Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

Assessment of Severity in Decompensated Liver Cirrhosis Using Albumin-Bilirubin (ALBI) Score

Gaurav Singh[1], Ajay Kumar[2]

[1]Postgraduate Student, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.
[2]Professor, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.

Abstract
Background: The simplest, cost-effective, and relatively recent classification of cirrhosis is based on the serum albumin and total bilirubin, the albumin-bilirubin score (ALBI score) which has been found to not only characterize the stage of cirrhosis but can also predict the prognosis with high degree of sensitivity and specificity. As ALBI utilizes two common, easily available, repeatable, and cost-effective blood tests,it is the most preferred and reliable, prognostic score for estimating the mortality rates in patients with last stage of cirrhosis. The aim of this study is to assess of the severity of decompensated liver cirrhosis using albumin-bilirubin (ALBI) score. **Material and Methods:** Inclusion Criteria is Patients >18 years of age and both sex with decompensated liver cirrhosis (known or newly detected) irrespective of etiology. Exclusion Criteria are Patients with acute liver failure, Patients with coexisting chronic kidney disease, Patients with overt proteinuria, Patients being treated for acute infectious disease. **Results:** A total of 100 participants were taken in our study, out of which 74 (74%) were male and 26 (26%) were female. A majority of patients belong to 41-50 yrs group (39%). A total number of 93 (93%) participants did not require oxygen support and the remaining 7 (7%) participants were on oxygen support. Among participants with grade 1 hepatic encephalopathy 8 out of 10 belong (71.4%) to grade 3 ALBI, 11 of 11 (100%) participants from grade 2 hepatic encephalopathy belonged to grade 3 ALBI score, 15 out of 18 (83%) grade 3 HE belongs to ALBI grade 3, 3 out of 5 (60%) from grade 4 HE belongs to ALBI grade 3. The mean albumin in survived patient was 2.48 with standard deviation of 0.49 & in expired patient it mean was 2.58 with standard deviation of 0.63 with p value of 0.415. In Survived patient mean INR was 1.80 with standard deviation of 0.72 & in expired patient mean was 2.27 with standard deviation of 1.12 p value being 0.014. **Conclusion:** Albumin-bilirubin score (ALBI score) is a recently developed score that utilizes the total serum albumin and bilirubin to generate the scores utilized for staging the disease. It has been described to be safe, simple, cost-effective, reliable, reproducible, and repeatable score for staging the severity of cirrhosis as well as predicting the mortality.
Keywords: Albumin-Bilirubin Score, Primary Biliary Cholangitis, Model For End-Stage Liver Diseases.

Corresponding Author: Dr. Gaurav Singh, Postgraduate Student, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.

Introduction

Liver is the largest human body organ which reacts to different form of severe injuries in the form of fibrosis. Continuous fibrosis of liver parenchyma leads to distortion of the architecture affecting its functioning. The end-stage of liver injury irrespective of the cause and duration is cirrhosis.[1,2] Decompensated stage of cirrhosis is characterized by multiple characteristic clinical features and life-threatening complications with mortality rate of as high as 85% over a period of 5years without hepatic transplantation.[3] Thus, it becomes imperative to find out ways of accurately determining the prognosis of patients with cirrhosis in our daily practice. With the aim of characterizing the various stages of cirrhosis in an attempt to reduce the associated morbidity and mortality, several studies have been performed for standardizing its classification based on the extent of hepatic injury and predicting the prognosis based on the variety of clinical features and laboratory tests.[4] The simplest, cost-effective, and relatively recent classification of cirrhosis is based on the serum albumin and total bilirubin, the albumin-bilirubin score (ALBI score) which has been found to not only characterize the stage of cirrhosis but can also predict the prognosis with high degree of sensitivity and specificity.[5,6] ALBI score has been in use for prognosticating patients with primary biliary cholangitis (PBC) providing either superior or prognostic performance at par with other prognostic scores in common use like Child-Turcotte-Pugh (CTP) score, model for end-stage liver diseases (MELD) score.[7] As ALBI utilizes two common, easily available, repeatable, and cost-effective blood tests coupled with the fact that it is comparable to the already existing and used scores like CTP and MELD scores, make ALBI score the most preferred and reliable, prognostic score for estimating the mortality rates in patients with last stage of cirrhosis i.e. ACLF as well as for liver transplantation prioritization.[8] There is no such study to be performed in this part of the world where the cost of investigations are a limiting factor in treatment of the disease.

AIM

This study is aimed to assess the severity of decompensated liver cirrhosis using albumin-bilirubin (ALBI) score.

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

OBJECTIVES

- To identify the patients of decompensated liver cirrhosis admitted in IPD/HDU/ICU
- To grade these patients as per ALBI scoring system
- To evaluate discriminating ability of ALBI score as compared to MELD & CTP score in predicting severity in patients with decompensated liver cirrhosis.
- To assess usefulness of ALBI score in predicting in-hospital mortality in patients of decompensated liver cirrhosis.

Methodology

Inclusion criteria

Patients >18 years of age and both sex with decompensated liver cirrhosis (known or newly detected) irrespective of etiology.

Exclusion Criteria

- Patients not giving written & informed consent.
- Patients with acute liver failure.
- Patients with coexisting chronic kidney disease.
- Patients with overt proteinuria.
- Patients being treated for acute infectious disease.

RESULTS

Table 1: Distribution of study participants according to demographic, clinical and biochemical characteristics

Parameter	Survived (n=73)		Expired (n=27)	
	Mean	SD	Mean	SD
Age	50.44	11.97	45.44	12.84
Duration (in days)	19.30	24.91	29.22	41.38
SBP	119.75	18.30	123.31	21.23
DBP	76.56	12.68	76.89	13.92
Spo2	95.85	3.23	93.15	8.52
Pulse	90.93	16.03	97.48	19.15
Temperature	98.68	0.80	98.83	1.14
HB	8.90	2.66	9.12	3.21
TLC	8214.21	5043.15	13504.44	10635.89
PLT	1.15	1.25	1.45	1.09
SGOT	73.14	48.07	171.17	386.20
SGPT	39.02	28.46	64.33	137.19

The above table shows mean values of demographic, clinical and biochemical characteristics in live and expired group of subjects. The biochemical parameters were higher in expired group of subjects.

Table 2: Distribution of study participants according to ALBI Score and Age

ALBI Grade	1	2	3	Frequency (n=100)
<41	0	6	17	23
41-50	0	6	33	39
51-60	1	3	16	20
> 60	0	7	11	18

The above table shows distribution of study subjects based on Albumin-Bilirubin (ALBI) Score. Majority of subjects (77%) were in grade 3, while 22% were in grade 2 and only 1% in grade 1.

Table 3: Distribution of study participants according to Lymphadenopathy

Lymphadenopathy	Frequency (n=100)	Percentage (%)
Absent	99	99.0
Present	1	1.0

Out of 100 participants, only 1% had Lymphadenopathy.

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

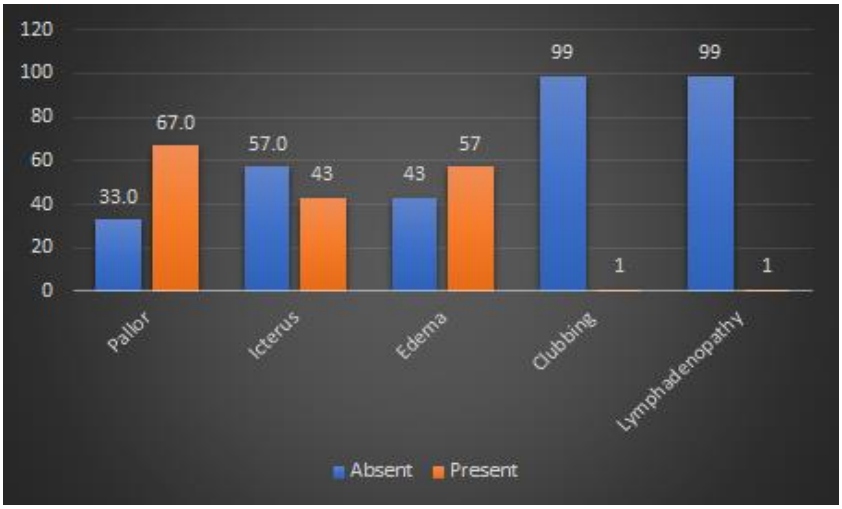

Table 4: Distribution of study participants according to Gender

Gender	Frequency (n=100)	Percentage (%)
Female	26	26.0
Male	74	74.0

Majority of study subjects were male (74%) while 26% were females.

Table 5: Distribution of study participants according to Liver Parameters

Parameter	Survived (n=73)		Expired (n=27)		p-value
	Mean	SD	Mean	SD	
TB	3.31	3.70	7.75	7.81	<0.001
IB	1.39	1.39	2.49	2.34	0.005
DB	1.93	2.55	5.30	5.69	<0.001
Albumin	2.48	0.49	2.58	0.63	0.415
BT	24.62	7.52	30.78	13.70	0.005
CT	14.00	0.00	14.00	0.00	NA
INR	1.80	0.72	2.27	1.12	0.014
ALBI SCORE	-1.07	0.54	-1.06	0.62	0.911
CTP SCORE	9.97	1.99	10.93	2.37	0.047
MELD SCORE	19.00	7.80	25.52	11.16	<0.001

The above table shows mean values of liver parameters in live and expired group of subjects. The liver parameters were higher in expired group of subjects. This difference was statistically significant with p value < 0.05.

Table 6: Distribution of study participants according to ALBI Grade with CTP Grade

ALBI Grade	CTP Grade			Total	p-value
	A	B	C		
1	1	0	0	1	<0.001
2	1	16	5	22	
3	0	25	52	77	
Total	2	41	57	100	

The above table shows distribution of ALBI and CTP score in study subjects. 52% subjects were in ALBI Grade 3 and CTP grade C. This difference was statistically significant with p value < 0.05.

Table 7: Distribution of study participants according to CTP and MELD Grade

CTP Grade	MELD Grade					Total	p-value
	<9	10-19	20-29	30-39	>40		
A	1	1	0	0	0	2	0.006
B	7	20	13	1	0	41	
C	1	19	22	11	4	57	
Total	9	40	35	12	4	100	

The above table shows distribution of CTP and MELD score in study subjects. Majority of subjects (57%) were in grade C of CTP of which 22% were having MELD score in range of 20-29 and 19% were having MELD score in range of 10-19. This difference was found to be statistically significant (p value < 0.05).

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

Table 8: Distribution of mean values of demographic, clinical and biochemical parameters in study participants according to ALBI Grade

ALBI Grade	1	2		3		p-value
	Mean	Mean	SD	Mean	SD	
Age	52.00	53.41	14.59	47.82	11.52	0.169
Duration (in days)	10.00	13.73	18.45	24.49	32.82	0.318
SBP	110.00	121.82	18.68	120.51	19.41	0.823
DBP	70.00	82.27	15.10	75.11	11.97	0.063
Spo2	98.00	96.14	2.78	94.79	5.82	0.501
Pulse	66.00	88.14	13.82	94.35	17.58	0.093
Temperature	98.40	98.58	0.46	98.76	0.99	0.665
HB	11.80	9.40	1.83	8.80	3.02	0.403
TLC	3540.0	8155.45	5382.90	10146.71	7788.35	0.379
PLT	0.40	1.30	1.00	1.22	1.28	0.763
SGOT	24.50	67.89	55.66	109.65	233.20	0.664
SGPT	24.10	43.03	39.91	46.94	83.20	0.938
TB	0.90	1.35	1.14	5.46	5.88	0.005
IB	0.60	0.67	0.50	1.99	1.88	0.005
DB	0.30	0.68	0.73	3.49	4.26	0.009
Albumin	4.10	3.05	0.47	2.33	0.40	<0.001
BT	15.00	22.68	9.96	27.45	9.66	0.070
CT	14.00	14.00	0.00	14.00	0.00	NA
INR	1.20	1.57	0.72	2.04	0.88	0.056
ALBI SCORE	-2.70	-1.78	0.34	-0.84	0.38	<0.001
CTP SCORE	6.00	8.55	1.63	10.77	1.96	<0.001
MELD SCORE	8.00	16.18	7.16	22.23	9.31	0.008

The above table shows distribution of mean values of demographic, clinical and biochemical parameters in study participants according to ALBI Grade. In grade 3 of ALBI, higher scores and liver parameters were observed which were found to be statistically significant (p value < 0.05).

DISCUSSION

This hospital-based, observational, cross-sectional study was carried out on 100 patients admitted to IPD, HDU & ICU attached to the Department of Medicine, Teerthanker Mahaveer medical college and Research Centre over a period of 12 months. A total of 100 participants were taken in our study, out of which 74 (74%) were male and 26 (26%) were female. Among 100 participant 23 (23%) were < 41 yrs, 39 (39%) were 41-50 yrs, 20 (20%) were 51-60 yrs, 18 (18%) were >60 yrs. Most of the participants were between the age group of 41 to 50 yrs. In comparison to ALBI Grade more participants were included in grade 3, among which majority belongs to 41-50 yrs group (39%). A total number of 93 (93%) participants did not require oxygen support and the remaining 7 (7%) participants were on oxygen support. CLD usually presents with signs like pallor, icterus, edema, clubbing, and ascites, which were observed in this study. After statical analysis, out of 100 participants, 67 (67 %) had pallor, 57 (57%) had oedema, whereas ascites was seen in 95 (95%) participants among which 36% were with gross ascites, 30% were with moderate ascites and lastly 29% participants had mild ascites & 5% were not having ascites. In comparison with ALBI score it is noted that majority of the participants were in grade 3, among which 29% were with gross ascites. Hepatic encephalopathy was absent in 56 (56%) participants, whereas 10 (10%) participants had grade 1 Hepatic encephalopathy, 11 (11%) participants had grade 2 Hepatic encephalopathy, 18 (18%) participants had grade 3 hepatic encephalopathy and 5 (5%) participants had grade 4 hepatic encephalopathy. Among participants with grade 1 hepatic encephalopathy 8 out of 10 belong (71.4%) to grade 3 ALBI, 11 of 11 (100%) participants from grade 2 hepatic encephalopathy belonged to grade 3 ALBI score, 15 out of 18 (83%) grade 3 HE belongs to ALBI grade 3, 3 out of 5 (60%) from grade 4 HE belongs to ALBI grade 3.12 (12%) participants had HbsAg reactive, 37 (37%) were HCV reactive, 51 (51%) non-reactive. Out of 100 participants, 1 (1%) participant had grade 1 ALBI, 22 (22%) participants had grade 2 ALBI and 77 (77%) were grade 3 ALBI. According to CTP score 2 (2%) participants had grade A, 41 (41%) participants had grade B, 57 (57%) participants had grade C. According to MELD score, score < 9 had 9 (9 %) participants, 10-19 score had 40 participants, 20-29 score had 35 participants, 30-39 had 12 participants, > 40 had 4 participants. Out of 100 patient with ALBI GRADE 1 had no mortality, grade 2 had no mortality, 5 mortality occurred in grade 3, in ALBI GRADE 1 patients with deranged INR were 0, in ALBI GRADE 2 patients with deranged INR were 15, in ALBI GRADE 3 the patient with deranged INR were 69 with normal INR for 1 patient were in grade 1 ALBI, 7 patients were in grade 2 ALBI, 8 patients were in grade 3 ALBI respectively, Zero patients had deranged creatinine levels in ALBI GRADE 1, 12 patients had deranged creatinine level in ALBI GRADE 2, 40 patients had deranged creatinine level in ALBI GRADE 3. Whereas 1 patient had normal creatinine level in grade 1 ALBI, 10 patients had normal creatinine level in grade 2 ALBI, 47 patients had normal creatinine level in grade 3 ALBI.1 patient had ascites in grade 1 ALBI, 21 patients had ascites in grade 2 ALBI, and 74 patients had ascites in grade 3 ALBI.

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

Whereas no patient in grade 1 ALBI with absent ascites, 1 patient in grade 2 ALBI with absent ascites, 3 patients in grade 3 ALBI with absent ascites. The mean albumin in survived patient was 2.48 with standard deviation of 0.49 & in expired patient it mean was 2.58 with standard deviation of 0.63 with p value of 0.415, mean bilirubin in survived patient was 3.31 with standard deviation of 3.70 & in expired patient mean was 7.75 with standard deviation of 7.81 with p vale being <0.001, survived patient mean INR was 1.80 with standard deviation of 0.72 & in expired patient mean was 2.27 with standard deviation of 1.12 p value being 0.014.[9,10]

Naqvi et al (2019),[11] in their study on 1254 patients investigated the accuracy of CTP, MELD and ALBI scores in predicting in-hospital mortality. The concluded found these scores comparable with sensitivity/specificity of CTP, MELD & ALBI scores being 75%/79.2%, 76.6%/76.7% and 78.1%/78.1% respectively. The authors concluded that ALBI score should be used as an alternative to MELD & CTP scores in daily clinical practice due to easy application. Our study results were similar with ALBI comparable to CTP but slightly superior to MELD scores.

Limitations of the Study

- Hospital based study.
- Low sample volume.
- Single center study.
- Only patients of decompensated phase of cirrhosis were included.
- Single ALBI score (laboratory errors were not accounted).
- Cross-sectional study without follow-up scores
- Short-term outcome during hospital-stay is included
- Majority of the patients in our study were having high or very high ALBI, MELD or CTP scores

CONCLUSION

Cirrhosis in its late stage has a high mortality rate, often needing liver transplantation for further survival. To address the morbidity and mortality related to cirrhosis as well as to predict prognosis especially in terms of the risk of survival, variety of Scoring systems including MELD and CTP scores have been developed that attempt to stage the severity of cirrhosis. Albumin-bilirubin score (ALBI score) is a recently developed score that utilizes the total serum albumin and bilirubin to generate the scores utilized for staging the disease. It has been described to be safe, simple, cost-effective, reliable, reproducible, and repeatable score for staging the severity of cirrhosis as well as predicting the mortality in several studies in recent medical literature including ours, thus helping in prioritizing the liver transplantation. Hence, ALBI scores should be used in daily clinical practice to maximise early detection of cirrhosis patients entering late stages of the disease.

REFERENCES

1. Bircher J, Benhamou JP, McIntyre N, Rizzetto M, Rodes J, editors. Oxford Textbook of Clinical Hepatology. 2nd Edition Oxford University Press; 1999.
2. Chedid MF, Picon RV, Chedid AD. ALBI and PALBI: Novel Scores for Outcome Prediction of Cirrhotic Outpatients Awaiting Liver Transplantation. Ann Hepatol. 2018 Oct 16;17(6):906–7.
3. Schuppan D, Afdhal NH. Liver cirrhosis. Lancet. 2008 Mar 8;371(9615):838–51.
4. Yoon YH, Chen CM. SURVEILLANCE REPORT #114. :88.
5. Johnson PJ, Berhane S, Kagebayashi C, Satomura S, Teng M, Reeves HL, et al. Assessment of liver function in patients with hepatocellular carcinoma: a new evidence-based approach-the ALBI grade. J Clin Oncol. 2015 Feb 20;33(6):550–8.
6. Fujita K, Oura K, Yoneyama H, Shi T, Takuma K, Nakahara M, et al. Albumin-bilirubin score indicates liver fibrosis staging and prognosis in patients with chronic hepatitis C. Hepatol Res. 2019 Jul;49(7):731–42.
7. Chan AWH, Chan RCK, Wong GLH, Wong VWS, Choi PCL, Chan HLY, et al. New simple prognostic score for primary biliary cirrhosis: Albumin-bilirubin score. J Gastroenterol Hepatol. 2015 Sep;30(9):1391–6.
8. Chakrabarti U, Thakur MB. Albumin bilirubin (ALBI) score : a new and simple model to predict mortality in patients of acute on chronic liver failure. J Assoc Physicians India. 2020 Jan;68(1):91.
9. Alsebaey A, Sabry A, Rashed HS, Elsabaawy MM, Ragab A, Aly RA, et al. MELD-Sarcopenia is Better than ALBI and MELD Score in Patients with Hepatocellular Carcinoma Awaiting Liver Transplantation. Asian Pac J Cancer Prev. 2021 Jul 1;22(7):2005–9.
10. Demirtas CO, D'Alessio A, Rimassa L, Sharma R, Pinato DJ. ALBI grade: Evidence for an improved model for liver functional estimation in patients with hepatocellular carcinoma. JHEP Rep. 2021 Oct;3(5):100347.
11. Naqvi IH, Talib A, Mahmood K, Abidi R, Rizvi SNZ. The ability of the new ALBI scoring in predicting mortality, complications and prognostic comparison among cirrhotics. Prz Gastroenterol. 2019;14(4):250–7.