RESEARCH ARTICLE

F.U.Med. J. Health Sci.
2019; 33 (1): 43 - 46
http://www.fusabil.org

Evaluation of Platelet İndex and Biochemical Parameters in Patients with Hepatitis B Virus *

Umut Safiye ŞAY COŞKUN [1, a]
Zeliha Cansel ÖZMEN [2, b]

[1] Tokat Gaziosmanpaşa University,
Faculty of Medicine,
Department of Medical Microbiology,
Tokat, TURKEY

[2] Tokat Gaziosmanpaşa University,
Faculty of Medicine,
Department of Medical Biochemistry,
Tokat, TURKEY

[a] ORCİD: 0000-0002-4359-4799
[b] ORCİD: 0000-0001-9045-2518

Objective: The clinical importance of thrombosis in Hepatitis B virus (HBV)-related liver diseases has been demonstrated in many studies. In addition, it was shown that inflammation of the liver is associated with lipid metabolism disorder. The aim of this study was to determine the platelet index and biochemical parameters in HBV-DNA positive and HBV-DNA negative patients for investigating whether these parameters are contributing in the follow-up of Hepatitis B patients.

Materials and Methods: In this study, results of 54 HBV–DNA positive and 54 HBV–DNA negative patients with chronic Hepatitis B between January 2016 and December 2017 at Tokat Gaziosmanpasa University Medicine Faculty Hospital Microbiology Laboratory were evaluated retrospectively. Aspartat aminotransferaz (AST), alanin aminotransferaz (ALT), low density lipoprotein (LDL) parameters were detected by COBAS 6000 (Roche Dianostic, France) device with spectrophotometric method. Platelet (PLT), mean platelet volume (MPV), platelet-large cell ratio (P-LCR) were measured by Sysmex XN 1000 (Sysmex Corporation, Kobe, Japan) complete blood count device. Student t test and one-way ANOVA test were used for comparison between groups. P<0.05 was considered statistically significant.

Results: In this study, there were a statistically significant increase in AST, ALT, LDL, MPV and P-LCR levels compared to the control group in both HBV-DNA positive and HBV-DNA negative patients. However there was a statistically significant decrease in PLT levels (P<0.05).

Conclusion: Our results show that the parameters of AST, ALT, LDL, PLT, MPV and P-LCR are easy to operate and cost-effective for both the disease and the course of treatment. P-LCR should be considered as a part of the parameter of platelet index may contribute to the clinician in the follow-up of Hepatitis B infection.

***Key words**: Pregnancy, Hepatitis B, platelet index, biochemical parameters, platelet -large cell ratio*

Hepatit B Virüsü ile Enfekte Hastalarda Trombosit İndekslerinin ve Biyokimyasal Parametrelerin Değerlendirilmesi

Amaç: Hepatit B virüsü (HBV) ile ilişkili karaciğer hastalıklarında trombositlerin klinik önemi birçok çalışmada gösterilmiştir. Ayrıca karaciğerdeki inflamasyonunun lipid metabolizma bozukluğu ile ilişkili olduğu belirtilmiştir. Bu çalışmanın amacı HBV-DNA pozitif ve HBV-DNA negatif hastalarda trombosit indexlerin ve biyokimyasal parametrelerin Hepatit B hastalarının tedavisinin takibinde katkı sağlayıp sağlamayacağını araştırmaktır.

Gereç ve Yöntem: Bu çalışmada Tokat Gaziosmanpaşa Üniversitesi Tıp Fakültesi Hastanesi Mikrobiyoloji Laboratuvarına gelen Hepatit B ile enfekte olan 54 HBV–DNA pozitif, 54 HBV–DNA negatif hasta sonuçları retrospektif olarak değerlendirilmiştir. Aspartat aminotransferaz (AST), alanin aminotransferaz (ALT), düşük yoğunluklu lipoprotein (LDL) parametreleri spektrofotometrik yöntemle COBAS 6000 (Roche Dianostik, Fransa) cihazı ile, trombosit (PLT), ortalama trombosit hacmi (MPV) ve trombosit-büyük hücre oranı (P-LCR) parametrelerinin düzeyleri ise Sysmex XN 1000 (Sysmex, Kobe, Japonya) hemogram cihazı kullanılarak belirlenmiştir. Gruplar arası karşılaştırılmada, student t–testi ve one-way ANOVA testi kullanılmıştır. P<0.05 değeri istatiksel olarak anlamlı kabul edilmiştir.

Bulgular: Bu çalışmada hem HBV-DNA pozitf hem de HBV-DNA negatif olan hastalarda (kronik hepatit B hastalarında) kontrol grubuna göre AST, ALT, LDL, MPV ve P-LCR düzeylerinde istatistiksel olarak anlamlı bir artma ancak PLT düzeylerinde istatistiksel olarak anlamlı bir azalma olduğu tespit edilmiştir (P<0.05).

Sonuç: Elde ettiğimiz sonuçlar AST, ALT, LDL, PLT, MPV ve P-LCR parametrelerinin, gerek hastalığın gerekse tedavinin takibinde kullanılabilecek çalışması kolay ve maliyeti düşük parametreler olduğunu göstermektedir. P-LCR'nin, Hepatit B hastalığının takibinde klinisyene katkıda bulunabilecek trombosit indeksi parametrelerinin bir parçası olarak düşünülmüştür.

***Anahtar Kelimeler:** Hepatit B, trombosit indeksleri, biyokimyasal parametreler, trombosit-büyük hücre oranı*

Received : 27.12.2018
Accepted : 01.03.2019

Correspondence
Yazışma Adresi

Umut Safiye ŞAY COŞKUN
Tokat Gaziosmanpaşa University,
Faculty of Medicine,
Department of Medical Microbiology
Tokat - TURKEY

umut.saycoskun@gop.edu.tr

* International XXXVIII. Turkish Microbiology Congress, 4-8 November 2018, Antalya/TURKEY

Introduction

Platelets have an important role in the pathogenesis of local and systemic inflammation-related disorders. Thrombotic and inflammatory agents released from platelets can trigger disease-specific complications (1). The clinical significance of thrombosis in HBV-associated liver disease has been demonstrated in many studies. As a result of close association between blood and liver cells in sinusoids, platelets have been implicated as the primary contributor to liver inflammation (2).

Liver lobular inflammation has been shown to be associated with increased serum aspartate aminotransferase (AST), and alanine aminotransferase (ALT) levels (3). The degree of high ALT is considered to be a marker of liver damage and is used as a criterion for monitoring antiviral therapy or for response to treatment (4).

Hepatitis B infection is a difficult and expensive disease that threatens public health. Easy and cost-effective parameters need to be used in the course of the disease and the treatment will contribute to clinicians in these areas. The aim of this study was to determine if there was relationship between the level of platelet (PLT), mean platelet volume (MPV), platelet-large-cell ratio (P-LCR), AST, ALT, low density lipoprotein (LDL) and Hepatitis B infection. Also investigating whether these parameters are contributing in the follow-up of hepatitis B patients.

Material and Method

In this study, results of 54 HBV-DNA positive and 54 HBV-DNA negative patients with chronic hepatitis B between January 2016 and December 2017 at Tokat Gaziosmanpasa University Medicine Faculty Hospital Microbiology Laboratory were evaluated retrospectively. Fifty-four randomized patients who were not infected with hepatitis B were used as control group. AST, ALT, LDL, parameters were detected by spectrophotometric method with COBAS 6000 (Roche Dianostic, France) device. PLT, MPV, P-LCR parameter levelş were measured by Sysmex XN 1000 (Sysmex Corporation, Kobe, Japan) complete blood count device. Student t test and one-way ANOVA test were used for comparison between groups. P <0.05 was considered statistically significant.

Ethical approval was obtained from Tokat Gaziosmanpasa University of Medicine Clinical Research Ethics Committee (Project number: 16-KAEK-089).

Results

Fifty-four patients with HBV-DNA positive (30male, 24 female), 54 HBV-DNA negative (28 male, 26 female) and 54 control subjects (29 male, 25 female) were included in the present study. The mean age of HBV-DNA positive, HBV-DNA negative and control patients were 47.87 IU/L, 52,42 IU/L and 45.70 IU/L respectively. There was no statistically significant difference in sex and age between the groups (P>0.05). Biochemical characteristics of study populations were shown in Table 1. A statistically significant increase in AST, ALT, LDL, MPV and P-LCR levels were found in both HBV-DNA positive and HBV-DNA negative patients compared to the control group. However there was a statistically significant decrease in PLT levels (P<0.05).

Discussion

It is known that approximately two billion people in the world have encountered hepatitis B virus (HBV), and about 400 million people are chronic Hepatitis B. It is estimated that 500.000–700.000 people die each year due to HBV infection and/or related complications (5).

The MPV measurement is a simple and easy method for evaluating platelet functions. MPV reflects platelet production rate. Large platelets are more active than small platelets metabolically and enzymatically also have greater prothrombotic potential (1). In addition to the measurements of MPV, PDW, PCT and P-LCR levels are inexpensive, easy to apply and are easily accessible indexes with routine blood count (6).

Table 1. Biochemical characteristics of study populations

Variable	HBV DNA positive group	HBV DNA negative group	Control group
PLT (K/uL)	231.95 (67–324)[a]	235.70 (43–346)[a]	280.47 (141–572)[a]
MPV (fL)	10.75 (9.1–13.6)[a]	10.65 (9.3–11.9)[a]	10.30 (8–11.6)[a]
P-LCR	28.70±7.20[b]	28.55±6.18[b]	25.26±6.58[b]
ALT (U/L)	35.70 (11.7–72)[a]	36.80 (13–81.7)[a]	23.20 (4.9–45.3)[a]
AST (U/L)	34.60 (13.6–75)[a]	35.20 (14–83.4)[a]	23.80 (9.6–38.4)[a]
LDL (mg/dL)	122.98±27.72[b]	133.90±46.1[b]	103.90±35.9[b]

[a] One Way Anova; Mean±SD P<0.05

[b] One Way Anova; Median (Min-Max) P<0.05

PLT: Platelets, **MPV:** Mean platelet volume, **P-LCR:** Platelet Large-Cell Ratio, **ALT:** Alanine aminotransferase, **AST:** Aspartate aminotransferase, **LDL:** Low Density Lipoprotein

Platelets associated with inflammatory markers play a role in the initiation and spread of vascular and inflammatory diseases. Thrombocyte-large cell ratio (P-LCR) is an index representing the percentage of platelets larger than 12 fL (1). Platelet distribution width (PDW) is an indicator of heterogeneity of platelet size. In addition to their role in thrombosis and hemostasis, in recent years, it has been stated that platelet level have increased. Platelet activation has been demonstrated in the pathogenesis of various diseases (7). MPV, which is considered to be the major platelet index, was evaluated in many infected patients. These include acute and chronic cholecystitis (8) infective endocarditis (9) and malaria (10). The association of MPV with hepatitis B and fibrosis has been reported in studies in China (11, 12) and in Turkey (6, 13). However, there were no studies on Hepatitis B and P-LCR. Gao et al. (14) were reviewed septic shock patients retrospectively in 2014. Platelet indices were recorded during the first five consecutive days after admission, as well as the penultimate and the last day of hospital stay. The data were compared between surviving and non-surviving patients. According to the study PDW and PLCR showed increased trends, while PCT and PLT decreased in the non-survivor group. A statistically significant difference was seen between survivors and non-survivors for platelet indices which make them easily available and useful prognostic markers for patients in septic shock. Hu et al. (11) indicated MPV has significantly increased in chronic HBV-infected patients and is associated with disease severity; thus, it may serve as an important biomarker. Ye Pan et al. (12) detected the relationship between inflammation and fibrosis also platelet parameters were analysed. Liver fibrosis and inflammation were assessed by histopathology of biopsied liver tissue. PLT and PDW accounted for 20.5% of liver inflammation (n=677). PLT and PDW accounted for 18.4% of liver fibrosis. They indicated platelet parameters can provide valuable information for the assessment of hepatic inflammation and fibrosis. In this study, in accordance with literature we found increase in MPV and decrease in PLT level in hepatitis B infectious patients. We also found that P-LCR level was increased in the same patient population.

It was shown that ALT and AST levels have increased in hepatocyte destruction with hepatitis B infection patients (15). It is also expected to detect high level of hepatic steatosis in chronic Hepatitis B (CHB) infection patients In a study of Chinese patients with prevalence and risk factors for CHB and hepatic steatosis, the effects of hepatic steatosis on the severity of liver damage were evaluated and hyperlipidemia was reported in CHB patients(16). Kim et al. stated that chronic viral hepatitis B is frequently associated with hepatic steatosis and increases in LDL (17). Inflammation in liver is associated with impaired lipid metabolism (18). In this study statistically significant increase in AST, ALT, LDL levels were found in both HBV-DNA positive and HBV-DNA negative patients ($P<0.05$). The fact that fibrosis and steatosis were not determined at the cell level constitutes the limitation of this study. However, in this study, LDL elevation may be caused by impaired lipid metabolism due to inflammation.

In conclussion, a statistically significant increase in AST, ALT, LDL, MPV and P-LCR levels was found in HBV DNA positive patients but in contrast there was a statistically significant decrease in PLT level. These results suggest that noninvasive biochemical and hemogram parameters may contribute to follow up of chronic hepatitis B disease. We also suggest P-LCR should be consider as a part of the parameter of trombosit index in Hepatitis B infection.

References

1. Tong HV, Song Le H, Hoan NX, et al. Soluble MICB protein levels and trombosit counts during hepatitis B virus infection and response to hepatocellular carcinoma treatment. BMC Infect Dis 2015; 15: 25.
2. Ripoche J. Blood platelets and inflammation: Their relationship with liver and digestive diseases. Clin Res Hepatol Gastroenterol 2011; 35: 353-357.
3. Shi JP, Fan JG, Wu R, et al. Prevalence and risk factors of hepatic steatosis and its impact on liver injury in Chinese patients with chronic hepatitis B infection. J Gastroenterol Hepatol 2008; 23: 1419-1425.
4. Nar R, Milletli Sezgin F. The relationship between the serum RNA titers of hepatitis C virus and biochemical parameters in chronic hepatitis C patients. J Viral Hepat 2016; 22: 28-33.
5. World Health Organization. Hepatitis B vaccines. Weekly Epidemiological Record 2004; 79: 255-263.
6. Ekiz F, Yuksel O, Kocak E, et al.Mean platelet volume as a fibrosis marker in patients with chronic hepatitis B. J Clin Lab Anal 2011; 25: 162-165.
7. Lupberger J, Hildt E. Hepatitis B virus-induced oncogenesis, World J Gastroenterol 2007; 13: 74-81.
8. Seker A, Incebıyık A, Kucuk, Terzi A, et al. Mean platelet volume in patients with acute and chronic cholecystitis. Acta Medica Mediterranea 2013; 29: 515.
9. Icli A, Tayyar S, Varol E, et al. Mean platelet volume is increased in infective endocarditis and decreases after treatment. Med Princ Pract 2012; 22: 270-273.
10. Ali EA, Abdalla TM, Adam I. Platelet distribution width, mean platelet volume and haematological parameters in patients with uncomplicated *Plasmodium falciparum* and *P.vivax* malaria. F1000Res 2017; 6: 865.
11. Hu Y, Lou Y, Chen Y, Mao W. Evaluation of mean platelet volume in patients with hepatitis B virus infection. Int J Clin Exp Med 2014; 7: 4207-4213.
12. Pan Y, Muheremu A, Wu X, Liu J. Relationship between platelet parameters and hepatic pathology in patients with chronic hepatitis B infection - a retrospective cohort study of 677 patients. J Int Med Res 2016; 44: 779-86.

13. Purnak T, Olmez S, Torun S, et al. Mean platelet volume is increased in chronic hepatitis C patients with advanced fibrosis. Clin Res Hepatol Gastroenterol 2013; 37: 41-46.

14. Gao Y, Li Y, Yu X, et al. The impact of various platelet ındices as prognostic markers of septic shock. PLoS ONE 2014; 9: e103761.

15. Liew PL, Lee WJ, Lee YC, et al. Hepatic histopathology of morbid obesity: Concurrence of other forms of chronic liver disease. Obes Surg 2006; 16: 1584-1593.

16. Shi JP, Fan JG, Wu R, et al. Prevalence and risk factors of hepatic steatosis and its impact on liver injury in Chinese patients with chronic hepatitis B infection. J Gastroenterol Hepatol 2008; 23: 1419-1425.

17. Kim KH, Shin HJ, Kim K, et al. Hepatitis B virus X protein induces hepatic steatosis via transcriptional activation of SREBP1 and PPAR gamma. Gastroenterology 2007; 132: 1955-1967.

18. Zheng RD, Chen JN, Zhuang QY, et al. Clinical and virological characteristics of chronic hepatitis B patients with hepatic steatosis. Int J Med Sci 2013; 10: 641-666.