PREDICTIVE ACCURACY OF MODEL FOR END STAGE LIVER DISEASE (MELD) AS A PROGNOSTIC MARKER FOR CIRRHOSIS IN COMPARISON WITH CHILD – PUGH SCORE

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ABSTRACT

Objective: To compare Model for End Stage Liver Disease (MELD) and Child-Turcott-Pugh (CTG) scoring as predictors of survival in cirrhotic patients.

Study Design: Observational prospective study.

Place and Duration of Study: Military Hospital, Rawalpindi from 1st Dec 2008 to 30th April 2009.

Material and Methods: The study was carried out at Military Hospital, Rawalpindi a tertiary care hospital of Pakistan. Study included 55 patients suffering from cirrhosis of both genders being above 12 years of age, admitted in medical wards during the period from 1st December, 2008 to 30th April 2009. Each patient was assigned a MELD and CTP score. On discharge, these patients were followed up at 03-months, 06months and 1-year duration through telephone.

Results: Thirty seven (67.3%) patients were male while 18 (32.7%) were female patients, with age ranging from 27 years to 75 years (mean 53). Fourteen (25.4%) patients were dead at 3-months, 22 patients (40%) were dead at 6-months and 29 (52.7%) patients were dead at 1-year follow up. MELD score proved to be a better indicator of survival than CTP score over a period of 01 year follow-up.

Conclusion: MELD score is a better prognostic marker for cirrhotic patients as compared to CTP score.

Keywords: MELD, Child-Turcott-Pugh, Cirrhosis, Liver transplant.

INTRODUCTION

Cirrhosis is a serious and irreversible disease characterized by replacement of liver tissue by fibrotic scar tissue as well as regenerative nodules, leading to progressive loss of liver function. Cirrhosis represents the late stage of liver disease, alcoholism being the commonest cause worldwide and viral hepatitis being the main cause in Pakistan.

According to 2002 worldwide mortality estimates, 929,000 deaths occurred due to chronic HBV, HCV including 44,600 cirrhotic deaths[1]. In 1998, chronic liver disease (CLD) was classified as the tenth most frequent cause of death in the United States according to the national vital statistics report[2].

It is estimated that 10% of the population in Pakistan has HBV infection[3] which carries a 15% to 40% risk of developing cirrhosis. Over the years, HCV has overtaken HBV in the etiogenesis of cirrhosis in Pakistan[4]. In a study conducted at Shifa International Hospital, Islamabad twelve months admission data was reviewed from its computerized data base and mortality rates for different diseases among the hospitalized patients was observed. Out of 160 deaths related to medical causes from 8529 admissions, 20.6% patients had chronic liver disease[5].

Decompensated cirrhosis is associated with a poor prognosis and liver transplantation provides the only curative treatment option with excellent long-term results. Facilities of liver transplant are expensive and almost nonexistent in our country. Hence it is important to have a

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reliable scoring system for prognosticating cirrhosis so as to appropriately counsel patients and where possible, prioritize the patients for liver transplantation.

The Child-Turcott-Pugh (CTP) scoring historically has been used by clinicians as a prognostic tool to assist in management decisions involving patients with cirrhosis. Model for End stage Liver Disease (MELD) score was developed later to overcome the shortcomings of the Child-Pugh classification.

Little data is available to predict ability of MELD as a prognostic marker in cirrhotic patients as compared to CTP score in Pakistan. As the country braces for launching liver transplant facilities, more such studies need to be conducted.

PATIENTS AND METHODS

This observational prospective study was carried out at Military Hospital, Rawalpindi at tertiary care hospital of Pakistan. Study included patients suffering from Chronic Liver Disease of both genders being above 12 years of age, admitted in medical wards during the period from 1st December, 08 to 30th April 2009.

During admission, detailed medical history, physical examination and required biochemical tests were carried out which included serum creatinine, total bilirubin, INR (International normalized ratio) and serum albumin. MELD and Child-Pugh scores were calculated at baseline in each of these patients.

On discharge, these patients were followed up at 3-months, 6months and 1-year duration through telephone.

MELD score was calculated by the "Online UNOS MELD calculator":

0.957 × Loge (creatinine [mg/dl]) + 0.378 X Loge (total bilirubin [mg/ml]) + 1.120 x Loge (INR) + 0.643

Based on the MELD score, patients were stratified into 04 groups; < 10, 10 to 19, 20 to 29 and ≥ 30.

Child-Pugh scoring employs five clinical measures of liver disease as depicted in table-1. Patients are then placed in one of the three CTP class (A, B or C) according to the sum of points they get (A: <7, B: 7 to 9, and C: >9).

The correlation between variables was evaluated by Pearson's correlation test. Receiver-operating characteristic (ROC) curves were used to determine the cutoff values for each score with the best sensitivity and specificity in discriminating between patients who survived and those who died.

Concordance (c)-statistic was used to assess the ability of MELD or CTP scores to predict 3-month survival. The prediction of overall survivals was estimated by comparing actuarial curves of subgroups of patients stratified according to either CTP scores or MELD risk scores. All data was analyzed by SPSS Version 17.

RESULTS

A total of 55 patients were evaluated in this prospective study. Thirty seven (67.3%) patients were male while 18 (32.7%) were female patients. Study included patients ranging from age of 27 years to 75 years with mean age of 53. Fourteen (25.4%) patients were dead at 3-months, 22 patients (40%) were dead at 6-months and 29 (52.7%) patients were dead at 1-year follow up. Cumulative survival rates calculated according to MELD and CTP score are given in table-2.

DISCUSSION

The study was primarily carried out to assess the predictive accuracy of Model for End Stage Liver disease (MELD) as a prognostic marker for cirrhosis in comparison with Child-Turcott- Pugh (CTP) classification. The CTP class historically has been used by clinicians to assist in management decisions involving patients with cirrhosis. However, this classification scheme has

a number of limitations. It is based upon subjective parameters such as the degree of ascites and encephalopathy. The quantification of the degree of abnormality in these two physical findings may vary due to observer bias and difference in clinical methods. Moreover they may be altered substantially by medical interventions.

Table-1: Child-Turcotte-Pugh Scoring.

Measure	1 Point	2 Points	3 Points
Total bilirubin,umol/l	<34	35-50	>50
Serum albumin, g/l	>35	28-35	<28
PT INR	<1.7	1.71-2.30	>2.30
Ascites	None	Mild	Moderate to Severe
Hepatic Encephalopathy	None	Grade I-II	Grade III-IV

Table- 2: Cumulative survival score according to model for end stage liver disease (MELD) and child-turcotle push scoring (CTP).

Scoring System	Total Patients n= 55	Cumulative Survival at 3 months, n(%)	Cumulative Survival at 6 months, n(%)	Cumulative Survival at 1 year, n(%)
MELD				
<10	12	12 (100)	11 (91.6)	9 (75.0)
10 – 19	25	20 (80.0)	16 (64.0)	12 (48.0)
20 – 29	16	9 (56.2)	6 (37.5)	5 (31.2)
≥ 30	2	0 (0.0)	0 (0.0)	0 (0.0)
CTP				
A (<7)	15	15 (100)	13 (86.6)	10 (66.6)
B (7 – 9)	18	16 (88.8)	14 (77.7)	11 (61.1)
C (>9)	22	10 (45.5)	6 (27.3)	5 (22.7)

MELD was developed initially using data from a population of 231 patients with cirrhosis who underwent elective transjugular intrahepatic portosystemic shunt (TIPS) procedure[6].This data was utilized to predict three month survival in these patients. This score is now being used by the United Network for Organ Sharing (UNOS) and Eurotransplant for prioritizing allocation of liver transplants.

Studies in recent past suggest that MELD score subsequently has been shown to be a reliable marker of mortality risk in both hospitalized and ambulatory patients with cirrhosis[7]. The score's usefulness appears to be irrespective of underlying disease etiology. These results are in accordance with our study where cumulative survival rate at 3 months, 6 months and 1 year is better predicted by MELD score than CTP.

The MELD score also has been recently validated to predict 1-year and 5-year mortality in a large cohort of non-transplant cirrhosis patients with widely varying causes and severities of chronic liver disease[8]. Moreover, the predictive accuracy of MELD was found to be essentially independent of complications related to portal hypertension of which ascites and encephalopathy are both subjective assessments.

In a European series of cirrhotic patients, the MELD score is an excellent predictor of both short and medium term survival, and performs at least as well as the CTP score. An increase in MELD score is associated with a decrease in residual liver function[9].

In an international study a MELD score cut-off of 9 had 100% sensitivity and 81% specificity

while a Child-Pugh score of 9 had 62% sensitivity and 77% specificity in assessing 3-month survival showing clearly that MELD has better predictive value[10]. Our study further enhanced the results and shows that not only at 3 months but also at 6 months and 1 year MELD score had better predictive value to determine the prognosis of cirrhotic patients as compared to Child-Pugh score.

In another study conducted in Pakistan, MELD score was compared with CTP score as a useful prognostic marker in cirrhotic patients with infection. MELD score was found to have better specificity than CTP score in determining outcome[11], similar to the results of our study.

Considering the prevalence of chronic viral hepatitis and cirrhosis in the country, it is inevitable that soon liver transplant facilities will be available in Pakistan. This will require robust selection criteria for potential transplant candidates. Hence more and larger studies to compare these two parameters need to be done in our setup.

CONCLUSION

MELD score is a better prognostic marker for cirrhotic patients as compared to CTP score. MELD can be effectively used to predict survival in these patients as well as to prioritize them for liver transplant in setups where facility is available.

Conflict of Interest

This study has no conflict of interest to declare by any author.

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