

# High Meld Score and Spontaneous Bacterial Peritonitis: A Proven Relationship

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## ABSTRACT

Almost a 3<sup>rd</sup> of patients with liver cirrhosis and ascites may develop spontaneous bacterial peritonitis (SBP) <sup>1,2</sup>. SBP carries a high morbidity and mortality<sup>3,4</sup>. Hence identifying predisposing factors that may cause a patient with ascites to develop SBP are of great interest. The Model for End-Stage Liver Disease (MELD) score is a measure of mortality risk in patients with end-stage liver disease<sup>7</sup>. Development of ascites and encephalopathy, two complications of end-stage liver disease that are not used in the MELD score calculation, have generally correlated with higher MELD scores. **Aims & methods:** The aim of this study was to determine the frequency of higher MELD score in patients of SBP with liver cirrhosis. Eighty-five patients fulfilling the inclusion criteria were selected. An informed consent was taken from all patients. Demographic data including age, sex etc. was obtained. All patients had MELD scoring on the basis of serum creatinine, serum bilirubin and INR. MELD scores were calculated according to the method used by the United Network of Organ Sharing (UNOS). **Results:** A total of 85 patients were included in the study. It included 52 (61%) male patients and 33 (39%) female patients. Mean age was 48.88 years (SD ±8.82), Serology for viral markers showed that 68(80 %) patients were positive for hepatitis C antibodies and 8(9.4%) patients were positive for hepatitis B while 3 (3.5%) patients were positive for both hepatitis B & C. In the remaining 6 patients, 2 (2.35%) patients had alcoholic cirrhosis and in 4 (4.7%) patients, etiology of liver disease could not be ascertained. MELD scores in these patients ranged from 9 to 36. Eight patients (9.41%) with SBP had a MELD score of below 15 while 15 (17.64%) patients had scores between 16 and 20. 32 (37.64%) patients had MELD scores between 21 and 25. 20 (23.52%) patients had scores between 26 and 30 while 10 (11.76%) patients had a MELD score higher than 30. **Conclusion:** A high MELD score (≥16) is noted in a significant number of patients with spontaneous bacterial peritonitis (over 90%).

**Key words:** Spontaneous bacterial peritonitis. Encephalopathy. Portal hypertension. Model for end stage liver disease.

## INTRODUCTION

Spontaneous bacterial peritonitis (SBP) is a common and serious infection occurring in over 30% of patients with liver cirrhosis and ascites<sup>1,2</sup>. In-hospital mortality is over 20% in these cases<sup>3,4</sup>.

In cirrhosis, intestinal permeability to bacteria is increased. This, along with increased intestinal bacterial overgrowth results in translocation of bacteria into the peritoneal cavity. Uncontrolled bacterial growth in ascitic fluid then develops as a

result of an impaired host immune response<sup>5,6</sup>.

Because of significant morbidity and mortality related to SBP, identifying predisposing factors is of great interest. The Model for End-Stage Liver Disease (MELD) score is a measure of mortality risk in patients with end-stage liver disease. It accurately predicts 3-month mortality in patients with liver cirrhosis<sup>7</sup>. Initially it was created to predict poor survival in patients with complications of portal hypertension undergoing TIPS and was validated to score severity of liver

disease / consequent risk of mortality in patients awaiting liver transplantation. The variables used to calculate the MELD score are serum bilirubin, creatinine and the international normalized ratio (INR). Development of ascites and encephalopathy, two complications of end-stage liver disease that are not used in the MELD score calculation, have generally correlated with higher MELD scores. Hence a higher MELD score has the potential to identify patients with more severe liver disease and hence more likely to develop SBP<sup>8, 9, 10, 11</sup>.

### **Hypothesis**

A high MELD score is associated with a higher incidence of spontaneous bacterial peritonitis

### **OPERATIONAL DEFINITIONS**

#### **Model for End-Stage Liver Disease (MELD)**

MELD score was developed to determine the severity of liver disease based on the patient's serum bilirubin, serum creatinine, and the international normalized ratio (INR).

MELD Score =  $10 \{0.957 \text{ Ln (Serum creatinine mg/dL)} + 0.378 \text{ Ln(Total bilirubin mg/dL)} + 1.12 \text{ Ln(INR)} + 0.643\}$

MELD score  $\geq 16$  will be taken as a high score.

#### **Spontaneous Bacterial Peritonitis**

Infection of abdominal cavity, despite any obvious cause of infection and confirmed on paracentesis (needle drainage of the ascitic fluid) with an ascitic polymorphonuclear neutrophil (PMN) count greater than 250 cells/mm<sup>3</sup>.

### **OBJECTIVE OF THE STUDY**

To determine the frequency of higher Model for End-Stage Liver Disease (MELD) score in patients of liver cirrhosis with spontaneous bacterial peritonitis (SBP)

#### **Study Design**

Cross sectional survey.

#### **Setting**

Department of Gastroenterology-Hepatology,

Shaikh Zayed Hospital, Lahore.

#### **Duration:**

Four Months

#### **Sample Size:**

85 patients with liver cirrhosis and SBP.

#### **Sampling Technique:**

Non-probability purposive sampling

#### **Inclusion Criteria**

- All adult male and female patients with ascites (assessed clinically and on ultrasound) secondary to liver cirrhosis due to any cause.
- Patients who have SBP confirmed on ascitic fluid paracentesis (ascitic fluid PMN count  $\geq 250$  cells/mm<sup>3</sup>).

#### **Exclusion Criteria**

- Patients exposed to antibiotics within the previous 2 weeks (assessed on history).

#### **Data Collection**

Eighty-five patients fulfilling the inclusion criteria were selected from Inpatient Department, Gastroenterology ward, Shaikh Zayed Hospital, Lahore. An informed consent was taken from all patients. Demographic data including age, sex etc. was obtained. All patients had MELD scoring on the basis of laboratory values of serum creatinine, serum bilirubin and INR. MELD scores were calculated according to the method used by the United Network of Organ Sharing (UNOS) (<http://www.unos.org>). All information was recorded through form.

### **RESULTS**

A total of 85 patients were included in the study. It included 52 (61%) male patients and 33 (39%) female patients. Mean age was 48.88 years (SD  $\pm 8.82$ ).

Sixty-nine (92%) patients presented with abdominal pain while 58 (77%) with fever and 21 (28%) with encephalopathy. 48 (64%) patients had paracentesis in the past. Among all 85 patients 51 (60%) were having ascites for one year and 24(28%)

for more than one year.

Out of 85 patients, 64 (75%) had no previous history of SBP while 9 (10.6%) had two episodes of SBP and 12 (14%) had one episode of SBP in the past.

Serology for viral markers showed that 68(80%) patients were positive for anti HCV antibodies and 8 (9.4%) patients were positive for hepatitis B surface antigen while 3 (3.5%) patients were positive for both B surface antigen and HCV antibodies. In the remaining 6 patients, 2 (2.35%) had alcoholic cirrhosis and in 4 (4.7%) patients, etiology of liver disease could not be ascertained (Table 1).

**Table 1: Etiology of liver disease among test population.**

Cause of liver disease	No. of Patients	Percentage
Hepatitis C	68	80.0%
Hepatitis C	8	9.4%
Hepatitis B & C	3	3.5%
Alcoholic liver disease	4	4.7%
Indeterminate	2	2.35%
Total	85	100.0

MELD scores in these patients ranged from 9 to 36. 8 patients (9.4%) with SBP had a MELD score of below 15 while 15 (17.6%) patients had scores between 16 and 20. 32 (37.6%) patients had MELD scores between 21 and 25. 20 (23.5%) patients had scores between 26 and 30 while 10 (11.7%) patients had a MELD score higher than 30 (Table 2). Hence 90.59% patients were found to have MELD scores above 15.

**Table 2: Patient distribution according to MELD score.**

MELD Score	No. of Patients	Percentage
< 15	8	9.4%
16-20	15	17.6%
21-25	32	37.6%
26-30	20	23.5%
> 30	10	11.7%
Total	85	100.0

Ascitic fluid analysis showed mean white cell

count (WCC) of 677.43/mm<sup>3</sup> (SD ± 428.75), polymorphonuclear neutrophil (PMN) count of 418.21/mm<sup>3</sup> (SD± 269.74), lymphocyte count of 240.14/mm<sup>3</sup> (SD ± 215.47), albumin level of 0.66g/dL (SD±0.58), glucose level of 219.11 g/dL (SD±60.14) and LDH level of 96.24 (SD± 35.74).

## CONCLUSION

A high MELD score (≥16) is noted in a significant number of patients with spontaneous bacterial peritonitis (over 90%). This underlines the importance of an immediate diagnostic paracentesis for total and differential leucocyte counts along with culture and sensitivity (C/S) in all cirrhotic patients with ascites who are admitted to the hospital. This is even more important in those with severe liver disease, as identified with a high MELD score as these are proven to be at greater danger of having SBP. These patients must be immediately started on broad-spectrum antibiotics and change to organism specific antibiotics once C/S reports become available. Earlier identification of such high-risk patients and earlier initiation of antibiotic therapy will result in reduction in mortality and morbidity.

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