A Study on the Clinico-etiological Profile of Cirrhosis of the Liver and Prognostic Value of the MELD Score on Short-term Survival

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Abstract

Introduction: Although there are a large number of patients with chronic liver disease (CLD) in India, the clinico-etiological profile of cirrhosis of the liver and exact prognostic value of the model for end-stage liver disease (MELD) score on short-term survival is scarce, and it needs further evaluation.

Aims: To study the etiology of cirrhosis of the liver; observe the clinical manifestations at the time of presentation and the subsequent development of complications in patients having cirrhosis; and calculate the MELD score and assess its usefulness as a prognostic marker in short-term survival of patients with cirrhosis.

Methodology: A prospective longitudinal study was performed on 50 patients who presented to our institution with CLD. Patients were subjected to clinical examination and laboratory investigations. The severity of the liver disease was assessed by the MELD score.

Results: Alcohol was the most common etiological factor for cirrhosis in 60% patients followed by cryptogenic in 22%, autoimmune hepatitis in 6%, Wilson's disease in 6%, alcohol with hepatitis B in 4%, and hepatitis C in 2% patients. Patients with a MELD score of 40 or more have 0% 3-month survival rate. The 3-month survival rate in patients having a MELD score of 30 to 39 is 50%, followed by 75% in patients having a MELD score of 20 to 29. Patients with a MELD score ≤9 have 100% 3-month survival rate.

Conclusion: Alcohol was the most common etiological factor for cirrhosis in our study. Three-month survival rates were inversely related to the MELD score.

Keywords: Autoimmune hepatitis, Chronic liver disease, Cirrhosis of the liver, MELD score ,Wilson's disease.

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Introduction

Cirrhosis of the liver is pathologically defined as a diffuse parenchymal injury to the liver and subsequent fibrosis along with distortion of the hepatic architecture and regenerative nodule formation.[1] Prognosis in patients with cirrhosis has been within the easy clutch of the treating physician because of the availability of the model for end-stage liver disease (MELD) scoring system which is well validated for prognostication related to survival of such patients.[2] It was developed initially to assess the risk of death of patients within the first 3 months after the transjugular intrahepatic portosystemic shunt (TIPS) surgery, and later, it was used to determine the prognosis and prioritize the allocation of liver transplantation. It is calculated according to the following formula:

"MELD = $3.78 \times \ln[\text{serum bilirubin (mg/dL)}] + 11.2 \times \ln[\text{INR}] + 9.57 \times \ln[\text{serum creatinine (mg/dL)}] + 6.43$".

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Methodology

A prospective longitudinal study was performed at Calcutta National Medical College on 50 patients with cirrhosis of the liver within first 9 months of this study, and they were followed up for 3 months after the first visit. In the study, the etiological factors of cirrhosis of the liver, clinical manifestations at presentation and subsequent development of complications, and survival of patients at 3 months in relation to the MELD score were analyzed. A detailed history, thorough clinical examination, and necessary investigations [liver function test, serum creatinine, prothrombin time/international normalized ratio (INR), MELD score, serum ferritin, transferrin saturation, ceruloplasmin, 24-hour urinary copper, ultrasonography of abdomen, upper gastrointestinal endoscopy, autoimmune panel, slit lamp examination, CT scan whole abdomen, ascitic fluid study, liver biopsy] were performed in patients for the diagnosis of cirrhosis and to determine its etiology and the presence of various complications. Patients were followed up in the outpatient department at monthly interval for 3 months.

Table 1: Frequency of different etiologies of CLD

| Cause	No. of patients (n = 50)	Percentage
Alcohol with hep B	2	4
Autoimmune	3	6
Cryptogenic	11	22
Hepatitis C	1	2
Wilson's	3	6
Alcoholic	30	60

Results

In our study population, there were 50 patients (males 72% and females 28%). We found that alcohol was the most common etiological factor for cirrhosis (60%), followed by cryptogenic (22%), autoimmune hepatitis (6%), Wilson's disease (6%), alcohol with hepatitis B (4%), and hepatitis C (2%). The frequency of different etiologies of CLD in our study has been depicted in Table 1.

It was observed from the study that a maximum number patients of cirrhosis were between 51 and 60 years of age (38%) followed by 41 to 50 years of age (18%), 20 to 30 years of age (18%), 61 to 70 years of age (16%), and 31 to 40 years of age (10%). Distension of the abdomen was the most common presenting complaint in 44 patients (88%) followed by jaundice in 31 (62%), swelling of legs in 8 (16%), hematemesis/melena in 8 (16%), ecchymoses/petechiae/purpura in 4 (8%), and altered sensorium in 2 (4%) patients. Ascites was the most common examination present in 46 (92%) patients, followed by pallor in 34 (68%), splenomegaly in 34 (68%), icterus in 26 (52%), pedal edema in 24 (48%), hepatomegaly in 22 (44%), and both asterixis and spider naevi in 8% of patients. Thirty-three patients had serum creatinine level <1.2 mg/dL, followed by 10 patients having a creatinine level of 1.3 to 1.8 and 7 patients having creatinine level ≥1.9. Thirty-four percent of patients had serum bilirubin level <2 mg/dL, 64% of patients had serum bilirubin level >3 mg/dL, and only 2% of patients had a serum bilirubin level of 2 to 3 mg/dL. Eighty-two percent of patients had an INR <1.7. This was followed by 14% of patients with INR >2.3, and only 4% of patients had an INR of 1.7 to 2.3. Patients with a MELD score of 40 or more have no 3-month survival rate. Three-month survival rate in patients having a MELD score of 30 to 39 is 50%, followed by patients having a MELD score of 20 to 29 (75%). Patients with a MELD score ≤9 have a 100% 3-monthsurvival rate. The diagrammatic representation of 3-month survival rate according to the MELD score has been depicted in Figure 1.

Discussion

Cirrhosis of the liver is defined as the distortion of hepatic lobular architecture along with fibrosis and subsequent conversion of the normal hepatic architecture into regenerative nodules.[1] Chronic liver disease (CLD) is one of the most important causes of mortality and morbidity worldwide, which is responsible for around 2 million deaths each year.[3] Cirrhosis has been seen as the 11th most common etiology of death worldwide, and hepatocellular carcinoma is also a very important etiology; when combined, they account for about 3.5% of all deaths globally.[4] Alcoholic liver disease and postnecrotic cirrhosis following viral hepatitis are the two most common causes of cirrhosis.[5] Among the other etiologies, nonalcoholic steatohepatitis, autoimmune hepatitis, and several storage and metabolic disorders are
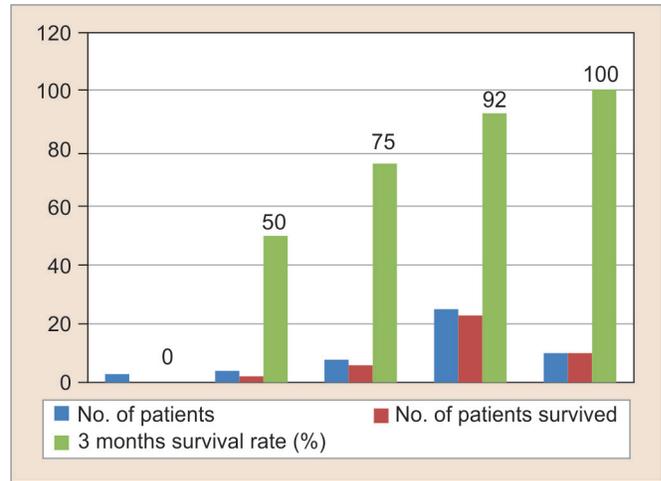
Fig. 1: Diagrammatic representation of 3-month survival rate according to the MELD score

common.[6-8] As per the latest World Health Organization data which were published in 2017, the total number of deaths due to liver diseases was 259,749 or 2.95% of the total number of deaths, which is about one-fifth (18.3%) of the global deaths due to cirrhosis.[9]

Although there are many studies on the etiological spectrum of CLDs in India, most of them are cross-sectional studies.[10,11] The knowledge regarding the etiological spectrum of CLD is very essential for effective planning and formulation of health-related policies, especially in low- to medium-income countries, such as India. It is seen that most of the causes of CLD are preventable, and some of them are completely or partially treatable; therefore, one of the objectives of our study was to analyze the etiologies of cirrhosis of the liver. The MELD score is calculated with the help of the following formula:

"MELD = 3.78 × ln[serum bilirubin (mg/dL)] + 11.2 × ln[INR] + 9.57 × ln[serum creatinine (mg/dL)] + 6.43.

In our study population, alcohol was found to be the most common etiological factor for cirrhosis of the liver in 60% patients, and the least was with hepatitis C (2%). This is in contrast to some studies from India and the West. Sarin et al. and Thakur et al. have reported the postnecrotic etiology as the most common etiology of cirrhosis.[12,13] However, Dilawari et al. in 1994 reported alcohol to be the commonest etiology of cirrhosis as in our study.[14] Our study found alcohol as the most common etiology of cirrhosis because of high incidence of alcoholism in the population that is covered by our hospital. Ascites was found to be the commonest clinical feature (64.4%) in our study. This finding matches with several other studies reported from India.[12]

Scores and indices to predict the severity of cirrhosis of the liver as well as to predict survival are of utmost importance for assessment of prognosis in such patients.[15] The Child-Pugh score is a very important scoring system to evaluate the prognosis in patients with cirrhosis of the liver. But it has several fallacies regarding its accuracy so far; the discriminative ability and subjective assessment of all the parameters are concerned.[16] In addition, this score does not include the assessment of renal function in it. Hence, the MELD scoring system was later proposed as a reliable method to predict the risk of mortality and assessment of survival in patients with cirrhosis. The Mayo Clinic study group had proposed this new scoring system (MELD) for evaluation of the outcome and

prognostication in patients undergoing TIPS surgery.[2] Later, they used this scoring system for the evaluation of short-term survival and prognosis for patients with various stages of cirrhosis of the liver in general.[17,18]

In our study, we tried to evaluate 3-month survival in different stages of cirrhosis of the liver based on the MELD score. In our study population, there was a statistically significant difference in terms of mortality in those with a MELD score of more than 20 (8 of 15 patients died, i.e., 46.7%) than in those with a score of less than 20 (2 of 35 patients died, i.e., 5.7%). Giannini et al. found similar results in their study of the aminotransferase ratio and MELD score in cirrhosis.[17] In their study, they showed that a MELD score >9 was associated with significantly reduced survival. Another study by Heuman et al. also concluded that in those with a MELD score <21, only reduced levels of serum sodium and persistent ascites were the two important independent risk factors of mortality, and in those with MELD scores >21, the MELD itself was the independent predictor.[18] In our study, we also confirmed the prognostic ability and accuracy of the MELD scoring system.

The major limitation of the study is the small sample size. Although there are many studies on the etiology and prognostication on the basis of the MELD scoring system, there are only a few studies on this topic from eastern India. We seek to acquaint the clinicians on this topic for better understanding of the clinical course of such patients.

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