

# A Comparative Study of ALBI and Child Pugh Score in Predicting Renal Dysfunction in Chronic Liver Disease Patients

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## Abstract

## Original Research Article

**Background/aims:** The albumin-bilirubin (ALBI) score is a new model for assessing the severity of liver dysfunction. In the present study, we aimed to retrospectively compare the performance of ALBI with Child-Pugh for predicting the renal dysfunction in patients with chronic liver disease. **Materials and methods:** Data of Patients with chronic Liver disease irrespective of etiology were retrospectively reviewed. Child Pugh and ALBI. Scores were calculated for the patients and results from ROC curves were analyzed. **Results:** Study conducted on 299 patients of chronic liver disease, age distribution was between 20-85years with mean age of patients being 45.7+/-10.94 years, sex ratio male: female::265:35 with renal dysfunction rate of 29.8%.The area under curves of ROC of ALBI and Child Pugh are 0.550,0.569 respectively. There was statistically significant correlation between renal dysfunction with both CPS and ALBI score. **Conclusion:** Ability of ALBI score for predicting renal dysfunction was comparable with that of Child Pugh score.

**Keywords:** Albumin bilirubin score, Child Pugh score, Receiver operating characteristic.

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## INTRODUCTION

Cirrhosis of liver is more common disease in our country and is a major health problem worldwide, associated with significant morbidity and mortality. According to the WHO, about 800,000 people die of cirrhosis annually [1].

Renal disorder is common and serious problem with decompensated cirrhosis [2]. Acute kidney injury (AKI) occurs in approximately 19% of hospitalized patients with cirrhosis [3]. HRS is unique form of liver failure associated with CLD and characterized by functional renal impairment without significant change in renal physiology. Identification of renal function is important because it is associated with a high morbidity and mortality [4].

Child Pugh and Meld scores are two of the most important models for assessing severity of liver disease. Recently the Albumin Bilirubin score (ALBI) has been established as a convenient and evidenced based model to access the severity of liver dysfunction in patients with hepatocellular carcinoma (HCC)[5].

This study aimed to retrospectively compare the performance of ALBI with Child-Pugh score for

predicting the renal dysfunction in patients with cirrhosis of liver.

## OBJECTIVES OF STUDY

- To assess ALBI and child Pugh score in CLD patients
- To correlate ALBI, Child Pugh score with renal dysfunction

## MATERIALS AND METHODS

A retrospective cross sectional observational study was done in 299 patients with cirrhosis of liver admitted in Bowring and Lady Curzon hospital attached to Bangalore medical college and research institute, during January 2016 to December 2016.

### Inclusion criteria

- All patients aged above 18 years with chronic liver disease
- Presence of chronic liver disease as evidenced by: abdominal ultrasound(shrunken liver with altered echo texture) and liver profile derangement
- Patients with creatinine more than 1.5

### Exclusion criteria

- HCC

- Patient on nephrotoxic drugs
- Patients with septic shock, UTI, diabetes, Hypertension, underlying CKD

### METHOD OF COLLECTION OF DATA

Patients of chronic liver disease are taken irrespective of cause admitted between 2016 January and 2016 December at Bowring and Lady Curzon hospital were retrospectively reviewed.

Chronic liver disease due to any cause e.g.: hepatitis B, C, malignancy, metabolic causes, autoimmune hepatitis, storage disorders were included.

Routine investigations like CBP, RFT, LFT, serum electrolytes, HIV, HBsAg, HCV, prothrombin time, APTT, Ultrasound of abdomen, upper GI endoscopy and other relevant investigations were noted. Diagnosis of chronic liver disease was established by USG abdomen with shrunken liver with altered echo texture.

Complications like anemia, hepatic encephalopathy, renal dysfunction are noted. ALBI ( $-0.085 \times (\text{albumin g/l}) + 0.66 \times \log (\text{bilirubin } \mu\text{mol/l})$ ), Child-Pugh scores were calculated and compared.

### METHOD OF STATISTICAL ANALYSIS

All statistical analysis were performed using the Medcalc software .Continuous data were expressed as the mean+/- standard deviation(SD) and median with minimum and maximum. Categorical data were expressed as the frequency. Receiving-operative characteristics curve analysis was performed to identify the discriminative ability of the ALBI, Child Pugh scores in predicting renal dysfunction. Areas under the ROC curves were calculated and compared. The best cut off value was selected as the sum of sensitivity and specificity was maximal. Then sensitivity, specificity were reported.

### RESULTS AND ANALYSIS

The sample size in our study was 299 patients. The age distribution was between 20-85 yrs with mean age of patients being 45.7+/-10.94 years (Table 1). 265 were males and 34 were females (Table 2).

**Table-1: Age distribution of patients studied**

	Minimum	Maximum	Mean	Std. Deviation
AGE	20.0	85.0	45.7	10.94

**Table-2: Gender distribution of patients studied**

Gender	Frequency	Percent
Females	34	11.4
Males	265	88.6
Total	299	100.0

**Table-3: Etiology of cirrhosis in study population**

Etiology	Frequency
Alcohol	291(97.3)
HBsAg	8(2.7)

The most common etiology of cirrhosis was alcohol (n=291, 97.3%), followed by HBV infection (n=8, 2.7%) (Table 3)

**Table-4: Percentage of study population with renal dysfunction**

Creatinine	Frequency	Percent
less than 1.5	210	70.2
More than 1.5	89	29.8
Total	299	100.0

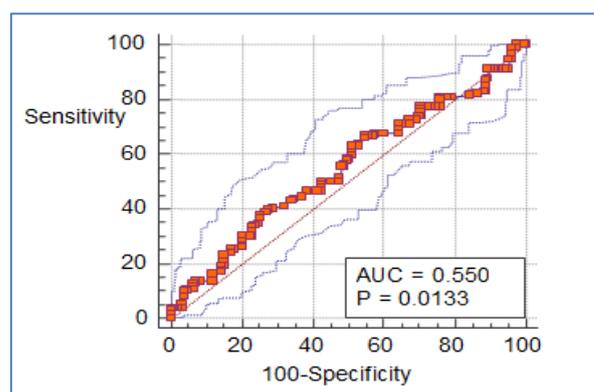
Out of 299, 89(29.8%) patients had a renal dysfunction (Table 4). Mean creatinine was 1.3±1.0 (mg/dL).

**Table-5: Distribution of Child Pugh score in study population**

Child Pugh score	Frequency	Percent
A	12	4.0
B	48	16.1
C	239	79.9
Total	299	100.0

Most of the patients were having child Pugh score C (79.9%)

AUC of the ALBI score for predicting renal dysfunction was 0.550(confidence interval 95%:0.492 to 0.608)( Figure 1).The best cut off value of ALBI score was -0.17, with the sensitivity of 39.7, specificity of 72.55.



**Fig-1: ALBI**

**Table-6**

Area under the ROC curve (AUC)	0.550
Standard Error	0.0335
95% Confidence interval	0.492 to 0.608
z statistic	1.502
Significance level P (Area=0.5)	0.01330

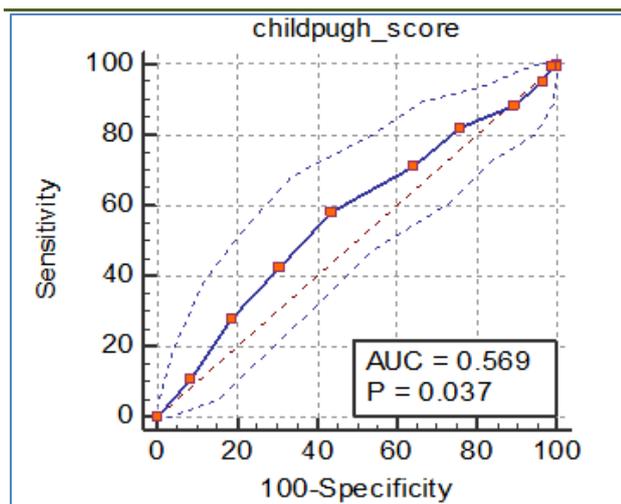


Fig-2: Childpugh score

Table-7

Area under the ROC curve (AUC)	0.569
Standard Error	0.0330
95% Confidence interval	0.511 to 0.626
z statistic	2.084
Significance level P (Area=0.5)	0.0372

AUC of the child Pugh score for predicting renal dysfunction was 0.549(confidence interval 95%:0.05430 to 0.2445)( Figure 2).The best cut off value of child Pugh score was 12 with the sensitivity of 58.22, specificity of 56.2.

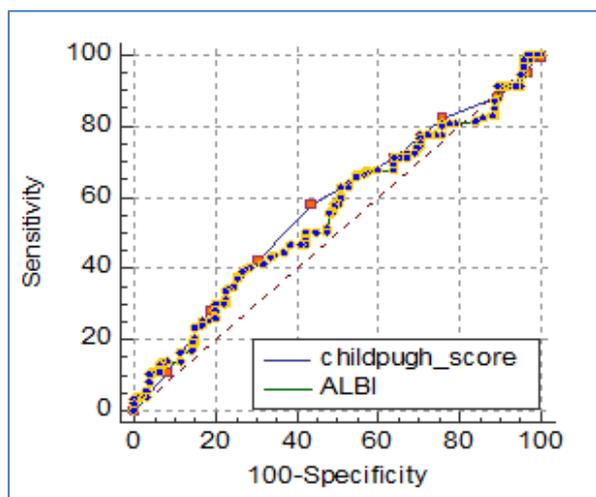


Fig-3: Childpugh score and ALBI

Table-8: Pair wise comparison of ROC curves

Child Pugh score ~ ALBI	
Difference between areas	0.0185
Standard Error	0.0353
95% Confidence Interval	-0.0507 to 0.0878
z statistic	0.524
Significance level	P = 0.6000

The AUC of predicting renal dysfunction was comparable with child Pugh score and ALBI score

(child Pugh and ALBI score P value = 0.600) (Figure 3). The AUC for predicting the renal dysfunction was not significantly different between the ALBI versus Child-Pugh (P=0.600).

## DISCUSSION

Cirrhosis of liver is a major health problem all over the world. Cirrhosis of the liver is often accompanied by functional renal failure particularly in advanced stages of liver disease, associated with significant morbidity and mortality [6]. Renal dysfunction in cirrhosis is due to Alteration in hemodynamic with reduced effective arterial blood volume and peripheral vasodilatation is followed by activation of vasoconstrictive hormones like rennin-aldosterone, vasopressin and neurohumoral systems [7]. Furthermore, infections, aggressive use of diuretics, repeated large volume paracenteses and gastrointestinal hemorrhage often contributes to RD in these patients cause the pronounced reduction in glomerular filtration rate (GFR).

There are several scoring systems available to evaluate the severity of liver dysfunction and predict the prognosis of patients with liver disease, such as the Child–Pugh, MELD and ALBI scores. The Child–Pugh score includes five parameters, total bilirubin, serum albumin, prothrombin time, ascites and hepatic encephalopathy.

The ALBI score only involves 2 common laboratory parameters, albumin and total bilirubin, and it has been used in patients with HCC for assessing the severity of liver dysfunction [8].

In Child Pugh, the highly subjective evaluation of ascites and encephalopathy might reduce the accuracy of assessment [9]. The ALBI score uses the bilirubin and albumin levels to reflect insufficient liver function and new liver damage.

However, to the best of our knowledge, there are studies on Renal dysfunction in liver cirrhosis and its correlation with Child-Pugh score and MELD score but there are no studies on the correlation of ALBI score with renal dysfunction.

This study aimed to retrospectively compare the performance of ALBI with Child-Pugh score for predicting the renal dysfunction in patients with chronic liver disease.

We hypothesized that ALBI is potentially associated with clinical outcomes in cirrhosis patients. Based on this background, we investigated the relationship between the ALBI score and renal dysfunction.

We found that 29.8% of hospitalized patients with cirrhosis were diagnosed as having RD. Mohan *et*

al. observed RD in 22% of cirrhosis case [10]. We found that liver cirrhosis was more frequent in male than female (88.6%) with mean age is 45.7+/-10.94 years. Ira IY *et al.* found that male was the majority (68.8%) with mean age 56.12 years [11].

This study showed statistically significant correlations between renal dysfunction with both Child-Pugh and ALBI score i.e. both the CPS and the ALBI score correlated positively with serum Creatinine. But in the present study ability of ALBI score for predicting renal dysfunction was comparable with that of Child Pugh score (P = 0.6000) i.e. there were no statistically significant Differences. Study done by Nupur Das *et al.* also found a statistically significant relationship between CPS and serum Cr as a parameter of RD [12]. Yun Jung Choi, *et al.* found in the cirrhosis patients with higher severity of cirrhosis, RD was developed much more [13].

## CONCLUSION

- Significant correlations were observed between renal dysfunction with both Child-Pugh and ALBI score i.e. increase in degree of liver severity is related to the increase in renal dysfunction
- Ability of ALBI score for predicting renal dysfunction was comparable with that of Child Pugh score
- Highly subjective evaluation of ascites and encephalopathy in child Pugh might reduce the accuracy of assessment, ALBI includes only two parameters, which can be readily obtained and it is objectively evaluated. Assessment ALBI score helps in predicting renal dysfunction in patients of cirrhosis in where patients are less accessible to higher centres.

The study emphasizes that we should be more vigilant when treating CLD patients, regarding their renal function, as proper screening, prevention, and treatment of renal dysfunction can decrease morbidity and mortality.

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