, increased MPV values appear to be an independent predictor of long-term outcome after percutaneous intervention and in predicting stent restenosis [6].

Obesity is an epidemic and chronic disease that increases worldwide. Body mass index (BMI) is used for the definition and grading of obesity. The relationship between BMI and mortality and morbidity is shown in the literature [7]. Overweight and obese patients have many chronic diseases such as type 2 diabetes mellitus, dyslipidemia, chronic kidney disease, ischemic heart disease, non-alcoholic fatty liver. Systemic inflammation seen in these patients plays an important role in the development of chronic diseases [8,9].

The prevalence of obesity in obesity (class III obesity) is increasing especially recently. In patients with grade I obesity and class III patients, in-hospital mortality was higher in the course of the acute coronary syndrome in morbidly obese patients [10].

The aim of this study was to evaluate the correlation between body mass index and mean platelet volume (MPV)

MATERIAL AND METHODS

78 patients who have admitted to the study clinic internal cause excess weight and body mass index as obese according to hypertension, diabetes mellitus, hyperlipidemia, without atherosclerotic cardiovascular disease were included in the study. After the anamnesis of the patients, laboratory tests, height, weight, hip circumference heart rate, and office blood pressure measurements were taken. All patients had transthoracic echocardiography.

Body mass index (kg / m2), body weight and height were calculated. Classification by the World Health Organization according to BMI; 18.5-24.9 kg / m2 normal, 25.0-29.9 kg / m2 excess weight, and ≥30 kg / m2 were obese. Obese patients were identified as obesity 30-34,99 kg / m2 class obesity, 35-39.99 kg / m2 class 2 obesity, 40-49.99 kg / m2 class 3 obesity and ≥50 kg / m2 class 4 obesity.

Blood Count

Blood samples were collected from the antecubital vein after 8 hours of fasting following the indication from the patients and transferred to an anticoagulant tube containing dipotassium ethylenediaminetetraacetic acid (EDTA). Complete blood count analysis and other measurements were analyzed on the Cell Dyn 3700. Abbott devises to ensure that in vitro

platelet activation did not affect the results immediately after blood samples were taken.

Statistical analysis

Statistical Package for the Social Sciences (SPSS) package program was used for data, version 17 (Chicago, IL, USA). Mean, and standard deviation for parametric data and percentage ratios for nonparametric data were calculated. Pearson correlation test evaluated the relationship between BMI and MPV.

Transthoracic Echocardiography

Transthoracic echocardiography was performed using a GE-Vivid 3 ultrasound device with a 2.5-3 MHz transudation probe. At the left ventricular echocardiographic examination, end-diastolic (cm) and end-systolic (cm) measurements were obtained by using M-mode, and fractional shortening (FS%) and ejection fraction (EF%) was obtained.

In the Doppler echocardiography, flow velocity indices were obtained from apical images with intermittent and continuous Doppler technique and evaluated with device software. Early right (E) and atrial (A) flow velocities (m / sec) E/A ratio, right ventricular diastolic filling with left ventricular desalination time were calculated.

The study was conducted in accordance with the Declaration of Helsinki Principles (June 2008) in accordance with the ethical rules.

RESULTS

When the basal demographic characteristics of the patients were examined, it was observed that the average age was 45.06 (± 10.69) years and the majority of the patients were women (97.44%: 76; response 2.56% s: 2) mean body mass INDEX 43.4 (± 5.3) kg / m2. When whole blood parameters were examined, hematocrit levels were determined as 40.21% (± 3.26).

Mean platelet volume (MPV) was found to be 8.57 fL (± 1.22) (Table 1).

Table 1. Demographic biochemical and blood count values of patients

	Mean ±SD
Age (years)	45.06±10.69
Gender	
Male (s:2)	%2,56
Female (s:76)	%97,44
Height (cm)	156.5±5.7
Weight (kg)	106.32±13.93
Body Mass Index (kg/m2)	43.4±5.3
Total cholesterol (mg/dL)	196.1±39.4
LDL (mg/dL)	122.1±32.1
HDL (mg/dL)	46.7±10.1
TG(mg/dL)	146.2±89.9
AST(mg/dL)	19.6±9.5
ALT(mg/dL)	21.5±14

GGT(mg/dL)	34±18.5
BUN(mg/dL)	26.2±6.8
Creatinin (mg/dL)	0.7±0.1
HTC (%)	40.21±3.26
MPV (fL)	8.57±1.22
PLT	285.98±60.4 (X1o3 uL)

Echocardiographic thinning of the left atrium (36 ± 3.8 mm), aortic measurements (28.2 ± 3.6 mm) ejection fractions (64 ± 3.8%) and end-diastolic septum (10.6 ± 0.9 mm) and end diastolic posterior wall thickness normal 10.8 ± 0.8 mm) boundaries were detected. Table 2

Table 2. Echocardiographic results of patients

	Mean ±SD
Left atrium diameter (mm)	36 (±3.8)
Aort meausurement (mm)	28.2 (±3.6)
Ejection fraction (%)	64 (±3.8)
End-diastolic septum thickness (mm)	10.6 (±0.9)
End-diastolic back wall thickness (mm)	10.8 (±0.8)

There was a positive correlation between body mass index and MPV (p: 0.004; r: 0.319). The age of patients with MPV was not significantly correlated with age, cholesterol levels, renal function, and liver enzymes.

DISCUSSION

Obesity is becoming increasingly widespread worldwide as an epidemiological disease. In obese patients, the prevalence of hypertension diabetes mellitus and coronary artery disease is high in the etiopathogenesis of chronic inflammation [8]. The morbidity and mortality rates of coronary artery disease in BMI residue (≥ 40% kg / m2), especially in the classification of obesity. BMI was found to be higher than patients with lower BMI [9].

Although platelets do not contain cell nuclei and DNA, they contain metabolically active molecules. There are studies showing that the cell volume is more active [2].

Studies on the clinical availability of MPV values continue. Relatively low cost and rapid data obtained from routine blood counts have been evaluated in relation to many diseases. Studies with MPV values suggest that it has potential prognostic and diagnostic characteristics especially in hematology and cardiovascular field. There are studies showing that increased MPV values are correlated with risk factors for

cardiovascular diseases such as diabetes mellitus [11] impaired fasting blood glucose [12] insulin resistance [13] hypertension [14] hyperlipidemia [15] and metabolic syndrome [16]. The patients included in our study did not have any associated diseases known to lead to increased MPV. In the correlation analysis, body mass index increased as MPV increased significantly. The increase in morbidity and mortality rates of morbidly obese patients may be related to cardiovascular diseases.

Obese patients should be considered more and more with the increase in BMI and patients who are at risk with inexpensive tests should be determined earlier. MPV can be used as a promising parameter in this sense. However, the larger the reference range, the higher the MPV value as the blood sample is put on hold, is still a limiting problem in clinical use. Further studies are needed to explain the exact relationship.

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