

Diagnostic Accuracy of Mean Platelet Volume for Spontaneous Bacterial Peritonitis (SBP) in Patients with Hepatitis C Related Decompensated Liver Cirrhosis Taking Ascitic Fluid Analysis as the Gold Standard

KASHIF RAFI¹, HASSAN NADEEM², MUHAMMAD OMER FAROOQ³, NIAZ MUHAMMAD⁴, SADIA JABBAR⁵, ASMAT ULLAH⁶

¹Senior Registrar, Pakistan Kidney and Liver Institute & Research Centre, Lahore

²Senior Registrar Transplant Hepatology, Pakistan Kidney and Liver Institute and Research Centre, Lahore

³Senior Registrar Department of Gastroenterology & Hepatology, Sheikh Zayed Medical College/ Hospital Rahim Yar Khan

⁴Consultant Gastroenterologist and Hepatologist, Department of Gastroenterology and hepatology, Bolan Medical Complex Hospital, Quetta

⁵Senior Registrar Department of Gastroenterology and Hepatology PGMI/Lahore General Hospital, Lahore

⁶Assistant Professor Gastroenterology, Pir Abdul Qadir Shah Jilani Institute of Medical Sciences, Khair Pur Mirs Sindh

Corresponding author: Kashif Rafi, Email: kashifrafi111@gmail.com, Cell: +92 333 4250656

ABSTRACT

Objective: To determine the diagnostic accuracy of Mean Platelet Volume for Spontaneous Bacterial Peritonitis (SBP) in patients with Hepatitis C related Decompensated Liver Cirrhosis taking Ascitic Fluid Analysis as the gold standard.

Study Setting: The study was conducted at Department of Gastroenterology, Shaikh Zayed Hospital, Lahore.

Duration of Study: August 29, 2018 to March 1, 2019

Study Design: Cross-Sectional Study

Subjects & Methods: Total 180 patients were counseled. Four ml of venous blood samples were taken from all patients using aseptic technique. CBC was done by the auto analyser and MPV was noted. Ultrasound guided 20ml of ascitic fluid was aspirated using aseptic technique. SBP on ascitic fluid analysis and MPV was diagnosed as per operational definition. All the collected data were entered and analysed into SPSS v25.0. A 2x2 table was generated to calculate sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy. Data will be stratified for age, gender and duration of liver cirrhosis. Post-stratification, Chi-Square test was applied taking p-value of ≤ 0.05 as statistically significant.

Results: In this study, 180 patients who have Hepatitis C related Decompensated Liver Cirrhosis with intraperitoneal fluid on ultrasound were enrolled. Among these patients, 107(59.4%) were males, while 73(40.6%) were females. Age range in this study was from 20 years to 65 years with mean age of 42.1 ± 12.9 years. Sensitivity (Se), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV) and accuracy of MPV was 75.1%, 55.8%, 84.4%, 41.3% and 70.5% respectively.

Conclusion: Mean Platelet Volume can be used for the screening and detection of Spontaneous Bacterial Peritonitis (SBP) in patients with Hepatitis C related Decompensated Liver Cirrhosis.

Keywords: Ascitic Fluid Analysis, Mean Platelet Volume, Liver Cirrhosis.

INTRODUCTION

Hepatitis C virus (HCV) is endemic in Pakistan and its burden is expected to increase in coming decades owing mainly to widespread use of unsafe medical procedures. HCV seroprevalence among the general adult Pakistani population is 4.9%.¹

Chronic liver disease (CLD) is the end result of long standing HCV infection. It causes significant morbidity and mortality, mainly due to complications like hepatic encephalopathy, spontaneous bacterial peritonitis, ascites, thrombocytopenia, hepatorenal syndrome (HRS) and esophageal variceal hemorrhage (EVH).²⁻³

Bacterial infections are more common in patients with cirrhosis than in the general population, and those with decompensated cirrhosis are more susceptible to infections than those with a compensated liver disease.⁴

Soha et al. in 2015 conducted a study on patients with liver cirrhosis having ascites and found that the sensitivity of Mean Platelet Volume (MPV) was 85.7%, specificity 75%, positive predictive value (PPV) 78.3% and negative

predictive value (NPV) was 83.3% for the diagnosis of spontaneous bacterial peritonitis (cut off=8.3).⁵

Lashin et al. in 2016 conducted a study that stated that a statistically significant increase in MPV levels was observed in cirrhotic patients. The MPV was having sensitivity, specificity, NPV and PPV of 68.75%, 80%, 87% and 54.8% respectively for diagnosing SBP (cut off=8.71).⁶

The rationale of the study is to resolve the controversy related to the sensitivity, specificity, PPV and NPV as highlighted and presented in the literature published internationally. There is a difference between result of the different studies that has evaluated the sensitivity, specificity, PPV and NPV of the mean platelet volume to diagnose SBP in decompensated liver disease patients.

This study will help in determining the diagnostic accuracy of MPV for spontaneous bacterial peritonitis in patients with hepatitis C related cirrhosis taking ascetic fluid analysis as the gold standard and can help in reducing the complications associated with ascitic fluid aspiration for the

diagnosis and hence results in reducing the mortality and morbidity in these patients.

MATERIALS AND METHODS

This cross-sectional study was conducted at Department of Gastroenterology, Shaikh Zayed Hospital Lahore, during from August 29, 2018 to March 1, 2019. Total 180 patients of both genders presented with Hepatitis C related Decompensated Liver Cirrhosis with intraperitoneal fluid on ultrasound were enrolled in this study. Patients had ages ranging between 20 to 65 years. Written informed consent and detailed history were taken from each patient. Patients who took antibiotics in past 10 days as per history and clinical record, patients with non -hepatic malignancies, patients having renal failure (serum creatinine $\geq 2\text{mg/dl}$) or cardiac failure (Ejection Fraction $\leq 35\%$) as per clinical record, patients with focal lesion of the liver on ultrasound as per clinical record, and patients with secondary bacterial peritonitis were excluded.

Four ml of venous blood samples were taken from all patients using aseptic technique. CBC was done by the auto analyser and MPV was noted. Ultrasound guided 20ml of ascitic fluid was aspirated using aseptic technique.

Ten ml of ascitic fluid sample was inoculated for culture & sensitivity using blood culture bottle at the bed side and 10 ml sent for biochemical and microbiology analysis including protein, albumin, glucose, TLC and DLC. SBP on ascitic fluid analysis and MPV was diagnosed as per operational definition.

All the data were noted and recorded into the attached proforma along with demographic details of the patient. All the labs were acquired from same lab (Hospital Lab) to eliminate bias and confounding variables were controlled by exclusion.

All the collected data were entered and analysed into SPSS v25.0. Numerical variable i.e. age was presented by Mean \pm S.D. Categorical variables i.e. gender and presence or absence of SBP on ascitic fluid and MPV were presented in frequency and percentage. A 2x2 table was generated to calculate sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy.

RESULTS

In this study, 180 patients who have Hepatitis C related Decompensated Liver Cirrhosis with intraperitoneal fluid on ultrasound were enrolled. Among these patients, 107(59.4%) were males, while 73(40.6%) were females.

Age range in this study was from 20 years to 65 years with mean age of 42.1 \pm 12.9 years. Majority of the patients 76(42.2%) were >45 years of age group. While 43(23.9%) and 61(33.9%) patients were between 20-30 years and 31-45 years of age groups respectively.

Majority of the patients 62(34.4%) had duration of liver cirrhosis for 1-2 years. While 61(33.9%) and 57(31.7%) patients had duration of liver cirrhosis for <1 year and >2 years respectively.

Among 180 patients, 137(76.1%) patients had SBP on Ascitic Fluid Analysis and 122(67.8%) on MPV.

Sensitivity (Se), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV) and accuracy

of MPV was 75.1%, 55.8%, 84.4%, 41.3% and 70.5% respectively.

Table 1: Frequency distribution of gender

Gender	Frequency	Percent
Male	107	59.4
Female	73	40.6
Total	180	100.0

Table 2: Frequency distribution of age groups

Age groups	Frequency	Percent
20-30 years	43	23.9
31-45 years	61	33.9
>45 years	76	42.2
Total	180	100.0

Table 3: Frequency distribution of duration of liver cirrhosis

Duration of liver cirrhosis	Frequency	Percent
<1 year	61	33.9
1-2 years	62	34.4
>2 years	57	31.7
Total	180	100.0

Table 4: Frequency distribution of SBP on MPV

SBP on MPV	Frequency	Percent
Yes	122	67.8
No	58	32.2
Total	180	100.0

Table 5: Frequency distribution of SBP on AFA

SBP on AFA	Frequency	Percent
Yes	137	76.1
No	43	23.9
Total	180	100.0

Table 6: Presence of SBP on MPV vs. AFA

SBP on MPV	SBP on AFA		Total
	Yes	No	
Yes	103	19	122
No	34	24	58
Total	137	43	180

Table 6:

Sensitivity	75.1%
Specificity	55.8%
Positive Predictive Value	84.4%
Negative Predictive Value	41.3%
Accuracy	70.5%

DISCUSSION

Spontaneous bacterial peritonitis is one of the most common bacterial infections in cirrhotic patients with ascites, this infection stimulates the immune system in different forms, such as increase the total leucocytic count and PMN count in both blood and ascetic fluid [7].

It is possible that the rise in mean platelet volume (MPV) in bacterial infection is caused by an expanded creation of bigger and/or more youthful platelets as a response to the pathogen [8].

The ability of MPV values to predict SBP in cirrhotic patients was analyzed using receiver operator characteristic (ROC) curve analysis. A statistically

significant increase in MPV levels was observed in cirrhotic patients with SBP.

ROC curve analysis suggested that the optimum MPV level cutoff point for cirrhotic patients with SBP was 8.3 FL, with a sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy as 75.1%, 55.8%, 84.4%, 41.3% and 70.5% respectively.

The results of the study were close to that reported by **Suvak et al [9]** who stated that the optimum MPV level cutoff point for cirrhotic patients with SBP was 8.4, with a sensitivity, specificity, negative predictive value (NPV), and positive predictive value (PPV) of 72.7%, 57.5%, 85.4% and 42.1%, respectively.

Also this was in agreement with that reported by **Abdel-Razik et al [10]** where MPV had 8.6 as a cutoff value, 95.9 % sensitivity and 91.7% specificity for detecting SBP.

Also, **Marisol et al [11]** found that the best was the cutoff value of 8.3 fl, with sensitivity, specificity, PPV, NPV and accuracy of 84%, 82%, 83%, 84% and 83% respectively.

Bacterial infections are more common in patients with cirrhosis than in the general population, and those with decompensated cirrhosis are more susceptible to infections than those with a compensated liver disease [4].

Soha et al. in 2015 conducted a study on patients with liver cirrhosis having ascites and found that the sensitivity of Mean Platelet Volume (MPV) was 85.7%, specificity 75%, positive predictive value (PPV) 78.3% and negative predictive value (NPV) was 83.3% for the diagnosis of spontaneous bacterial peritonitis (cut off=8.3) [5].

Lashin et al. in 2016 conducted a study that stated that a statistically significant increase in MPV levels was observed in cirrhotic patients. The MPV was having sensitivity, specificity, NPV and PPV of 68.75%, 80%, 87% and 54.8% respectively for diagnosing SBP (cut off=8.71) [6].

CONCLUSION

Mean Platelet Volume can be used for the screening and detection of Spontaneous Bacterial Peritonitis (SBP) in

patients with Hepatitis C related Decompensated Liver Cirrhosis.

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