Comparison of Scoring Systems for Prognosis in Cirrhotic Patients Admitted with Hepatic Encephalopathy

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ABSTRACT

Objective: To compare various scoring systems to predict the prognosis in patients of cirrhosis presenting with hepatic encephalopathy at Pak Emirates Military Hospital Rawalpindi.

Study Design: Cross-sectional study.

Place and Duration: Gastroenterology Department, Pak Emirates Military Hospital Rawalpindi, from Sep 2018 to Feb 2019.

Methodology: This study was conducted on 55 patients suffering from liver cirrhosis and presetting with hepatic encephalopathy at our hospital. Diagnosis of liver cirrhosis and hepatic encephalopathy was made by a consultant gastroenterologist based on clinical findings and relevant investigations. Chronic liver failure-sequential organ failure assessment (CLIF-SOFA), Model for end stage liver disease (MELD), and Child-Turcotte-Pugh (CTP) scores were calculated for all patients within the first 24 hours of presentation. Outcome in the study was patient either discharged or deceased at the end of study. Comparison was made between the three scores that which is a better predictor for prognosis of these patients.

Results: Out of 55 patients included in the final analysis 35 were male and 20 were female. Commonest etiology of hepatic encephalopathy was Infection followed by Constipation.10 patients had grade 1 encephalopathy, 15 had grade 2, 20 had grade 3 while 10 had grade 4 encephalopathy. CLIF-SOFA emerged as better predictor for prognosis followed by MELD and CTP.

Conclusion: CLIF-SOFA was the best of all scores in predicting the prognosis of patients suffering from liver cirrhosis presenting with hepatic encephalopathy. MELD and CTP were also significant in this regard but less as compared to CLIF-SOFA.

Keywords: CTP, CLIF-SOFA, Hepatic encephalopathy, Liver cirrhosis, MELD.

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INTRODUCTION

Liver is a vital organ of the body which can also be site of various pathological processes including the benign and malignant pathologies.[1] Diseases of liver and hepato-biliary regionhave been notorious in affecting the quality of life of the individuals in number of ways.[2] These diseases can be reversible or irreversible and may lead to temporary or permanent damage to the parenchyma of this vital organ of human body. Chronic or end stage liver disease is one of the common causes of liver failure around the globe.[2,3] In some cases there is an acute phenomenon instead of chronic damage which can lead to liver failure. Once this organ has suffered from cirrhosis or has failed and stopped function then medial remedies are usually of no use and transplant remains the only option.[3]

Prognosis of cirrhotic liver disease has been an area of interest for clinicians as well the researchers for decades. Advent of definitive procedures like liver transplant also has increased the requirement to predict the prognosis with reliability to prioritize the patients for this expensive and specialized procedure.[4] Prognosis of cirrhotic patients and course of this disease has various shades. Multiple factors determine the exact pathway of the patients with altered liver architecture. There may be asymptomatic disease for years or repeated episodes of encephalopathy and hematemesis or liver failure or finally death if the organ is not transplanted.[5] There are a lot of methods and scoring systems which have been used by hepatologists in ward or Intensive Care Unit settings to predict the severity and prognosis of the patients suffering from liver cirrhosis.[6]

Scoring systems have been designed incorporating various parameters to predict the prognosis and long term and short-term mortality among patients of end stage liver disease. Studies have been done to look for the best scoring system which is more accurate in doing this task of predicting the prognosis of cirrhotic patients. sai *et al*, performed a study on non-cancer cirrhotic patients involving MELD, MELD-Na and novel model to predict the prognosis of end stage liver

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patients. They concluded that all these methods were reliable in this regard.[7] A Turkish study done on cirrhotic patients with hepatic encephalopathy revealed that CLIF-SOFA scoring system is best of all in predicting the prognosis of these patients, followed by APACHE II, CTP, and MELD scores.[8] An analysis done in our neighboring country China was interesting in this regard showing that CLIF-SOFA and CLIF-C OF scores, as well as SAPS II were better tools than SIRS, qSOFA, MELD, or qCLIF-SOFA to evaluate the prognosis of critically ill cirrhotic patients with suspected infection.[9]

Burden of cirrhosis and chronic liver disease is really alarming in our setup.[10] Previously there was no definitive treatment for these patients but recently liver transplant program has been started in our part of the world in government, military as well as private setups. This requires exact prioritizing of patientsshort term and long-term prognosis for this expensive procedure. Not much work has been available in our own population regarding the ideal scoring system for this purpose. A recent study done in a single setting of a military hospital compared MELD and CTP and found out that MELD score served this purpose better. There is lacking in data from other set ups. Therefore, this study was designed with the rationale to compare various scoring systems to predict the prognosis in patients of cirrhosis presenting with hepatic encephalopathy at Pak Emirates Military Hospital Rwp.

METHODOLOGY

This cross-sectional study was conducted at the Hepatology Unit of Pak Emirates Military Hospital Rawalpindi, from September 2018 to February 2019. Sample was enrolled by using the non-probability consecutive sampling technique. Sample size was calculated by using the World Health Organization WHO sample size calculator and using the population prevalence proportion of 90%.[10]

Inclusion Criteria: All patients between the age of 12 and 60 years admitted in the wards or ICU with hepatic encephalopathy secondary to liver cirrhosis were included in the study. Patients who were referred from other military, public sector and private hospitals with the same diagnosis were also included in the analysis in addition to the referrals from the other wards of own hospital.

Exclusion Criteria: The patients with unclear diagnosis regarding the cause of liver failure. Patients who were pregnant or active alcohol users were also not included. Patients with active psychiatric illness or due to extra-hepatic cause were also excluded. Patients who were unwilling for the liver transplant due to any reason were also made part of the exclusion criteria.

Diagnosis of liver cirrhosisand hepatic encephalopathy was made on the clinical, laboratory and radiological findings by the consultant gastroenterologist.[12,13]

Hepatic encephalopathy was graded according to the West Haven criteria.[14] Scoring systems which were used in the study were described as follows. MELD Formula used was: 0.957 x Loge (Creatinine [mg/dL]) + 0.378 x Loge (Total Bilirubin [mg/mL]) + 1.120 x Loge (INR)+ 0.643.[15]

CLIF-SOFA involves the six components including bilirubin, kidney, HE grades, international normalized ratio (INR), circulation, and lungs.[16]

Child-Turcotte-Pugh Scoring involves total bilirubin, INR, serum albumin, presence of ascites and hepatic encephalopathy.[17] Ethical approval was taken from the ethical review board committee of Military Hospital Rawalpindi before the start of this study. After written informed consent from the primary caregivers of potential participants, patients presenting with hepatic encephalopathy secondary to liver cirrhosis in the Gastroenterology Unit of PEMH Rawalpindi fulfilling the above-mentioned criteria of inclusion and exclusion were included in the study. As before including them into the study all work up regarding the nature and extent of liver damage has already been done in addition to the calculation of the scores required for the study so after including them into the study further investigations were done to look for medical co-morbids, infections and confounding factors for implementing exclusion criteria. These included all base line investigations (Blood Complete picture, liver function test, renal function test, C-reactive protein, tumor markers etc.) and ultrasound abdomen. Mini mental state examination was also done to confirm hepatic encephalopathy or other causes of delirium (to exclude) in these patients.

All statistical analysis was performed by using the Statistics Package for Social Sciences version 24.0 (SPSS-24.0). Mean and standard deviation for the age, CLIF-SOFA, CTPand MELD score of study participants was calculated. Frequency and percentages for gender and etiological causes of hepatic encephalopathywere calculated. Pearson Chi-square, Fishers exact test were applied to compare among the various scoring systems that which is best for the prediction of prognosis.

The *p*-value less than and equal to 0.05 considered significant.

RESULTS

A total of 59 patients of cirrhosis reported in the department with hepatic encephalopathy in the given period. Two of them were either over or underagere-garding our inclusion criteria, one was active alcohol user and diagnosis of one remained unclear. Out of 55 patients included in the final analysis 35 (59.3%) were male and 20 (40.7%) were female. Male to female ratio was 1.75:1. Mean age of patients diagnosed with hepatic encephalopathy secondary to liver cirrhosis in our study was 47.83 ± 1.732 years.Other characteristics of study population have been summarized in Table-I.

Table-I: Characteristics of patients admitted with hepatic encephalopathy due to liver cirrhosis

Age (Years)	
Mean ± SD	47.83 ± 1.732 years
Range (min-max)	12 - 59 years
Mean MELD Score	19.33 ± 2.436
Mean CLIF-SOFA Score	10.2 ± 1.114
Mean CTP Score	10.9 ±3.132
Gender	
Male	35 (63.6%)
Female	20 (36.4%)
Grade of Hepatic Encephalopathy	
I	10 (16.9%)
II	15 (25.4%)
III	20 (33.9%)
IV	10 (16.9%)
Causes of Hepatic Encephalopathy	
Infection	19 (32.2%)
Constipation	13 (22.1%)
Esophageal bleeding	11 (18.6%)
Hypokalemia	08 (13.5%)
Excessive protein in diet	03 (5.1%)
Others	01 (1.6%)

Infection was the commonest etiological cause of hepatic encephalopathy in our patients followed by Constipation. Consumption of high protein diet as cause of encephalopathy was least reported by our patients. 10 (16.9%) patients had grade 1 encepha-lopathy, 15 (25.4%) had grade 2, 20 (33.9%) had grade 3 while 10 (16.9%) had grade 4 encephalopathy. After applying the Pearson chi-square and fishers exact test CLIF-SOFA emerged as better predictor for prognosis followed by MELD and CTP (Table-II).

DISCUSSION

Chronic liver disease has been an area of immense interest for the researchers and medical professionals in the past two decades as there was no definitive treatment for the cure of this vital organ once it has been fibrosed. Liver transplant emerged as a revolutionary mode of treatment in the lives of cirrhotic patients not only in terms of life expectancy but also in terms of improvement in the overall quality of life.[18] Still this treatment option is not widely practiced in our country. Liver transplantation is on very early stages especially in military and government sector. This facility available or not; still existing resources are used to make the quality of life of the patient better. Due to economic reasons and non-availability of trained professionals we are far behind in this field as compared to our neighbors India and China which have been practicing it for years with huge success.[9,14] This becomes the ethical duty of the training physician to ascertain the condition of patient and predict with accuracy regarding the most probable prognosis of the patient with this debilitating illness. This also becomes important in prioritizing the patients for the liver transplant.[6] Therefore we designed this analytical study with the rationale to compare various scoring systems to predict the prognosis in patients of cirrhosis presenting with hepatic encephalopathy at Pak Emirates Military Hospital Rawalpiondi.

Table-II: Prognosis of the study group and predictors

Socio-Demographic Factors	Discharge	Deceased	Pearson Chi-square	*p*-value
Total n=55	n (%) 23 (41.8)	n (%) 32 (58.2)		
Age				
<30 years	19 (58.2)	26 (31.2)	0.017	0.897
>30years	04 (41.8)	06 (68.8)		
Gender				
Male	19 (2.8)	16 (3.7)	6.149	0.013
Female	04 (97.2)	16 (96.3)		
MELD Score				
<10	20 (71.1)	13 (72.4)	11.969	<0.001
>10	03 (28.9)	19 (27.6)		
CLIF SOFA Score				
<7	18 (71.1)	04 (69.6)	24.112	<0.001
>7	05 (28.9)	28 (30.4)		
CTP Score				
<9	18 (71.7)	18 (56.1)	2.867	0.085
>9	05 (28.3)	14 (43.9)		
Grade of Hepatic Encephalopathy				
I and II	16 (94.9)	09 (91.9)	9.269	0.002
III and IV	07 (5.1)	23 (8.1)		

Most of the patients included in our analysis were male with a male to female ratio of 1.75:1. Gender has no role in predicting the prognosis of patients with hepatic encephalopathy in our target population. Similar results have been produced in the studies done

in the past as well.[10] Infection was the commonest cause of encephalopathy followed by constipation in our target population. This is also not a new finding and consistent with the results of other studies done on this topic. Study of Berzigotti *et al*, published in 2017 is important in this regard which revealed that infection was the commonest cause of encephalopathy in the patients of CLD they studied.[13] Type of etiology of cirrhotic liver disease may also bean influencing factor on the prognosis in various studies done in the past but it was not the scope of our study, so we did not establish or studied this association.

CLIF SOFA emerged as the best predictor of prognosis in our study. Previous studies have also demonstrated same findings that it ranks best among all the scales or scoring systems used to predict the prognosis of the cirrhotic patients. Lan *et al,* produced similar results and CLIF-SOFA was best predictor in their study,[9] but Salamat *et al,* in 2010 from our own setting concluded MELD score as best predictor.[10] Reason might be extensive parameters which have been incorporated in this system. It has all the parameters, even extra-hepatic which can be directly or indirectly linked with the mortality or morbidity of the patients who have been suffering from the irreversible damage to one of the most important organs of the body.

MELD score emerged as better predictor of prognosis when compared to CTP score in our analysis. These results have been different from the studies done in west where CTP was better among the two. Study of Tas *et al,* and Lan *et al,* are important in this regard.[8,9] Zubair *et al,* did a study in military set up few years ago and found out MELD score better to CTP.[11] MELD was also easy to be calculated and was more accurate in predicting long term survival in addition to short term prognosis. Further studies with large sample size may ascertain this finding with more precision.

High grade of hepatic encephalopathy also predicted poor prognosis in our study. This is also in line with the findings of similar studies done in other parts of the world. Patidar *et al*, in their study concluded that higher the grade of encephalopathy, poorer the prognosis.[19] High grade of encephalopathy may be reflection of high-grade damage to the liver as well as other functions of the body and if patients remain for long in that condition, other problems may arise which complicate the existing illness leading to poor prognosis. Mainstay of treatment in this regard is liver transplantation and already done local studies show the burden of illness and need for transplant in our setup.[10,11] Lack of trained staff and huge financial implications may delay his option further.

Our study was not free of limitations. It was a data of one gastroenterology unit and that too of a military set up so the results could not be generalized on the population. Factors which could alter the prognosis and affect the mortality and morbidity inside hospital after the calculation of scores were not considered. It may be some other event which could have led to death instead of cirrhotic liver. Discharged patients were not followed up for long so their prognosis could not be determined exactly. More studies involving multiple centers especially public sector hospitals may generate accurate and generalizable results.

CONCLUSION

CLIF-SOFA score was the best of all scores in predicting the prognosis of patients suffering from liver cirrhosis presenting with hepatic encephalopathy. MELD score and CTP score were also significant in this regard but less as compared to CLIF-SOFA.

Conflict of Interest: None.

Authors' Contribution

MMM: Study design and statistical analysis, IF: Study design and discussion, UAS: Discussion, AW: Data collection and introduction, MF: Statistical analysis, AWM: Abstract.

REFERENCES

1. Butt AS. Epidemiology of viral hepatitis and liver diseases in Pakistan. Euroasian J Hepatogastroenterol 2015; 5(1): 43-48.
2. Wang FS, Fan JG, Zhang Z. The global burden of liver disease: The major impact of China. Hepatol 2014; 60(6): 2099-2108.
3. Perri GA, Khosravani H. Complications of end-stage liver disease. Can Fam Physician 2016; 62(1): 44-50.
4. Trieu JA, Bilal M. Factors associated with waiting time on the liver transplant list: An analysis of the United network for organ sharing (UNOS) database. Ann Gastroenterol 2017; 31(1): 84-89.
5. El-Serag HB. Hospitalizations for chronic liver disease: Time to intervene at multiple levels. Gastroenterol 2018; 155(3): 607-609.
6. Ho SY, Liu PH, Hsu CY. Prognostic performance of ten liver function models in patients with hepatocellular carcinoma undergoing radiofrequency ablation. Sci Rep 2018; 8(1): 843. Published 2018 Jan 16. doi:10.1038/s41598-018-19251-y
7. Tsai YW, Tzeng IS, Chen YC, Hsieh TH, Chang SS. Survival prediction among patients with non-cancer-related end-stage liver disease. PLoS ONE 2018; 13(9): e0202692. https://doi.org/10.1371/journal.pone.0202692
8. Tas A, Yalsin MS, Saritas B, Kara B. Comparison of prognostic systems in cirrhotic patients with hepatic encephalopathy. Turk J Med Sci 2018; 48(1): 543-547. doi:10.3906/sag-1709-32.
9. Lan P, Wang SJ, Shi QC. Comparison of the predictive value of scoring systems on the prognosis of cirrhotic patients with suspected infection. Med (Baltimore) 2018; 97(28): e11421.
10. Salamat A, Zubair UB, Shafqat H, Saeed F. Assessment of patients with chronic liver disease qualifying for liver transplant. Pak Armed Forces Med J 2012; 62(1). Available at: https://pafmj.org/index.php/PAFMJ/article/view/3487

11. Zubair UB, Salamat A, Alam MM, Shafqat H, Saeed F. Predictive accuracy of model for end stage liver disease (MELD) as a prognostic marker for cirrhosis incomparison with child pugh score. Pak Armed Forces Med J 2015; 65(1): 22-25.
12. Wiegand J, Berg T. The etiology, diagnosis and prevention of liver cirrhosis: part 1 of a series on liver cirrhosis. Dtsch Arztebl Int 2013; 110(6): 85-91.
13. Berzigotti A. Advances and challenges in cirrhosis and portal hypertension. BMC Med 2017; 15(1): 200.
14. Swaminathan M, Ellul MA. Hepatic encephalopathy: current challenges and future prospects. Hepat Med 2018; 10(1): 1-11.
15. Moraes ACO, Fonseca-Neto OCLD. The use of MELD score (Model for end stage liver disease) and derivatives in cardiac transplantation. Arq Bras Cir Dig 2018; 31(2): e1370.
16. Zhang X. Bacterial infection and predictors of mortality in patients with autoimmune liver diseaseassociated acute-on-chronic liver failure. Can J Gastroenterol Hepatol 2018; 2018(1): 5108781.
17. Puentes JCP, Rocha H, Nicolau S, Ferrão G. Effectiveness of the MELD/Na Score and the Child-Pugh Score for the identification of palliative care needs in patients with cirrhosis of the liver. Ind J Palliat Care 2018; 24(4): 526-528.
18. Englschalk C, Eser D, Benefit in liver transplantation: A survey among medical staff, patients, medical students and non-medical university staff and students. BMC Med Ethics 2018; 19(1): 7. Published 2018 Feb 12. doi:10.1186/s12910-018-0248-7
19. Patidar KR, Thacker LR. Covert hepatic encepha-lopathy is independently associated with poor survival and in-creased risk of hospitalization. Am J Gastroenterol 2014; 109(11): 757-763.

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