

Utility of MELD Score as Prognostic Indicator in Patients of Liver Cirrhosis and its Correlation with Child-Pugh Score

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ABSTRACT

Introduction: The model for end-stage liver disease (MELD) score is a useful tool to assess prognosis in critically ill cirrhotic patients. Therefore present study's aim is to evaluate prognostic value of MELD score in patients with cirrhosis and to find out the correlation of MELD score with Child-Pugh Score.

Material and Methods: Present study was carried out in a large public hospital in Mumbai from October 2003 to November 2004 on liver cirrhosis patients. Seventy six patients of cirrhosis of liver who had attended gastroenterology outpatient department of the hospital were included in the study. Thirty age and sex matched healthy controls were included in the study. MELD score was calculated at Mayo clinic calculator site.

Results: Mean age of cases of cirrhosis was 46.97 + 12.96 years with range of 15-74 years. There was no significant difference in the age or sex distribution of cases in the survival or expired category ($p > 0.05$). Our study showed significant difference in mortality between the three Child Pugh grades ($p < 0.05$). Present study showed significant correlation between MELD score and Child-Pugh Score. Mean MELD score was significantly more in expired cases (22.0 ± 7.74) than in survived cases (14.87 ± 6.42) during six monthly follow up period ($p < 0.05$). Cases with MELD scores ≥ 30 had significantly high mortality rate.

Conclusion: Therefore MELD score can be used as significant short term prognostic factor in patients with cirrhosis.

Keywords: Child Pugh Score; MELD Score; Cirrhosis; Prognosis;

INTRODUCTION

Child-Turcotte-Pugh score has been used as a predictor of mortality in patients with liver cirrhosis since 40 years.¹ This score is an important component of the prognostic evaluation of cirrhotic patients and of the current organ allocation policy. This traditional score has several shortcomings such as subjectivity of some parameters and limited discriminant ability.^{1,2} In order to overcome the limits of the Child-Pugh score, previous studies have evaluated a "combined score" with quantitative liver function tests. Hence, new prognostic models such as Model for End-Stage Liver disease (MELD), Short and Long term Prognostic Indices (STPI and LTPI), Rockall score and Emory score were proposed for predicting survival in patients with liver cirrhosis.^{1,2}

The model for end-stage liver disease (MELD) score is a useful tool to assess prognosis in critically ill cirrhotic patients.^{3,4} However, its short-term prognostic superiority over the traditional Child-Turcotte-Pugh (CTP) score

has not been definitely confirmed. Therefore, the aims of present study was to study prognostic value of MELD score in patients with cirrhosis and to find out the correlation of MELD score with Child-Pugh Score.

MATERIAL AND METHODS

Present study (Prospective case controlled study) was carried out in a large public hospital in Mumbai from October 2003 to November 2004 on liver cirrhosis patients. 76 patients of cirrhosis of liver who had attended gastroenterology outpatient department of the hospital were included in the study. Thirty age and sex matched healthy controls without any liver, renal or metabolic illness was included in the study.

Inclusion Criteria for cases

1. Willingness to enroll in the study.
2. Hemodynamically stable patients of liver cirrhosis diagnosed by Clinical parameters, Biochemical parameters, Ultrasonography, Liver Biopsy etc.

Exclusion Criteria for cases

1. Significant Cardiac dysfunction diagnosed by Clinical Examination, Electrocardiogram, Echo cardiography.
2. Tense Ascites
3. Hemodynamic Instability.
4. Diseases affecting Lipid Profile like uncontrolled Diabetes Mellitus or hereditary hyperlipidemia etc.
5. Grade III or IV hepatic encephalopathy

Inclusion Criteria for controls

1. Age and Sex matched
2. No clinical evidence of Liver, Cardiac or Respiratory illness.
3. Willingness to participate in the study.

Exclusion Criteria for Controls

1. Presence of Liver, Cardiac, or any other major illness.

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Range	Cirrhosis	Controls
Mean Age \pm SD years	46.97 \pm 12.96 years (15-74)	45.8 \pm 11.3 years (18-68)

Table-1: Age wise distribution

Parameters	Survived Cases	Expired Cases	Significance (p)
No. of cases	60	16 (21%)	-
Age - Median	49.5 yrs	47.0 yrs	p>0.05
Range	15-74	24-70	
Sex- Male	44 (77.3%)	13 (81.3%)	p>0.05
Female	16 (26.7%)	03 (18.7%)	

Table-2: Age and sex vs mortality

Category	No. of patients	Mortality (%)
Child A	20	0
Child B	23	2 (12.5%)
Child C	33	14 (87.5%), p<0.05

Table-3: Child-pugh-turcotte score

MELD Score	No. of patients	Mortality (%)
< 10	14	1 (7%)
10-19	40	6 (15%)
20-29	18	6(33%)
\geq 30	4	3(75%) (p<0.05)

Table-4: MELD score

Grade	Mean MELD score	Correlation (r)
Child A	9 \pm 1.2	r =0.813 (p<0.05)
Child B	11.19 \pm 3.3	
Child C	22.71 \pm 5.71	

Table-5: Child Score Vs MELD Score

Parameters	Survived (average score)	Expired (average score)	P value
Child Pugh Score	8.3 \pm 2.29	10.88 \pm 1.75	P<0.05
Meld Score	14.87 \pm 6.42	22.0 \pm 7.74	P<0.05

Table-6: Child and MELD score versus mortality

2. Diseases affecting Lipid Profile like uncontrolled Diabetes Mellitus or hereditary hyperlipidemia etc.

Apart from detailed clinical examination and routine biochemical tests like hemogram, complete liver function tests and renal function tests, patients underwent USG-doppler and 2-D echocardiography (whenever indicated). Serum Lipid profile was done in the department of biochemistry. MELD score was calculated at Mayo clinic calculator site.

STATISTICAL ANALYSIS

In this study group, mean and standard deviation were calculated for each parameters of all three groups by using Statistical Software package SPSS. To find out the significance difference between two groups Student t test and Z mean test was used and for categorical data Chi-square

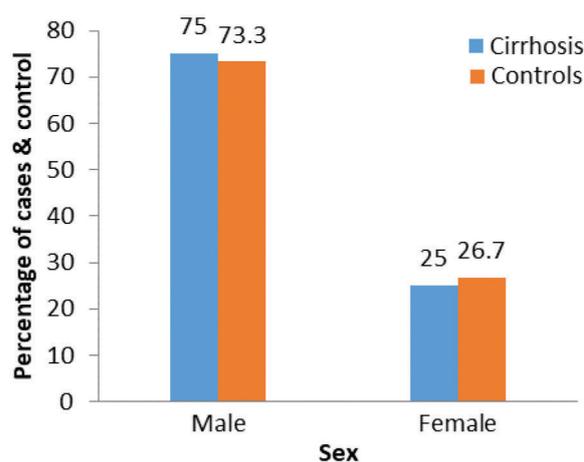


Figure-1: Sex Wise Distribution

test was used. P<0.05 was considered as significant for each variable.

RESULTS

Table 1 shows that mean age of cases of cirrhosis was 46.97 \pm 12.96 years with range of 15-74 years. Mean age of controls was 45.8 \pm 11.3 years with range of 18-68 years.

Male constituted 75% of the cases while 73.3% of the controls were male. Male to Female ratio was 3:1 (Figure 1). Table 2 shows that 16/76 (21%) patients expired over six months follow up. There was no significant difference in the age or sex distribution of cases in the survival or expired category (p>0.05).

Table 3 shows that 20 cases belonged to Child A grade, 23 belonged to Child B while 33 patients were in Child C grade at the time of presentation. There was significant difference in mortality in between the three Child grades (p<0.05).

MELD score was calculated at the Mayo Clinic Site. Most cases had the MELD score between 10 to 29 (76%). Those who had scores \geq 30 had significantly high mortality rate (75%) (Table 4).

Table 5 shows that Child-Pugh Score and the MELD score were significantly correlated. The coefficient of correlation between the two scores was r =0.813 with p <0.05.

Mean Child-Pugh score was calculated among cases who survived and the cases who expired. The mean Child Score was significantly less in survived (8.3 \pm 2.29) cases than in expired cases (10.88 \pm 1.75) (p<0.05). Mean MELD score

was also significantly more in expired cases (22.0 ± 7.74) than in cases who survived (14.87 ± 6.42) during six monthly follow up period. ($p < 0.05$)

DISCUSSION

Like the Child classification, the MELD score was designed to predict the outcome of decompressive therapy for portal hypertension. Calculation of the MELD score is based on serum bilirubin, prothrombin time calculated as International Normalized Ratio, and serum creatinine. The MELD score has advantages when compared with the Child-Pugh score like a) it uses only objective parameters b), its objective parameters are less subject to center-to-center variability than is the Child classification and c), the MELD score increases as the three constituent parameters deteriorate, whereas the individual scoring elements in the Child score remain fixed once a defined threshold has been reached. Formula for the MELD score is- $3.8 \log_e(\text{bilirubin [mg/dL]}) + 11.2 \log_e(\text{INR}) + 9.6 \log_e(\text{creatinine [mg/dL]}) + 6.4$ (etiology: 0 if cholestatic or alcoholic, 1 otherwise).

In our study, mean age of patients with cirrhosis was 46.97 ± 12.96 years. This was a decade lesser than a Japanese study by Sakugawa H et al.⁵ Median age was reported to be 57 years in a study from United States. The mean age of HCV related post necrotic cirrhosis has been reported to be much higher (64.4 years) than the overall age of cirrhosis patients in an Italian study.⁶

The lower mean age is probably due to high incidence of alcoholic cirrhosis and HBV related post necrotic cirrhosis in our study while HCV related post necrotic etiology dominates the eastern and the western studies. Male preponderance is also probably due to the fact that alcohol consumption is seen predominantly among men in India. Social taboos also probably restrain women in India from seeking treatment for alcohol related problems. Similar observations have been made by Sarin et al⁷, Roy K et al⁸ and Berry et al.⁹

In our study, alcohol was the most common etiology (50%) of cirrhosis. This was followed by post-necrotic cirrhosis (HBV- 27.6% and HCV- 6.57%). This is in contrast to some studies from India and west. Sarin et al⁸ and Thakur et al¹⁰ have reported Post-necrotic etiology as the most common etiology of cirrhosis. However Dilawari et al in 1994¹¹ and Upadhyaya et al¹² reported alcohol to be the commonest etiology of cirrhosis as in our study. 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 the most common clinical feature (64.4%) in our study. This in concurrence with the other reported studies from India⁷⁻¹⁰ where the incidence ranges from 57% to 86%. This high incidence is probably because most patients of chronic liver disease will seek medical advice only when a complication of portal hypertension sets in with the development of ascites, hematemesis or jaundice. Our study had G.I bleed in 26% patients while Sarin et al reported hematemesis in 58.65% cases while Dilawari et al reported hematemesis in 11-14% cases, reflecting the varying modes

of decompensation of cirrhotic patients.

Child-Pugh-Turcotte score was initially coined to prognosticate patients undergoing portal hypertensive surgery. It was later modified to evaluate patients of cirrhosis. We found 26.3%, 30.2% and 43.4% of our patients in Child A, Child B, and Child C group respectively at the time of presentation. Sarin et al⁸ also reported similar Child Group distribution in their study.

As a result of various lacunae in the Child-Pugh score, various other prognostic markers have been proposed and tested in recent times. We studied MELD score, lipid profile and Hepatic vein waveform to find out their prognostic value in cirrhosis. The study group at the Mayo Clinic had introduced MELD to evaluate the prognosis of patients undergoing TIPSS.¹³ They then generalized its application to patients with different stages of liver cirrhosis in order to evaluate their short term survival prognosis.^{3,4} In our study, we tried to evaluate 6 month survival in different stages of liver cirrhosis based on the MELD and Child-Pugh Score. We found significant difference in the mortality rate in patients with MELD score of more than 20 than in patients with MELD score of less than 20. Giannini E et al¹⁴ found similar results in their study of Aminotransferase ratio and MELD score in cirrhosis. They found MELD score of more than 9 as the cut off level above which the probability of survival was significantly reduced. Heuman DM et al¹⁵ found that in patients with a MELD score of less than 21, only low serum sodium and persistent ascites were independent predictors of mortality while for MELD scores above 21, only MELD was independently predictive. In our study, we found significant correlation between MELD and Child-Pugh score with $r = 0.813$ ($p < 0.05$). A European study found a similar significant correlation between MELD score, the degree of metabolic liver functional impairment, as well as Child-Pugh score.¹⁶ Two independent studies in 2001 performed in North American cirrhotic patients showed that the MELD score correlated significantly with Child-Pugh score in predicting patient outcome following conditions like acute variceal bleeding¹⁷ and orthotopic liver transplantation¹⁸ (OLT) in the setting of chronic liver disease.

We found significant difference in the Mean MELD score in surviving patients (14.87 ± 6.42) and the expired patients (22.0 ± 7.74) ($p < 0.05$). Giannini E et al¹⁴ found a MELD score of more than 9 as the cut off value whereas Heuman DM et al¹⁵ found MELD score of more than 21 to be the level above which MELD score was independent predictor of survival.

CONCLUSION

Mean age of cases of cirrhosis is $46.97 + 12.96$ years with range of 15-74 years. Half of cases are in the age range of 41-60 years. Present study shows no significant difference in the age or sex distribution of cases in the survival or expired category ($p > 0.05$).

Our study shows significant difference in mortality between the three Child Pugh grades ($p < 0.05$). Cases with MELD scores ≥ 30 had significantly high mortality rate. Therefore

MELD score can be used as significant short term prognostic factor in patients with cirrhosis. Present study shows significant correlation between MELD score and Child-Pugh Score. The coefficient of correlation between the two scores is $r = 0.813$ with $p < 0.05$. In present study, Mean MELD score is significantly more in expired cases (22.0 ± 7.74) than in survived cases (14.87 ± 6.42) during six monthly follow up period ($p < 0.05$).

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