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The Evaluation of Mean Platelet Volume in Hepatitis C Infection

Hepatit C Enfeksiyonunda Ortalama Trombosit Hacminin Değerlendirilmesi

Fatih DEMİRCAN[1], Faruk KILINÇ[2], Nevzat GÖZEL[1], Banu ERKALMA ŞENATEŞ[3], Ebubekir ŞENATEŞ[4]

[1]*Çağrı Private Medical Center, Department of Internal Medicine, Elazığ, Turkey*
[2]*Dicle University Faculty of Medicine, Department of Internal Medicine, Diyarbakır, Turkey*
[3]*Dicle Training and Research Hospital, Department of Internal Medicine, Diyarbakır, Turkey*
[4]*Dicle Medical Faculty, Department of Gastroenterology, Diyarbakır, Turkey*

ABSTRACT

Objective: Mean platelet volume (MPV) is a simple test that can be detected by routine blood counts and is considered a risk factor for atherothrombosis. In our study, we aimed to compare platelet count and mean platelet volume of patients with diagnosis of hepatitis C with healthy patients groups.

Materials and Methods: In this study, blood test results, age and gender of 107 HCV patients and 100 healthy individuals who admitted to our internal medicine polyclinic between January 2010 and August 2013 were evaluated retrospectively. Patient information was obtained from hospital records. Serum platelet counts, MPV, total cholesterol, triglycerides, LDL cholesterol, aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma-glutamyl transferase (GGT), and alkaline phosphatase (ALP) levels were recorded.

Results: Of the 107 patients diagnosed with HCV, 55 (51.4%) were males and 52 (48.6%) were females and the mean age was 45.0±11.0 years (range 23-66). In the control group, 51 patients were males and 49 were females, the mean age was 43.9±12.0 years (range 17-67). The mean ALT and AST levels of the patients with HCV were 58.8±76.0 IU/L (12-401) and 79.7±124.6 IU/L (14-670), respectively; in the control group it was 31.6±12 IU/L (15-82) and 33.1±10 IU/L (15-78), respectively and the difference between the groups was significant ($p<0.001$). The mean triglyceride level was significantly higher in the HCV group (205.5±53.3 mg/dL) than that in the control group (185.5±34.4 mg/dL) ($p<0.001$). The mean platelet count was 152.2±53.8 $x10^3/mm^3$ in patients with HCV infection and it was 190.7±66.8 $x10^3/mm^3$ in the control group; the difference between the groups was significant ($p<0.001$). The mean MPV was 9.1±1.7 fL in HCV group and 7.4±1.0 fL in the healthy group, and the difference was statistically significant ($p<0.001$).

Conclusion: In conclusion, according to our study; significant elevation in MPV level in patients with HCV infection may be responsible for the effect of the virus that leads to platelet dysfunction. This condition supports the relationship between the existence of HCV infection and the risk of atherothrombosis. *(Viral Hepatitis Journal 2014; 20(1): 11-14)*

Key words: Hepatitis C, platelets, mean platelet volume

ÖZET

Amaç: Ortalama trombosit hacmi [mean platelet volume (MPV)], rutin kan sayımı ile tespit edilebilen basit bir testtir ve aterotromboz için bir risk faktörü olarak kabul edilmektedir. Çalışmamızda, hepatit C virüsü (HCV) ile enfekte tanılı hastaların, trombosit sayısı (PLT) ve MPV'lerini sağlıklı hasta gruplarıyla karşılaştırmayı amaçladık.

Gereç ve Yöntemler: Ocak 2010-Ağustos 2013 tarihleri arasında hastanemiz dâhiliye polikliniğine başvuran 107 HCV'li hasta ile 100 sağlıklı birey; tetkik sonuçları, yaş ve cinsiyet açısından retrospektif olarak değerlendirildi. Hasta bilgilerine hastane kayıtlarından ulaşıldı. Hastaların serum PLT,, MPV değerleri, total kolesterol, trigliserid, LDL kolesterol, aspartat aminotransferaz (AST), alanin aminotransferaz (ALT), gama-glutamil transferaz (GGT) ve alkalen fosfataz (ALP) düzeyleri kaydedildi.

Bulgular: HCV tanılı 107 hastanın 55 (%51,4)'ü erkek, 52 (%48,6)'sı kadın; ortalama yaşları 45,0±11,0 yıl (dağılım 23-66 yıl) idi. Kontrol grubunun ise 51'i erkek, 49'u kadın; yaş ortalaması 43,9±12,0, yıl (dağılım 17-67 yıl) olarak bulundu. HCV'li hastaların ALT ve AST enzim ortalamaları sırasıyla 58,8±76,0 (12-401 IU/L) ve 79,7±124,6 (14-670 IU/L) olarak tespit edildi. Kontrol grubunda ise yine sırasıyla 31,6±12 (15-82 IU/L) ve 33,1±10 (15-78 IU/L) düzeyinde saptanmış olup, gruplar arasındaki fark anlamlı idi ($p<0,001$). HCV'li grubun trigliserid düzeyi ortalaması (205,5±53,3 mg/dL) kontrol grubuna (185,5±34,4 mg/dL) göre anlamlı yüksek bulundu ($p<0,001$). HCV enfeksiyonu olan kişilerde PLT ortalaması 152,2±53,8x10^3/mm3 olarak bulunurken, kontrol grubunda bu sayı ortalama 190,7±66,8x$10^3/mm^3$ olarak bulunmuş olup, gruplar arasındaki farkın anlamlı olduğu görüldü ($p<0,001$). HCV'li grupta MPV ortalaması 9,1±1,7 fL, kontrol grubunda ise 7,4±1,0 fL olarak saptanmış olup, aradaki fark istatistiksel olarak anlamlı bulundu ($p<0,001$).

Sonuç: Çalışmamızda, HCV enfeksiyonu olan hastalarda MPV'nin anlamlı yüksekliği, virüsün trombosit fonksiyon bozukluğuna neden olan etkisinden sorumlu tutulabilir. Bu bulgu, HCV enfeksiyonu ile aterotromboz riski arasındaki ilişkiyi desteklemektedir. *(Viral Hepatit Dergisi 2014; 20(1): 11-14)*

Anahtar Kelimeler: Hepatit C, trombosit, ortalama trombosit hacmi

Address for Correspondence: *Fatih Demircan MD, Çağrı Private Medical Center, Department of Internal Medicine Elazığ, Turkey*
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Introduction

Hepatitis C virus (HCV) infection is a major health problem that is prevalent all over the world. According to data from the World Health Organization, the prevalence of HCV infection is 3% and it affects about 210 million people all over the world (1). The seroprevalence studies performed on healthy individuals and blood donors suggest that the anti-HCV positivity varies from 0.3% to 1.7%. The most important route of transmission of this virus is parenteral (1,2). Despite all the measures taken, even in developed countries, HCV is responsible for 70% of chronic hepatitis and 60% of hepatoma Malaria (3,4). It can be observed the chronic effects of the virus which is capable of affecting multiple organ systems such as dermatological, endocrine, hematologic, neurologic and renal function as well as extra-hepatic manifestations such as essential mixed cryoglobulinemia or membranoproliferative glomerulonephritis (5). Many effects of chronic HCV infection on hematological system is also available. The virus can lead to platelet dysfunction and thrombocytopenia (6).

Platelets contribute to thrombus formation playing an important role in the pathogenesis of atherosclerotic complications. Mean platelet volume (MPV) is a determinant of platelet function. MPV is an available inexpensive test which is easy to interpret, and routinely measured by automated cell counters. MPV can be practically used as an indicator of diagnostic importance in certain diseases, as well as a good indicator for platelet - specific activities such as thromboglobulin release, platelet factor 4, thromboxane A2 , platelet aggregation, and platelet size (7,8). An increased MPV has been shown in such cases including diabetes mellitus (9,10). myocardial infarction (11,12). Hyperthyroidism (13). chronic obstructive pulmonary disease (COPD) (14). Smoking (15).and renal artery stenosis (16). In studies carried out on this area, different results have been reported. It was suggested that MPV could be useful in the diagnosis and treatment of many clinical conditions mainly including vascular diseases (17).

In our study, we aimed to investigate the effect of HCV infection on platelet count (PLT) and MPV.

Material and Methods

In our study, data were retrospectively analyzed from 143 patients diagnosed as hepatitis C who applied to the Internal Medicine outpatient clinic of Elazığ Private Çağrı Medical Center between January 2010 and August 2013, and 100 healthy subjects without any disease who applied to the hospital for routine control purposes. Serum HCV antibody (anti-HCV) was analysed using electrochemiluminescence method (E601 Cobas, Roche Diagnostics, Germany). PLT and volume was performed via blood count LH 780 Beckman Coulter (Beckman Coulter, FL, USA).

Patient information from were obtained from the patients epicrisis which were filled at the internal medicine outpatient. Serum platelet counts, mean platelet count (MPV), total cholesterol, triglycerides, LDL cholesterol, aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma-glutamyl transferase (GGT) and alkaline phosphatase (ALP) levels of the patients were recorded.

The patients with diabetes mellitus, ischemic heart disease, thyroid disease, COPD, cerebrovascular disease as well as with HBsAg and anti-HCV positivity, alcohol use, autoimmune and metabolic liver disease were excluded from the present study. Thus, only a total of 107 HCV patients were included in the study.

For statistical assessment, SPSS 16.0 (for Windows) version was used. The mean, standard deviation, minimum and maximum values of the data were determined. Student t-test was applied for comparison of quantitative data with an independent normal distribution, while Mann-Whitney U-test was used for those without any independent normal distribution. In order to compare the qualitative data, Chi-square test was used. Data were evaluated at 95% confidence interval and $p<0.05$ was considered significant.

Results

Out of 107 patients diagnosed with HCV, 55 (51.4%) were male and 52 (48.6%) were female with a mean age of 45.0±11.0 year (ranging between 23 and 66 year), while the control group consisted of 51 male and 49 were female with a mean age of 43.9±12.0 year (ranging between 17 and 67 year). The mean age of all patients was 44.5±11.4 year with a close age distribution both in men and women gender, suggesting no significant difference between age and gender ($p=0.53$).

Of the HCV patients, the average enzymes of ALT and AST were found as 58.8±76.0 (12-401 IU/L) and 79.7±124.6 (14-670 IU/L), respectively. In the control group, however, the above values were found as 31.6±12 (15-82 IU/L) and 33.1±10 (15-78 IU/L), respectively, suggesting a significant difference between those groups ($p<0.001$). The mean triglyceride level of the HCV group (205.5±53.3 mg/dL) was significantly higher than that of the control group (185.5±34.4 mg/dL) ($p<0.001$) (Table 1).

The PLT average in subjects with HCV infection was 152.2±53.8 x103/mm^3, while control group showed 190.7±66.8 x103/mm^3, suggesting a significant difference between those groups ($p<0.001$). In addition, the average of MPV was 9.1±1.7 fL in HCV group, while it was 7.4±1.0 in healthy group, suggesting also a statistically significant difference ($p<0.001$) (Table 1).

Discussion

In 1978, Fabricant et al. have established an association between some infections and atherosclerosis (18). In the studies at following years, a probability of some infection agents such

Table 1. Comparison between groups of test parameters

Parameters	HCV (+) group	Control group	p
AST (IU/L)	124.9±74.6	33.1±1	<0.001
ALT (IU/L)	78.8±56	31.6±12	<0.001
ALP (IU/L)	65.6±37	58.6±22	0.11
GGT (IU/L)	102.5±63	95.4±52	0.38
TRG (mg/dL)	205.5±53	185.5±34	<0.001
LDL (mg/dL)	12.8±3	110.94±21	<0.001
MPV (fL)	9.1±1.17	7.4±1	<0.001
PLT (/mm^3)	152.2±53.8	190.7±66.8	<0.001

AST: Aspartate aminotransferase, ALT: Alanine aminotransferase, ALP: Alkaline phosphatase, GGT: gamma-glutamyl transferase, TRG: triglyceride, LDL: low density lipoprotein, MPV: Mean platelet volume, PLT: platelet count

as Chlamydia pneumoniae, Helicobacter pylori, cytomegalovirus, hepatitis A virus (HAV) and influenza virus to causing atherosclerosis has been suggested (19,20).

The infections caused by hepatitis C virus (HCV) are common both in Turkey and all over the world as a leading chronic viral infections. In our country, seroprevalence studies demonstrated that the anti-HCV positivity ranged from 0.3% to 1.7%. Parenteral route is the most important route of transmission of the disease (1,2). Despite all the measures taken, even in developed countries, HCV is responsible for 70% cases of chronic hepatitis and 60% cases of hepatoma Malaria (3,4). Attention is drawn on several studies investigating the association between HCV infection and atherosclerosis (19,20). HCV infection has been considered to cause to the release of cytokines that are important for the development of atherosclerosis by means of activating the immune system (21).

The mean platelet volume is an indication of platelet function and activation. Platelet activation capacity can be easily determined by this method (22,23).

Large platelets are more active than the small ones in terms of both enzymatical and metabolical aspects. That's why the large platelets have a prothrombotic potential (24). Previous studies demonstrated an increased values of MPV in thrombotic diseases such as acute myocardial ischemia, coronary atherosclerosis and cerebrovascular cases. Kılıçlı et al. stated that MPV could be a marker for myocardial infarction, while Bath et al. showed an increased number of MPV in the ischemic cerebrovascular cases (25,26). Korkmaz et al. reported that higher MPV levels reflected atherosclerosis and cardiovascular risk (27). while Yazıcı et al. reported that MPV could be useful in metabolic syndrome and ST elevated myocardial infarction (28). Köşüş et al. demonstrated an increased MPV levels in glycemic disorders (29). In consideration of these studies, higher levels of MPV can be associated with an increased cardiovascular risk and atherosclerosis.

During HCV infection, the extrahepatic retention is frequent to occur. One of the affected system is the hematopoietic system. One of the most important effects of the virus on the hematopoietic system is a decreased platelet count (6). In anti-HCV (+) patients, mild or moderate thrombocytopenia is usually observed.

Garcia-Suarez et al. in their study (30). reported severe thrombocytopenia in a small proportion of HCV-positive patients. Regarding to our study, however, 61 of HCV patients presented thrombocytopenia, one of whose PLT count was under 50 000 (0.5%), 17 subjects ranged between 50 000 and 100 000 (8.2%), and 43 were in the range of 100 000-150 000, while only 45 patients were between 100 000 and 150 000 in the control group. The difference between HCV patients and healthy subjects was statistically significant in terms of thrombocytopenia ($p<0.001$).

In their study investigated the effects of HCV infection on platelet parameters in hemodialysis patients, Şahin et al. found MPV values to be significantly higher in HCV-positive patients (31). In our study on patients with chronic HCV infection, MPV values were significantly higher compared with the control group ($p<0.001$). A negative relationship between PLT and MPV has been observed in many diseases such as myeloproliferative disorders (32). In their study, Köksaldı Motor et al. found that mean platelet volume in patients with chronic HCV was significantly higher (33). The results from our study seem to support this case, as well.

In conclusion, significantly higher MPV in patients with HCV infection may be responsible for the viral effect that causes platelet dysfunction, supporting the association between HCV infection and the risk of atherothrombosis.

Conflict of interest: None declared.

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