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Prognostic Evaluation of Decompensated Chronic Liver Disease: A Comparison Between CHIBA and MELD Scores

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Abstract

Background: Decompensated chronic liver disease (DCLD) represents an advanced stage of liver dysfunction characterized by complications such as jaundice, ascites, hepatic encephalopathy, and variceal bleeding. These manifestations indicate a significant decline in liver function and contribute to increased mortality rates globally.

Materials and Methods: A hospital-based observational cohort study was carried out at Government Medical College Hospital, Kannyakumari. The study involved 50 patients diagnosed with DCLD. Data were systematically collected, recorded in Microsoft Excel, and analyzed using IBM SPSS Statistics version 27.

Results: Out of the 50 patients enrolled, 89% had a history of alcohol consumption, while 11% were smokers. The mean Model for End-Stage Liver Disease (MELD) score was 22.0 ± 2.56, indicating a moderate degree of liver dysfunction with minimal variability. In contrast, the mean CHIBA score was 12.9 ± 7.89, reflecting a broader range of values. Statistical analysis revealed that both scoring systems were significant predictors ($p < 0.001$).

Conclusion: The CHIBA score demonstrated greater prognostic value compared to the MELD score in assessing outcomes in patients with decompensated chronic liver disease. However, further multicentric studies and prospective validations are necessary to confirm its clinical applicability.

Keywords: CHIBA score, MELD score, Decompensated Chronic Liver Disease, Prognosis, Liver Dysfunction

Introduction

Decompensated chronic liver disease (DCLD) signifies an advanced and critical phase of liver dysfunction, often marked by serious complications such as jaundice, ascites, hepatic encephalopathy, and variceal bleeding [1]. These clinical manifestations reflect a significant decline in hepatic function and are linked with increased mortality rates globally. The etiological factors contributing to DCLD differ across regions; however, the global burden, particularly due to non-alcoholic fatty liver disease (NAFLD), is on the rise and poses a major public health concern [2,3].

Given the high fatality rate associated with DCLD, there is a pressing need for accurate prognostic tools that can guide clinical management and help prioritize candidates for liver transplantation. Traditional scoring systems such as the Model for End-Stage Liver Disease (MELD), its modified versions, and the Child-Turcotte-Pugh (CTP) score have been extensively utilized for mortality risk assessment. Nonetheless, these models have certain shortcomings and may not always provide optimal predictive accuracy [4,5].

The CHIBA score - an acronym for Creatinine, Hepatic Encephalopathy, International Normalized Ratio

(INR), Bilirubin, and Ascites - has recently been introduced as an alternative prognostic tool for DCLD. It relies on routinely collected clinical signs and laboratory results, allowing for easy calculation and applicability even in resource-constrained healthcare environments [6].

The CHIBA scoring system is designed to enhance the prediction of clinical outcomes in patients with DCLD, offering a potentially more practical and precise alternative to existing models like MELD and CTP. By depending on widely available data, it may support improved risk stratification, aid in clinical decision-making, and better identify patients in urgent need of liver transplantation [7,8]. The emergence of the CHIBA score represents a notable advancement in the assessment of prognosis in advanced liver disease. Nonetheless, further research and external validation are necessary to establish its reliability and to benchmark its performance against established scoring systems [9,10].

The primary aim of this study is to evaluate the effectiveness of the CHIBA score in predicting clinical outcomes in patients with decompensated chronic liver disease (DCLD). This study seeks to assess the diagnostic accuracy of the CHIBA score and determine its utility as a reliable prognostic tool. Additionally, the objective includes a direct comparison between the CHIBA score and the widely used MELD score to establish which model offers better predictive performance in assessing disease severity and mortality risk in patients with DCLD.

Materials & Methods

Study Design and Setting: This hospital-based observational cohort study was conducted at the Government Medical College Hospital, Kanyakumari, over three months. The study aimed to evaluate the clinical profile, biochemical parameters, and short-term outcomes of patients diagnosed with decompensated chronic liver disease (DCLD).

Study Population: A total of 50 patients with a confirmed diagnosis of DCLD were enrolled. Patients aged 18 years or older who presented to the Departments of General Medicine and Emergency Medicine were included after meeting the eligibility criteria.

Inclusion Criteria

- Adults aged >18 years.
- Clinically and biochemically confirmed diagnosis of DCLD, based on standard criteria (e.g., ascites, jaundice, coagulopathy, hepatic encephalopathy, or imaging evidence of cirrhosis).
- Willingness to provide written informed consent for participation and follow-up.

Exclusion Criteria

- Patients with hepatocellular carcinoma or extrahepatic malignancies.
- Those with secondary metastases to the liver.
- Patients listed for liver transplantation within the next three months.
- Individuals who refused consent or had incomplete clinical data.

Data Collection: Upon admission, detailed clinical and demographic information was recorded using a structured proforma. The following parameters were assessed:

- **Demographic data:** age, sex, and occupation.
- **Clinical parameters:** presence of jaundice, ascites, hepatic encephalopathy, pedal edema, and other signs of liver failure.
- **Etiological factors:** alcohol intake, viral hepatitis markers, and comorbidities.
- **Biochemical parameters:** serum bilirubin, creatinine, international normalized ratio (INR), serum

albumin, liver enzymes, and electrolytes.

Clinical Assessments: The presence and severity of ascites were determined both clinically and through imaging modalities (ultrasound or CT scan). Ascites was graded as:

- **Absent/mild:** Score 0
- **Moderate:** Score 1
- **Tense:** Score 2

Hepatic encephalopathy (HE) was assessed clinically and graded according to the West Haven criteria, ranging from Grade I (mild confusion) to Grade IV (coma).
The Model for End-Stage Liver Disease (MELD) score was calculated using standard laboratory values of serum bilirubin, serum creatinine, and INR, using the formula:

$$\text{MELD Score} = 3.78 \times \ln(\text{bilirubin}) + 11.2 \times \ln(\text{INR}) + 9.57 \times \ln(\text{creatinine}) + 6.43$$

(Values below 1 were adjusted to 1 for logarithmic calculation.)

Laboratory Investigations: Venous blood samples were collected under aseptic precautions on the day of admission. Laboratory estimations were carried out using standardized methods in the hospital's biochemistry laboratory:

- Serum creatinine: measured by Jaffe's kinetic method.
- Serum bilirubin: estimated using the colorimetric diazo method on a Hitachi Roche Cobas c311 analyzer.
- INR: measured through an automated clotting method using a Sysmex coagulation analyzer.

Follow-Up: All patients were prospectively followed up for a period of three months from the date of admission. Clinical progress, development of complications (such as hepatic encephalopathy, spontaneous bacterial peritonitis, hepatorenal syndrome, or gastrointestinal bleed), and survival status were documented during follow-up visits or telephonic contact.

Statistical Analysis: All data were entered into Microsoft Excel and analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics such as mean, standard deviation, median, and percentage were used to summarize the baseline data. Comparisons between groups were made using the Chi-square test for categorical variables and the independent t-test or Mann–Whitney U test for continuous variables, based on data distribution. The correlation between MELD score and clinical or laboratory parameters was assessed using Pearson's or Spearman's correlation test. A p-value of less than 0.05 was considered statistically significant. Results were expressed as mean ± standard deviation (SD) or as frequency and percentage and presented in tables and charts for clarity.

Ethical Considerations: The present study was approved by the Institutional Ethics Committee of Government Medical College, Kanyakumari (Ref No: EC/GMC-KK/54219). A detailed Participant Information Sheet was provided to all participants, and written informed consent was obtained prior to their enrollment in the study.

Results

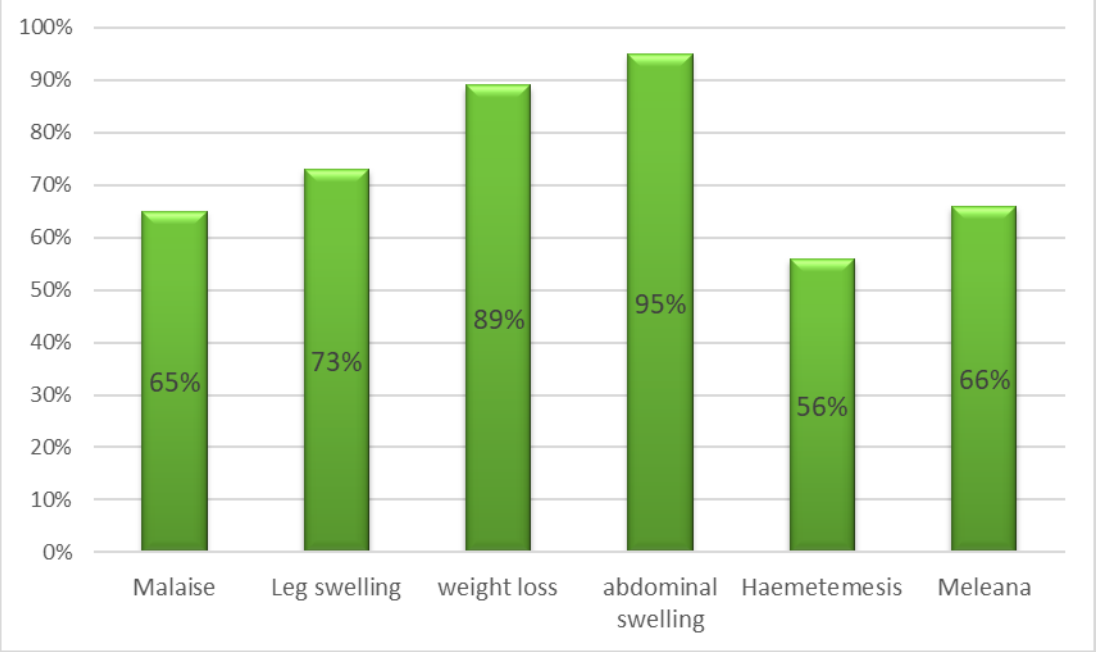
This is a hospital-based observational cohort study that was conducted in 50 patients with decompensated chronic liver disease.

Table 1: Age distribution among the DCLD patients

Age	Frequency (n)	Percentage (%)
< 30 years	2	4%
31 – 40 years	5	10%
41 – 50 years	12	24%
51. – 60 years	14	28%
>60 years	17	34%

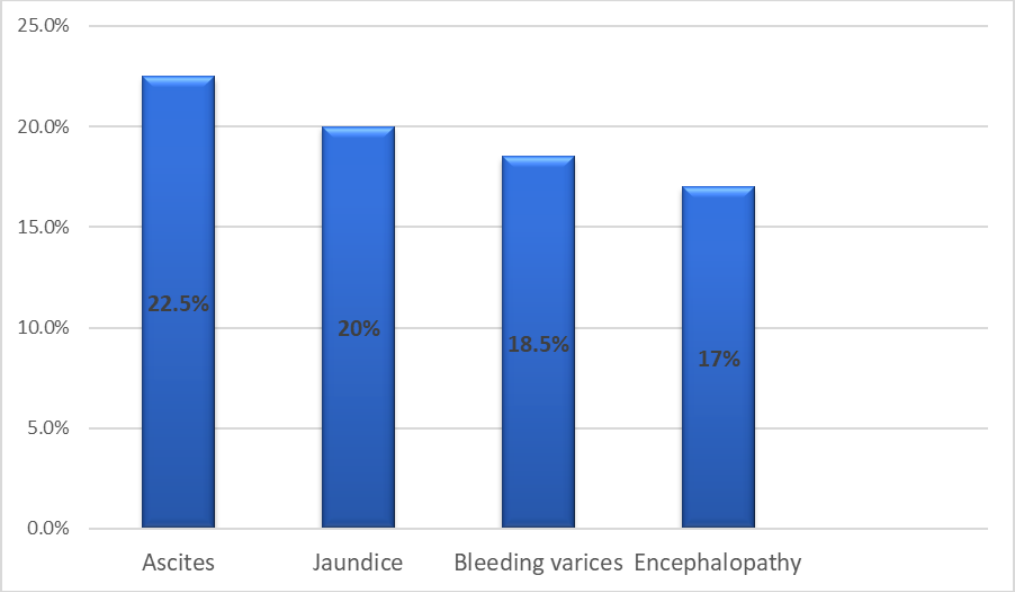
The age distribution among patients with Decompensated Chronic Liver Disease (DCLD). It shows that the highest proportion of patients are over 60 years old, accounting for 34% of the total. The youngest group, under 30 years old, represents the smallest portion at 4%. This distribution indicates that DCLD is more prevalent among older individuals.

Figure 1: Details of clinical features



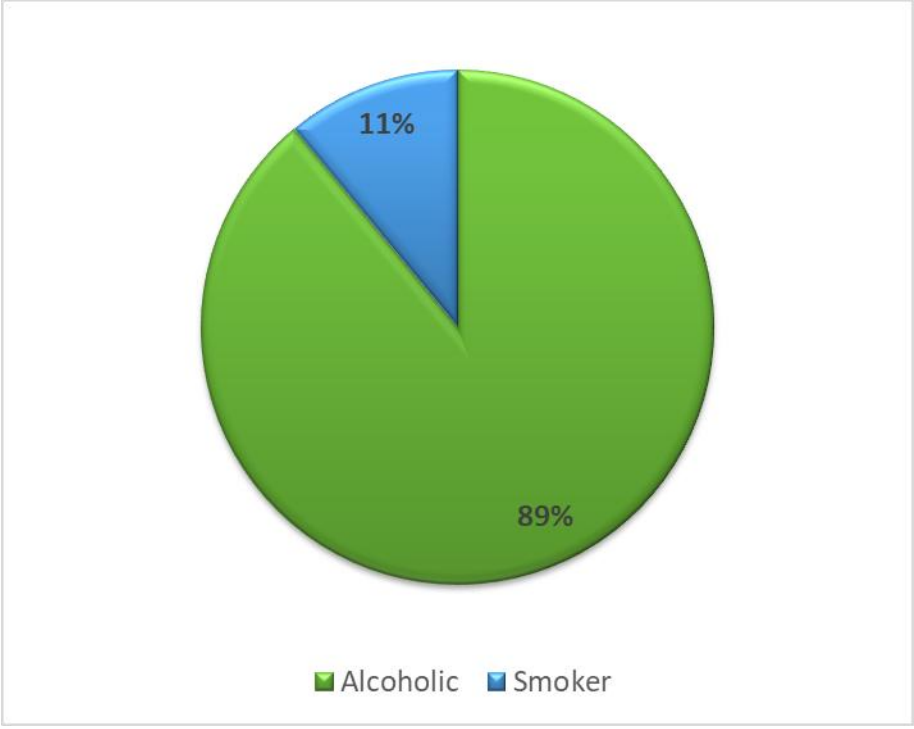
The prevalence of various symptoms in patients with Decompensated Chronic Liver Disease (DCLD). Abdominal swelling is the most common symptom, reported by 95% of patients, followed by weight loss (89%) and leg swelling (73%). Malaise affects 65% of patients, while Meleana (black, tarry stools) and hematemesis (vomiting blood) are reported by 66% and 56% of patients, respectively. These findings illustrate the diverse and often severe symptomatology associated with DCLD, underscoring the need for comprehensive clinical management.

Figure 2: Details of complications



The prevalence of various clinical features among patients with Decompensated Chronic Liver Disease (DCLD) is shown in chart 2. Ascites is the most common complication, affecting 22.5% of the patients. Jaundice follows, impacting 20% of the patients, while 18.5% experienced bleeding varices. Encephalopathy, which includes symptoms such as confusion, affects 17% of the patients.

Figure 3: Details on personal history



The prevalence of two behaviors among a group of individuals. It shows that 89% of the individuals are alcoholics, while only 11% are smokers.

Table 2: General characteristics of study population

Variables	Mean and Standard deviation
Height	163.5±12.6
Weight	86±5.36
BMI	29±3.6
Waist circumference	107±11.11
SPO2	97±2.54
Pulse rate	72±8.66
Systolic blood pressure (SBP)	110.24±5.44
Diastolic blood pressure (DBP)	69.12±2.19

The general characteristics of the study population is given in the above table. The average height is 163.5 cm, and the average weight is 86 kg. The mean Body Mass Index (BMI) is 29.

Table 3: Baseline variables of the study population

Variables	Mean and Standard deviation	P value
Hemoglobin	10.2 ± 1.5	0.001
Serum creatinine	1.8 ± 0.7	0.000
Total bilirubin	4.5 ± 1.2	0.002
INR	2.1 ± 0.4	0.000
SGOT	85 ± 25	0.000
SGPT	75 ± 20	0.011
ALP	140 ± 35	0.02

The mean hemoglobin level is 10.2 g/dL; Serum creatinine is 1.8 mg/dL. Total bilirubin has a mean of 4.5 mg/dL. Lastly, the mean ALP is 140 U/L.

Table 4: Mean of MELD and CHIBA Score

Score	Mean and	P value

	Standard deviation	
MELD	22.0±2.56	0.01
CHIBA	12.9±7.89	0.000

The severity of liver disease in a sample of patients with Decompensated Chronic Liver Disease (DCLD). The mean MELD score is 22.0±2.56, reflecting a moderately severe condition with relatively low variability among the patients. The mean Child-Pugh (CHIBA) score is 12.9±7.89, indicating more variability in disease severity. The CHIBA score is more important when compared to the MELD score. (Table 4)

Discussion

This study provides a comparative evaluation of the CHIBA and MELD scores in predicting the prognosis of patients with decompensated chronic liver disease (DCLD), offering important insights into their relative performance. Both scores demonstrated statistically significant prognostic capabilities, with certain notable distinctions. The findings of the present study are consistent with those reported by Kim et al., who demonstrated that the MELD score is a reliable predictor of short-term mortality in patients with advanced liver disease [2]. The strength of the MELD score lies in its objective nature, as it is derived from laboratory parameters such as serum creatinine, total bilirubin, and INR, which reflect hepatic and renal function. In the current cohort, the MELD score showed consistent predictive validity, particularly in identifying patients at increased risk of short-term mortality.

Despite these strengths, the limitations of the MELD score have been widely discussed in the literature. It does not account for important clinical complications such as ascites and hepatic encephalopathy, which are hallmark features of DCLD and significantly influence prognosis. This limitation is addressed by the CHIBA score, which incorporates both biochemical and clinical parameters, including ascites and the severity of hepatic encephalopathy. Similar observations were reported by Zhang et al., who noted that the CHIBA score improves prognostic accuracy in selected patient populations, especially where clinical manifestations play a dominant role [1].

The clinical relevance of integrating biochemical and clinical variables has also been highlighted by Sharma et al., who demonstrated improved sensitivity in predicting early decompensation and mortality among patients with cirrhosis when such combined models are used [3]. In the present study, the CHIBA score showed predictive accuracy comparable to that of the MELD score, suggesting that it may serve either as a complementary tool or a practical alternative, particularly in resource-limited settings where frequent laboratory testing may not be feasible.

Furthermore, Udompap et al. emphasized that prognostic scores incorporating functional or symptomatic parameters often better reflect the patient's current clinical status, especially in acute or unstable settings [4]. This supports the present findings and suggests that routine use of the CHIBA score may provide a more holistic assessment of disease severity in patients with DCLD.

From a clinical perspective, the results support a tailored application of prognostic scoring systems. While the MELD score remains indispensable, particularly for liver transplant prioritization, the inclusion of clinical parameters in the CHIBA score may enhance risk stratification and facilitate more individualized patient management. Tapper et al. also reported that integrating real-time clinical data with prognostic scoring systems improves bedside decision-making, underscoring the potential utility of the CHIBA model

in routine practice [5].

In addition, this study highlights the need for ongoing refinement of prognostic models in chronic liver disease. Given the dynamic nature of DCLD, static scoring systems may not fully capture rapid clinical deterioration. Future models may benefit from incorporating additional parameters such as serum sodium levels, inflammatory markers, or liver stiffness measurements. Advances in machine learning and artificial intelligence have also been proposed as promising tools for developing adaptive prognostic models, as discussed by Wong et al. [6].

In conclusion, both MELD and CHIBA scores provide valuable prognostic information in patients with DCLD. Their complementary use may offer a more comprehensive assessment of disease severity and mortality risk. Further multicentric prospective studies with larger sample sizes are required to validate these findings and optimize the clinical application of these prognostic tools.

Conclusion

The CHIBA score shows potential as an alternative prognostic tool to the MELD score in evaluating patients with decompensated chronic liver disease. By integrating key clinical features alongside biochemical markers, it offers a more holistic view of disease severity. Nonetheless, its broader applicability and effectiveness need to be confirmed through validation in varied patient groups and healthcare environments. Future investigations should emphasize prospective designs and direct comparative analyses to better clarify the clinical value and positioning of the CHIBA score in routine practice.

Conflict of Interest: Nil

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