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Original Research Article

Correlation between APRI Index, MELD Score and Child Pugh Score in cirrhosis of liver

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ABSTRACT

Background: Liver cirrhosis is the end result of chronic liver injury and is one of the most common cause of morbidity and mortality. Several scorings are available to predict the severity and prognosis of liver cirrhosis. This study aims to calculate APRI index, MELD score and child Pugh score in cirrhosis patients and to find the correlation between them.
Methods: This is the Cross-sectional study on 100 patients confirmed with cirrhosis of liver. Cirrhosis due to alcohol, Hepatitis B and C, autoimmune, Cryptogenic, NAFLD, were included in the study. APRI Index, MELD Score and Child Pugh Score were calculated, and the correlation was obtained.
Results: This study found out the relationship between APRI index, MELD Score and Child Pugh Score with significant p value. The study also showed that all the three scores were raised with patients who had complication of cirrhosis like encephalopathy, refractory ascites. Among those who had complication like grade 3 or 4 encephalopathy, APRI index had a mean value of 3.4, Child Pugh had a mean score of 13.2, and MELD had a mean score of 36.08 with standard deviation of 2.0, 1.5, 6.0 respectively.
Conclusions: APRI index is an independent predictor of morbidity and mortality. The prognostic performance of all 3 was comparable, Hence APRI index can be used as an alternative scoring which is cost effective and objective method in predicting the severity and prognosis in cirrhosis of liver.

Keywords: Aspartate amino transferase to platelet ratio index, Child Pugh score, Cirrhosis of liver, Model for end-stage liver disease

INTRODUCTION

Cirrhosis is defined as a diffuse process with fibrosis and nodule formation. It is the end result of the fibrogenesis that occurs with chronic liver injury.[1] The causes of cirrhosis are multiple and include metabolic, inflammatory, congenital, and toxic liver diseases.[2] The most common causes of cirrhosis are chronic alcoholism and chronic hepatitis B and C, followed by biliary diseases and hemochromatosis.[3] Alcohol is one of the common etiology. Alcohol related liver disease is the commonest cause of death, accounting for 2.5 million/yr.[4] The pathologic features of cirrhosis consists of development of fibrosis such that there is distortion of architecture with the formation of regenerative nodules5. 5-year survival rate of 14% to 35% in decompensated cirrhosis and 84% in compensated cirrhosis.[6-7] Identifying a marker associated with disease severity helps in improving clinical management as the definite and preferable treatment in liver cirrhosis is Liver transplantation, which is difficult to perform due to shortage of donors and high cost.[8] Aspartate amino

transferase to platelet ratio index (APRI) was initially proposed as a predictive marker for liver fibrosis and cirrhosis in hepatitis C virus infected patients.[9] Recent studies show that APRI predicted liver related mortality in alcoholic liver disease individuals and also regardless of the cause of cirrhosis of liver.[10]

APRI was calculated using the formula= AST (U/L)/ (upper limit of the normal range) ×100/platelet count (109/L). The 40 U/L of AST was used as the upper limit of the normal range. It is a mathematical formula using only two parameters, based on routine blood tests and is compared to Child Pugh score and MELD score. APRI reflect extent of liver injury and compensatory state of hepatic function, which is simpler, cost effective and easier to calculate than MELD score and Child Pugh score. An 86% Negative Predictive Value (NPV) and an 88% Positive Predictive Value (PPV) were reported to predict the presence of significant fibrosis, and a 98% Negative Predictive Value (NPV) and a 57% Positive Predictive Value (PPV) were reported to predict the presence of cirrhosis.[9]

Hence this study aimed at calculating APRI Index, MELD score and child Pugh score in liver cirrhosis patients, and to find the correlation between APRI index, MELD score and Child Pugh Score.

METHODS

The Study was a cross sectional study conducted on 100 Cirrhotic patients who were treated at Victoria Hospital ,attached to Bangalore Medical College and Research Institute, Bangalore from April 2019 to September 2019 .The Study was approved by institutional ethical committee and written informed consent was taken from all patients who were included in this study.

Inclusion criteria

- All patients aged above 18 years with chronic liver disease.
- Cirrhosis of liver as evidenced by abdominal ultrasound and liver profile derangement.

Exclusion criteria

- Age less than 18 years
- Primary hematological disorders
- Acute infectious diseases
- Primary Coagulation Disorders
- Chronic kidney disease

Cirrhosis of liver was confirmed by ultrasound and biochemical reports. Cirrhosis due to alcohol, Hepatitis B, Hepatitis C, Cryptogenic, Autoimmune, NAFLD leading to cirrhosis were included in the study. Complications like anaemia, hepatic encephalopathy, renal dysfunction, coagulopathy was noted.

APRI was calculated using the formula: APRI = (AST/PLATELET X 109) X 100

MELD SCORE is calculated using the formula, MELD = 3.78×ln [serum bilirubin (mg/dL)] + 11.2×ln [INR] + 9.57×ln [serum creatinine (mg/dL)] + 6.43.

Child Pugh is calculated based on (Table 1).[11] Analysis was based on the score obtained and divided into 3 classes: A, B and C

Child Pugh class A - 5 to 6
Child Pugh class B - 7 to 9
Child Pugh class C ->10

Table 1: Child Pugh classification of cirrhosis.

Factor	Units	1	2	3
Serum bilirubin	µmol/L mg/dL	<34 <2.0	34-51 2.0-3.0	>51 >3.0
Serum albumin	g/L g/dl	>35 >3.5	30-35 3.0-3.5	<30 <3.0
Prothrombin time	Seconds prolonged INR	<4 <1.7	4-6 1.7-2.3	>6 >2.3
Ascites		None	Easily controlled	Poorly controlled
Hepatic encephalopathy		None	Minimal	Advanced

Statistical methods

Data was tabulated in Microsoft Office Excel and statistical analysis was done by using SPSS for windows(version 20.0).Pearson correlation analysis was used to analyses the relationship between APRI Index, MELD score, Child Pugh score and paired t test was used for analysis of complication of cirrhosis with the all the three scores. p value less than 0.05 was considered statistically significant.

RESULTS

The Sample size in this study is 100 patients. The age distribution was between 26-80 years with mean age of 46.14 and standard deviation of 10.45. There were 93 males and 7 females (Figure 1) who were confirmed with liver cirrhosis.

The cause of cirrhosis in 100 patients was studied and found that, 75 were due to alcohol, 13 were due to Hepatitis B infection, 9 were due to Hepatitis C infection, and 1 each due to Autoimmune, NAFLD and Cryptogenic causes (Figure 2). Cirrhosis due to different causes was confirmed by relevant biochemical and radiological investigations.

One of the complication of cirrhosis is Ascites that was divided in to three category and graded as -1) No ascites

2) Controlled ascites 3) Refractory ascites, out of 100 patient, 18 patients had no ascites, 75 had controlled ascites, and 7 patients had refractory ascites as per analysis (Figure 3). The same classification is used in child Pugh scoring.

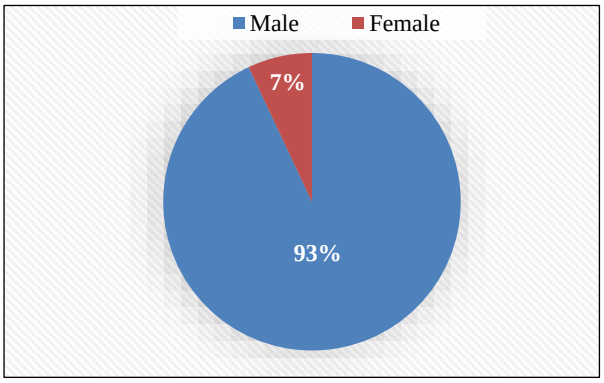

Figure 1: Sex ratio.

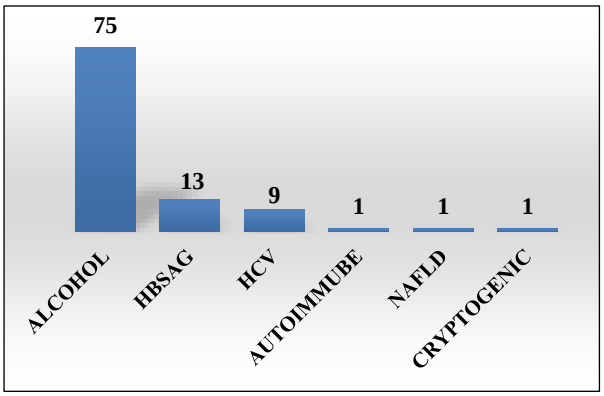

Figure 2: Causes of cirrhosis.

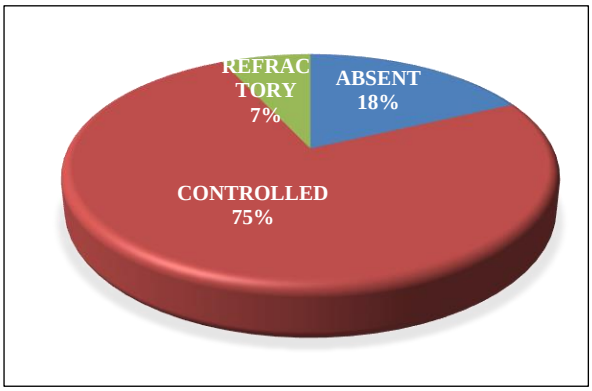

Figure 3: Distribution of ascites.

One of the complications of cirrhosis is Hepatic Encephalopathy that was divided in to three category and graded as-1) No encephalopathy 2) Minimal encephalopathy 3) Advanced encephalopathy. Out of 100 patients, 48 patients had no encephalopathy, 41 patients had grade 1 or 2 encephalopathy (minimal) and 11 patients grade 3 or 4 encephalopathy (advanced) (Figure 4).

11 patients were in Child Pugh A, 34 patients in child Pugh B, and 55 patients in child Pugh C respectively.

The study showed Significant P value between APRI index and Child Pugh score, MELD Score and Child Pugh Score, MELD Score and APRI index (Table 2). p value was less than 0.05 between APRI index and Child Pugh score, MELD Score and Child Pugh Score, MELD Score and APRI index

Hence Proving there is significant correlation between APRI index and Child Pugh score, MELD Score and Child Pugh Score, MELD Score and APRI index. Hence APRI index can be used as alternative marker for assessing severity and prognosis of liver cirrhosis.

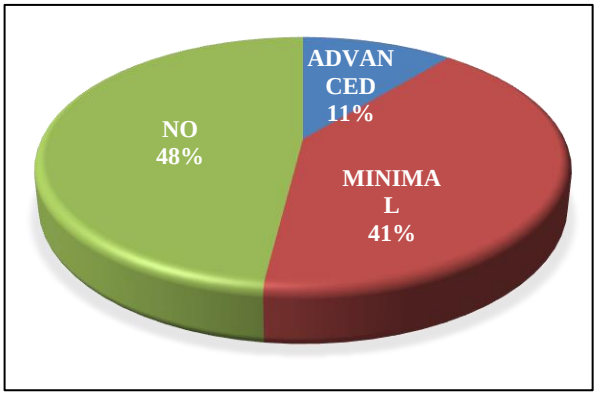

Figure 4: Distribution of encephalopathy.

Table 2: Correlation between APRI Index, MELD score and Child Pugh scores.

Scores	Pearson correlation(r) and p value	Child Pugh	Meld	APRI index
Child Pugh score	Pearson correlation(r)	-	0.781	0.240
	p value	-	0.0001	0.016
MELD Score	Pearson correlation(r)	0.781	-	0.200
	p value	0.0001	-	0.046
APRI Index	Pearson correlation(r)	0.240	0.200	-
	p value	0.016	0.046	-

r=Correlation coefficient, p<0.05 considered statistically significant

The study showed that higher APRI index, higher MELD score and higher Child Pugh score was found for patients who had complication of cirrhosis like ascites, thus proving that as the severity of the disease increase, all the three scores also increases. Among the patient who had Refractory ascites Child Pugh had a mean score of 13, MELD had a mean score of 26.8, and APRI index had a mean value of 4.371, with standard deviation of 2.8, 9.5, 2.4 respectively (Table 3).

The study also showed that higher APRI index, higher MELD score and higher Child Pugh classification score for patients who had complication of cirrhosis like encephalopathy. Among those who had complication like grade 3 or 4 encephalopathy, APRI index had a mean value of 3.4, Child Pugh had a mean score of 13.2, and MELD had a mean score of 36.08 with standard deviation of 2.0, 1.5, 6.0 respectively (Table 4). Hence as the complication sets in APRI index, MELD score and Child Pugh score increases.

Table 3: Statistical analysis between complication (Ascites) and various scores.

Scores	Grades	Number	Mean	Std. deviation
Child Pugh score	Absent	17	6.82	1.185
	Controlled	76	10.59	1.933
	Refractory	7	13.00	2.887
MELD Score	Absent	17	14.59	5.038
	Controlled	76	23.68	8.520
	Refractory	7	26.86	9.582
APRI index	Absent	17	1.347	1.350
	Controlled	76	2.751	2.321
	Refractory	7	4.371	2.499

Table 4: Statistical analysis between complication (Encephalopathy) and various scores.

Scores	Grades	Number	Mean	Std. deviation
Child Pugh score	No	48	8.50	1.786
	Minimal	41	11.17	1.986
	Advanced	11	13.27	1.555
MELD Score	No	48	18.60	8.010
	Minimal	41	24.73	8.343
	Advanced	11	29.91	6.074
APRI Index	No	48	1.829	1.611
	Minimal	41	3.346	2.722
	Advanced	11	3.418	2.099

DISCUSSION

Cirrhosis of liver is associated with significant morbidity and mortality. Several biochemical and radiological markers are used for assessing the extent of liver injury. APRI index uses AST and platelet count for assessing the fibrosis and extent of liver injury. Platelet count is reduced in liver cirrhosis due to destruction in spleen due to ''hypersplenism'' which is secondary to portal hypertension.[12,13] AST level in the blood are increased due to inadequate clearance by the liver due to fibrosis, hence high AST levels combined with low platelet count may be used to predict the severity and progression of liver injury in cirrhotic patient.[14,15]

In this study, authors tried to correlate APRI Index, MELD score, Child Pugh score with each other, and also for the assessment of complication and morbidity of liver cirrhosis.

Author found that prognostic performance of all 3 was comparable and all showed positive correlation with significant p value, also as the complication sets in cirrhosis all the three scores increases. APRI index being cost effective, objective method and easier to calculate, can be used to assessing severity and prognosis as it is equally efficacious as MELD score and Child Pugh score.

Study done by Weilin Mao et al, on 193 chronic HBV infected patients and concluded that APRI is a simple and noninvasive scoring system that predicted risk for the development of liver-related complications and mortality in patients with HBV-related cirrhosis, also study showed that APRI can be used as an additional marker for managing HBV-related cirrhosis patients.[9]

Study conducted Wong et al, on 3619 patients on Hepatitis B and Hepatitis C infected Patients and concluded that APRI score is a good marker and can be used as alternate noninvasive marker in predicting fibrosis of liver.[16]

CONCLUSION

The study showed positive correlation between APRI index, MELD score and child Pugh score The prognostic performance of all 3 was comparable, Hence APRI index can be used as an alternative scoring which is cost effective and subjective method in predicting the severity and prognosis in cirrhosis of liver.

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