



## Role of albumin-bilirubin score in non-malignant liver disease

Shi-Xue Xu, Fan Yang, Nan Ge, Jin-Tao Guo, Si-Yu Sun

**Specialty type:** Gastroenterology and hepatology

**Provenance and peer review:**

Invited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's scientific quality classification**

Grade A (Excellent): 0  
Grade B (Very good): B  
Grade C (Good): 0  
Grade D (Fair): 0  
Grade E (Poor): 0

**P-Reviewer:** Salkic N, Bosnia and Herzegovina

**Received:** December 14, 2023

**Peer-review started:** December 14, 2023

**First decision:** January 4, 2024

**Revised:** January 12, 2024

**Accepted:** February 18, 2024

**Article in press:** February 18, 2024

**Published online:** March 7, 2024



**Shi-Xue Xu, Fan Yang, Nan Ge, Jin-Tao Guo, Si-Yu Sun**, Department of Gastroenterology, Engineering Research Center of Ministry of Education for Minimally Invasive Gastrointestinal Endoscopic Techniques, Shengjing Hospital of China Medical University, Shenyang 110004, Liaoning Province, China

**Corresponding author:** Si-Yu Sun, MD, PhD, Professor, Department of Gastroenterology, Engineering Research Center of Ministry of Education for Minimally Invasive Gastrointestinal Endoscopic Techniques, Shengjing Hospital of China Medical University, No. 36 Sanhao Street, Shenyang 110004, Liaoning Province, China. [sunsy@sj-hospital.org](mailto:sunsy@sj-hospital.org)

### Abstract

The albumin-bilirubin (ALBI) score, which was proposed to assess the prognosis of patients with hepatocellular carcinoma, has gradually been extended to other liver diseases in recent years, including primary biliary cholangitis, liver cirrhosis, hepatitis, liver transplantation, and liver injury. The ALBI score is often compared with classical scores such as the Child-Pugh and model for end-stage liver disease scores or other noninvasive prediction models. It is widely employed because of its immunity to subjective evaluation indicators and ease of obtaining detection indicators. An increasing number of studies have confirmed that it is highly accurate for assessing the prognosis of patients with chronic liver disease; additionally, it has demonstrated good predictive performance for outcomes beyond survival in patients with liver diseases, such as decompensation events. This article presents a review of the application of ALBI scores in various non-malignant liver diseases.

**Key Words:** Albumin-bilirubin score; Liver cirrhosis; Primary biliary cholangitis; Hepatitis; Liver transplantation; Liver injury

©The Author(s) 2024. Published by Baishideng Publishing Group Inc. All rights reserved.

**Core Tip:** The application of albumin-bilirubin score in liver diseases is not limited to hepatocellular carcinoma. In addition to predicting disease progression, it can also be used to predict survival in other non-malignant liver diseases.

**Citation:** Xu SX, Yang F, Ge N, Guo JT, Sun SY. Role of albumin-bilirubin score in non-malignant liver disease. *World J Gastroenterol* 2024; 30(9): 999-1004

**URL:** <https://www.wjgnet.com/1007-9327/full/v30/i9/999.htm>

**DOI:** <https://dx.doi.org/10.3748/wjg.v30.i9.999>

## INTRODUCTION

The albumin-bilirubin (ALBI) score, obtained by combining serum albumin and bilirubin measurements, was initially proposed by Johnson *et al*[1] for evaluating liver function in patients with hepatocellular carcinoma (HCC). This evidence-based model is calculated based on objective laboratory values with the following formula:  $\text{ALBI score} = 0.66 \times \log_{10} [\text{total bilirubin } (\mu\text{mol})] - 0.085 \times [\text{albumin } (\text{g/L})]$ . Based on this calculation, patients can be stratified into three classes: grade I ( $\leq -2.60$ ), grade II ( $> -2.60$  but  $\leq -1.39$ ), and grade III ( $> -1.39$ )[1].

The Child-Pugh score was the earliest scoring system proposed and applied to assess the prognosis of patients with cirrhosis. It consists of five components: Albumin, bilirubin, prothrombin/international normalized ratio (INR), ascites magnitude, and hepatic encephalopathy stage. An increasing number of researchers have pointed out that the assessment of ascites and hepatic encephalopathy in clinical practice is subjective and lacks objective evaluation standards[2]. In contrast, the ALBI score not only eliminates subjective scoring components (ascites and hepatic encephalopathy) but also evaluates bilirubin and albumin as continuous variables rather than assigning scores based on cutoff values. Compared with the widely used model for end-stage liver disease (MELD) score, which incorporates bilirubin, creatinine, and INR to predict the survival of patients with chronic liver disease, the ALBI score has lower testing costs. The ALBI score has been widely applied in patients with HCC[2] and has gradually been applied in the assessment of nonmalignant liver diseases. This article presents an overview of the application of ALBI scoring in nonmalignant liver diseases.

## ALBI SCORE IN PRIMARY BILIARY CHOLANGITIS

Primary biliary cholangitis (PBC) is an autoimmune liver disease that causes progressive destruction of the intrahepatic bile ducts and is marked by the presence of highly specific anti-mitochondrial autoantibodies in the serum. In the preclinical stage, patients with PBC may remain asymptomatic with normal liver function[3], but due to the risk of progression to cirrhosis and liver failure, it is necessary to identify high-risk subgroups. Progressive elevation of serum bilirubin levels and a decline in liver synthetic function are poor prognostic factors for PBC[4]. The ALBI score not only combines these two factors but is also significantly correlated with histological changes, another poor prognostic factor for PBC[5,6]. In a retrospective study that included 61 patients with primary biliary cirrhosis, Chan *et al*[7] compared the prognostic performance of the Child-Pugh, MELD, Mayo risk, Yale, European, Newcastle, and ALBI scores. The ALBI score outperformed or showed similar prognostic performance to the other models in terms of discriminatory ability, homogeneity, and monotonicity of gradients. It has also been identified as the only independent predictor of these prognostic scores as well as histological stage[7]. Considering the small sample size in this study, a cohort study was performed that included 8768 patients; the authors found that a higher ALBI grade was associated with significantly higher all-cause mortality or the need for liver transplantation (LT), as well as liver-related mortality or the need for LT; the 5-year cumulative LT-free survival rates for patients in the ALBI grades I, II, and III groups were 97.2%, 82.4%, and 38.8%, respectively[6]. Time-dependent receiver operating characteristic curve (ROC) analysis showed that the ALBI score had higher areas under the ROC (AUROCs) than other markers for predicting overall survival and the incidence of LT[8].

The ALBI score also plays a predictive role when the disease progresses to liver cirrhosis. In patients with compensated PBC cirrhosis, a higher ALBI score was independently associated with liver-related mortality or LT and showed comparable or even better diagnostic accuracy for predicting 5-year liver-related mortality than the conventional Mayo risk and MELD scores[9]. Another study that included patients with PBC, 79.9% of whom were in the cirrhotic stage, similarly validated the application of the ALBI score to PBC cirrhosis[10]. Currently, there is a lack of research on the application of the ALBI score in the decompensated PBC cirrhosis population, and future large-scale prospective studies are required to validate its use in this specific population. Additionally, whether the ALBI score can be used to monitor the response of patients with PBC to ursodeoxycholic acid therapy remains unknown.

## ALBI SCORE IN HEPATITIS B VIRAL INFECTION

Hepatitis B imposes a significant medical burden and requires substantial financial resources for its annual management and treatment. The ALBI score has been widely studied and validated as a prognostic indicator in patients with hepatitis B-related liver diseases including chronic hepatitis B, cirrhosis, and acute-on-chronic liver failure. In patients with chronic hepatitis B, the ALBI score is significantly correlated with the fibrosis stage, suggesting that it can be used for both fibrosis staging and distinguishing advanced liver fibrosis from cirrhosis. ALBI scores  $< -2.190$  also correlated with better HCC-free survival[11]. In patients with acute-on-chronic liver failure, a high ALBI score upon admission may serve as a predictor of 3-month mortality[12].

The application of the ALBI score is more extensive in patients with hepatitis B-related cirrhosis. Chen *et al*[13] demonstrated superior predictive ability for long-term prognosis in patients with hepatitis B virus (HBV)-related cirrhosis compared with the Child-Pugh and MELD scores. In contrast, Wang *et al*[14] and Qi[15] found that the ALBI score was not superior to the Child-Pugh or MELD scores in predicting long-term prognosis in patients with HBV-related cirrhosis. In cirrhotic patients with acute-on-chronic liver failure, Peng *et al*[16] suggested that the ALBI score was not applicable for predicting in-hospital mortality, as it demonstrated poor discriminatory power with an AUROC of 0.57 [95% confidence interval (CI): 0.38-0.75;  $P = 0.52$ ].

## ALBI SCORE IN HEPATITIS C VIRAL INFECTION

Similar to its application in chronic hepatitis B, the ALBI score can also be used to diagnose the fibrosis stages in patients with chronic hepatitis C; a lower ALBI score is also associated with better HCC-free survival and overall survival[17]. Another common clinical scenario for hepatitis C infection is when patients receive direct-acting antiviral (DAAs) therapy to achieve viral clearance. In a population of patients with cirrhosis receiving DAA therapy, the ALBI score was significantly associated with the risk of HCC development. ALBI grade is also an independent risk factor for HCC occurrence[18]; even after hepatitis C virus eradication and achievement of sustained virologic response, the ALBI score remains significantly associated with a higher risk of HCC development in patients with hepatitis C virus-related cirrhosis[19,20].

## ALBI SCORE IN ETIOLOGY-UNSPECIFIED CIRRHOSIS

### Mortality

Liver cirrhosis is the end stage of chronic liver disease and is often accompanied by complications such as ascites, variceal bleeding, and hepatic encephalopathy. Individuals with compensated cirrhosis have a five-fold higher mortality risk compared to the general population, while those with decompensated cirrhosis have a ten-fold higher risk[21]. Hsieh *et al* [22] analyzed 242 patients with liver cirrhosis who underwent hemodynamic testing, exploring the value of various non-invasive and hemodynamic indicators in predicting prognosis in patients with liver cirrhosis. Among the various non-invasive scoring systems, the ALBI score demonstrated the strongest correlation with the hepatic venous pressure gradient and showed good predictive performance for 3-month (AUROC = 0.691) and 6-month mortality (AUROC = 0.740). Fragaki *et al*[23] also demonstrated the advantage of using ALBI in predicting the 1-, 2-, and 24-month survival rates in patients with liver cirrhosis (AUROCs = 0.912, 0.781, and 0.780, respectively). In the subgroup of individuals with decompensated cirrhosis, ALBI score was independently associated with death [hazard ratio (HR) = 3.03; 95% CI: 1.92-4.78;  $P < 0.001$ ][23], and higher ALBI grade indicated a significantly higher risk of death/LT (HR = 2.13; 95% CI: 1.59-2.85;  $P < 0.001$ )[24]. The AUROC of the ALBI score for predicting in-hospital mortality was 0.873[25]. In patients with cirrhosis who experience post-banding ulcer bleeding following endoscopic variceal ligation treatment, ALBI grade III was significantly associated with a higher 6-week mortality [odds ratio (OR) = 4.8; 95% CI: 1.18-19.6;  $P = 0.029$ ][26]. In cirrhotic patients who underwent transjugular intrahepatic portosystemic shunt placement, the ALBI score and grade have been identified as significant predictors of 30-d mortality from hepatic failure as well as of overall survival; however, their predictive performance was inferior to that of the MELD score[27].

### Decompensation event

Gastroesophageal varices represent a life-threatening complication of liver cirrhosis, manifesting in 40% of the patients with compensated cirrhosis and in up to 85% of those with decompensated cirrhosis. Left unmanaged, acute variceal bleeding occurs in approximately 12% of cases annually, posing a life-threatening risk to individuals with cirrhosis[28]. Timely identification of patients with liver cirrhosis who are at risk of variceal bleeding is crucial for improving prognosis through primary and secondary prevention measures[29,30]. Miyamoto *et al*[31] further divided ALBI grade II into stages IIa and IIb according to platelet level and found that patients with ALBI grade III had higher risks and rates of gastroesophageal varices compared to those with ALBI grades I-IIa. In addition, in patients who underwent endoscopic treatment for esophageal variceal bleeding, there were significant correlations between ALBI grade III and rebleeding (OR = 2.67; 95% CI: 1.34-5.3;  $P = 0.005$ )[26]. The study conducted by Navadurong *et al*[32] not only explored esophageal variceal bleeding as a decompensated event but also included ascites and hepatic encephalopathy as endpoints of observation. At 3 years of follow-up, time-dependent ROC analysis showed that the ALBI score-predicted decompensation risk was an AUROC of 0.86 (95% CI: 0.78-0.92) in cirrhotic patients. The cumulative incidences of decompensation over 3 years were 3.1%, 22.6%, and 50% in patients with ALBI grades I, II, and III, respectively. The OR for decompensation in patients with ALBI grade III was 23.33[32]. Despite these findings, this study did not analyze different decompensated events as separate endpoints or perform subgroup analysis targeting specific decompensated events.

### Others

The ALBI score can serve not only as a predictive factor but also as an assessment tool to evaluate the current liver function of patients. Zhu *et al*[33] investigated the value of using the ALBI score in patients with cirrhosis undergoing splenectomy for hypersplenism. In this study, the ALBI score was utilized as an indicator to assess the liver function of patients, whereas ALBI grading was used as a predictive factor for postoperative benefits. Their findings indicated that

improvement in liver function after splenectomy may manifest as a decrease in the ALBI score, and this change is more commonly observed in patients classified as ALBI grade II or III.

## ALBI SCORE IN LT

LT has always been considered the best option and only effective treatment for end-stage liver disease; however, owing to the high cost of medical care, scarcity of donor organs, and increasing number of patients awaiting LT, surgical procedures are limited. To improve the outcomes of LT recipients, it is necessary to conduct preoperative evaluations of liver function to screen and identify the most suitable candidates for LT. To this end, several studies have explored the application of the ALBI score in the prognosis of LT. Zhang *et al*[34] divided 272 patients who underwent right lobe LT based on their ALBI grade. Patients with ALBI grade III demonstrated higher susceptibility to bacterial pneumonia and early allograft dysfunction than those with grades I and II. The ALBI score demonstrated a higher predictive accuracy for 30-d mortality (AUROC = 0.702) than the Child-Pugh and MELD scores (AUROCs = 0.669 and 0.540, respectively). Another study demonstrated that ALBI grade III was an independent risk factor for overall survival after LT (HR = 1.836; 95% CI: 1.151-2.921;  $P = 0.010$ ). It also revealed that ALBI grade III was associated with poorer overall survival in patients without HCC who underwent LT; this difference was not observed in patients with HCC[35]. Ma *et al*[36] calculated that the cutoff value of the ALBI score for predicting post-LT survival was -1.48. Patients with ALBI scores > -1.48 had lower overall survival rates and higher incidences of post-LT complications such as biliary complications, intra-abdominal bleeding, sepsis, and acute kidney injury.

## LIVER INJURY

Recently, Chou *et al*[37] explored the application of ALBI score for traumatic liver injury. Research has found that the ALBI score is independently associated with the risk of mortality, and patients with ALBI grade III have significantly higher mortality rates and longer hospital stays compared to those with lower ALBI grades. Their findings suggest that ALBI grade could serve as a valuable tool for categorizing the risk of mortality in adult trauma patients with liver injury.

## CONCLUSION

Recognized for its simplicity and objectivity, the ALBI score is widely employed by clinical physicians for evaluating various liver diseases, not just liver cancer. Compared to the classic Child-Pugh and MELD scores, it exhibits wider applicability because it is more sensitive to subtle liver function changes. Despite these advantages, the ALBI score also has limitations. In certain liver diseases and extrahepatic conditions that can affect bilirubin levels, such as cholangiocarcinoma, intrahepatic bile duct stones, and hemolysis, this scoring system may not be applicable. The ALBI score also does not allow prediction of patient responses to specific treatments, as each patient has unique physiological characteristics, disease conditions, and treatment history. Doctors need to consider relevant indicators and clinical information to comprehensively assess disease status. It is recognized that no single scoring system can fully capture the complexity of a patient's condition, and several aspects of ALBI scoring require further research. The potential applicability of the ALBI score in assessing benign non-liver disease, particularly metabolic disorders, is worth exploring. The correlation between the ALBI score and other liver function indicators such as coagulation function and liver enzyme levels should also be investigated to provide a more comprehensive evaluation of liver function status, which may contribute to better prognosis prediction. Additionally, the application of the ALBI score in predicting treatment response requires further research, such as for its use in guiding clinical medication. In summary, while the ALBI score is an important liver function assessment tool, further research is needed to enhance its application value in clinical practice.

## FOOTNOTES

**Author contributions:** Xu SX, Yang F, Ge N, Guo JT, and Sun SY contributed to this study; Xu SX and Sun SY designed the overall concept and outline of the manuscript; Yang F, Ge N, and Guo JT contributed to the discussion and design of the manuscript; Xu SX and Yang F contributed to the writing and editing of the manuscript, illustrations, and review of the literature.

**Conflict-of-interest statement:** All the authors report no relevant conflicts of interest for this article.

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

**Country/Territory of origin:** China

**ORCID number:** Shi-Xue Xu 0000-0002-9928-6074; Fan Yang 0000-0002-5032-6450; Nan Ge 0000-0002-5764-7054; Jin-Tao Guo 0000-0001-5722-6359; Si-Yu Sun 0000-0002-7308-0473.

**S-Editor:** Wang JJ

**L-Editor:** A

**P-Editor:** Yu HG

## REFERENCES

- Johnson PJ, Berhane S, Kagebayashi C, Satomura S, Teng M, Reeves HL, O'Beirne J, Fox R, Skowronska A, Palmer D, Yeo W, Mo F, Lai P, Iñarrairaegui M, Chan SL, Sangro B, Miksad R, Tada T, Kumada T, Toyoda H. Assessment of liver function in patients with hepatocellular carcinoma: a new evidence-based approach-the ALBI grade. *J Clin Oncol* 2015; **33**: 550-558 [PMID: 25512453 DOI: 10.1200/JCO.2014.57.9151]
- 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; **3**: 100347 [PMID: 34505035 DOI: 10.1016/j.jhepr.2021.100347]
- Lleo A, Wang GQ, Gershwin ME, Hirschfield GM. Primary biliary cholangitis. *Lancet* 2020; **396**: 1915-1926 [PMID: 33308474 DOI: 10.1016/S0140-6736(20)31607-X]
- Lindor KD, Bowlus CL, Boyer J, Levy C, Mayo M. Primary Biliary Cholangitis: 2018 Practice Guidance from the American Association for the Study of Liver Diseases. *Hepatology* 2019; **69**: 394-419 [PMID: 30070375 DOI: 10.1002/hep.30145]
- Fujita K, Nomura T, Morishita A, Shi T, Oura K, Tani J, Kobara H, Tsutsui K, Himoto T, Masaki T. Prediction of Transplant-Free Survival through Albumin-Bilirubin Score in Primary Biliary Cholangitis. *J Clin Med* 2019; **8** [PMID: 31430975 DOI: 10.3390/jcm8081258]
- Yamashita Y, Umemura T, Kimura T, Joshita S, Hirohara J, Nakano T, Komori A, Tanaka A. Prognostic utility of albumin-bilirubin grade in Japanese patients with primary biliary cholangitis. *JHEP Rep* 2023; **5**: 100662 [PMID: 36873419 DOI: 10.1016/j.jhepr.2022.100662]
- Chan AW, Chan RC, Wong GL, Wong VW, Choi PC, Chan HL, To KF. New simple prognostic score for primary biliary cirrhosis: Albumin-bilirubin score. *J Gastroenterol Hepatol* 2015; **30**: 1391-1396 [PMID: 25753927 DOI: 10.1111/jgh.12938]
- Ito T, Ishigami M, Morooka H, Yamamoto K, Imai N, Ishizu Y, Honda T, Nishimura D, Tada T, Yasuda S, Toyoda H, Kumada T, Fujishiro M. The albumin-bilirubin score as a predictor of outcomes in Japanese patients with PBC: an analysis using time-dependent ROC. *Sci Rep* 2020; **10**: 17812 [PMID: 33082429 DOI: 10.1038/s41598-020-74732-3]
- Chen Q, Zhong R, Wang Y, Kui Y, Wen X, Huang J, Jin Q. The Albumin-Bilirubin Score as a Predictor of Liver-Related Mortality in Primary Biliary Cholangitis with Compensated Cirrhosis. *Dig Dis* 2023; **41**: 946-956 [PMID: 37321186 DOI: 10.1159/000531557]
- Feng J, Xu JM, Fu HY, Xie N, Bao WM, Tang YM. Prognostic scores in primary biliary cholangitis patients with advanced disease. *World J Gastrointest Surg* 2023; **15**: 1774-1783 [PMID: 37701680 DOI: 10.4240/wjgs.v15.i8.1774]
- Fujita K, Nomura T, Morishita A, Oura K, Yoneyama H, Kobara H, Tsutsui K, Himoto T, Masaki T. Albumin-Bilirubin Score Differentiates Liver Fibrosis Stage and Hepatocellular Carcinoma Incidence in Chronic Hepatitis B Virus Infection: A Retrospective Cohort Study. *Am J Trop Med Hyg* 2019; **101**: 220-225 [PMID: 31115300 DOI: 10.4269/ajtmh.19-0129]
- Chen B, Lin S. Albumin-bilirubin (ALBI) score at admission predicts possible outcomes in patients with acute-on-chronic liver failure. *Medicine (Baltimore)* 2017; **96**: e7142 [PMID: 28614241 DOI: 10.1097/MD.00000000000007142]
- Chen RC, Cai YJ, Wu JM, Wang XD, Song M, Wang YQ, Zheng MH, Chen YP, Lin Z, Shi KQ. Usefulness of albumin-bilirubin grade for evaluation of long-term prognosis for hepatitis B-related cirrhosis. *J Viral Hepat* 2017; **24**: 238-245 [PMID: 27862671 DOI: 10.1111/jvh.12638]
- Wang J, Zhang Z, Yan X, Li M, Xia J, Liu Y, Chen Y, Jia B, Zhu L, Zhu C, Huang R, Wu C. Albumin-Bilirubin (ALBI) as an accurate and simple prognostic score for chronic hepatitis B-related liver cirrhosis. *Dig Liver Dis* 2019; **51**: 1172-1178 [PMID: 30765220 DOI: 10.1016/j.dld.2019.01.011]
- Qi XT. Albumin-Bilirubin Score Predicts Short-Term Mortality in Patients with Hepatitis B Virus-Related Decompensated Cirrhosis. *Clin Lab* 2018; **64**: 777-783 [PMID: 29739046 DOI: 10.7754/Clin.Lab.2017.171134]
- Peng Y, Qi X, Tang S, Deng H, Li J, Ning Z, Dai J, Hou F, Zhao J, Wang R, Guo X. Child-Pugh, MELD, and ALBI scores for predicting the in-hospital mortality in cirrhotic patients with acute-on-chronic liver failure. *Expert Rev Gastroenterol Hepatol* 2016; **10**: 971-980 [PMID: 27070325 DOI: 10.1080/17474124.2016.1177788]
- Fujita K, Oura K, Yoneyama H, Shi T, Takuma K, Nakahara M, Tadokoro T, Nomura T, Morishita A, Tsutsui K, Himoto T, Masaki T. Albumin-bilirubin score indicates liver fibrosis staging and prognosis in patients with chronic hepatitis C. *Hepatol Res* 2019; **49**: 731-742 [PMID: 30892804 DOI: 10.1111/hepr.13333]
- Casadei Gardini A, Foschi FG, Conti F, Petracci E, Vukotic R, Marisi G, Buonfiglioli F, Vitale G, Ravaioli F, Gitto S, Verucchi G, Lenzi M, Bolondi L, Mazzella G, Brilli S, Andreone P; member of the Bologna DAA group. Immune inflammation indicators and ALBI score to predict liver cancer in HCV-patients treated with direct-acting antivirals. *Dig Liver Dis* 2019; **51**: 681-688 [PMID: 30327251 DOI: 10.1016/j.dld.2018.09.016]
- Caviglia GP, Troshina G, Santaniello U, Rosati G, Bombaci F, Birollo G, Nicolosi A, Saracco GM, Ciancio A. Long-Term Hepatocellular Carcinoma Development and Predictive Ability of Non-Invasive Scoring Systems in Patients with HCV-Related Cirrhosis Treated with Direct-Acting Antivirals. *Cancers (Basel)* 2022; **14** [PMID: 35159094 DOI: 10.3390/cancers14030828]
- Tanaka Y, Ogawa E, Huang CF, Toyoda H, Jun DW, Tseng CH, Hsu YC, Enomoto M, Takahashi H, Furusyo N, Yeh ML, Iio E, Yasuda S, Lam CP, Lee DH, Haga H, Yoon EL, Ahn SB, Wong G, Nakamura M, Nomura H, Tsai PC, Jung JH, Song DS, Dang H, Maeda M, Henry L, Cheung R, Yuen MF, Ueno Y, Eguchi Y, Tamori A, Yu ML, Hayashi J, Nguyen MH; REAL-C Investigators. HCC risk post-SVR with DAAs in East Asians: findings from the REAL-C cohort. *Hepatol Int* 2020; **14**: 1023-1033 [PMID: 33277685 DOI: 10.1007/s12072-020-10105-2]
- Ginès P, Krag A, Abiralde JG, Solà E, Fabrellas N, Kamath PS. Liver cirrhosis. *Lancet* 2021; **398**: 1359-1376 [PMID: 34543610 DOI: 10.1016/S0140-6736(21)01374-X]
- Hsieh YC, Lee KC, Wang YW, Yang YY, Hou MC, Huo TI, Lin HC. Correlation and prognostic accuracy between noninvasive liver fibrosis markers and portal pressure in cirrhosis: Role of ALBI score. *PLoS One* 2018; **13**: e0208903 [PMID: 30540824 DOI: 10.1371/journal.pone.0208903]

- 10.1371/journal.pone.0208903]
- 23 **Fragaki M**, Sifaki-Pistolla D, Orfanoudaki E, Kouroumalis E. Comparative evaluation of ALBI, MELD, and Child-Pugh scores in prognosis of cirrhosis: is ALBI the new alternative? *Ann Gastroenterol* 2019; **32**: 626-632 [PMID: 31700241 DOI: 10.20524/aog.2019.0417]
- 24 **Oikonomou T**, Goulis L, Doumts P, Tzoumari T, Akriviadis E, Cholongitas E. ALBI and PALBI Grades Are Associated with the Outcome of Patients with Stable Decompensated Cirrhosis. *Ann Hepatol* 2019; **18**: 126-136 [PMID: 31113581 DOI: 10.5604/01.3001.0012.7904]
- 25 **Deng H**, Qi X, Peng Y, Li J, Li H, Zhang Y, Liu X, Sun X, Guo X. Diagnostic Accuracy of APRI, AAR, FIB-4, FI, and King Scores for Diagnosis of Esophageal Varices in Liver Cirrhosis: A Retrospective Study. *Med Sci Monit* 2015; **21**: 3961-3977 [PMID: 26687574 DOI: 10.12659/msm.895005]
- 26 **Chen CW**, Kuo CJ, Lee CW, Kuo T, Chiu CT, Lin CJ, Lim SN, Yeh CT, Lin WR. Albumin-Bilirubin Grade as a Novel Predictor of the Development and Short-Term Survival of Post-Banding Ulcer Bleeding Following Endoscopic Variceal Ligation in Cirrhotic Patients. *Medicina (Kaunas)* 2022; **58** [PMID: 36557038 DOI: 10.3390/medicina58121836]
- 27 **Ronald J**, Wang Q, Choi SS, Suhocki PV, Hall MD, Smith TP, Kim CY. Albumin-bilirubin grade versus MELD score for predicting survival after transjugular intrahepatic portosystemic shunt (TIPS) creation. *Diagn Interv Imaging* 2018; **99**: 163-168 [PMID: 29154015 DOI: 10.1016/j.diii.2017.10.008]
- 28 **Tang L**, Li X, Cui J, Huang LY. EUS-guided coil placement and cyanoacrylate glue injection for gastric variceal bleeding with obvious spontaneous portosystemic shunts. *Endosc Ultrasound* 2023; **12**: 84-89 [PMID: 36510864 DOI: 10.4103/EUS-D-22-00006]
- 29 **Huang Z**, Zhang W, Lv F, Ma L, Xiao Y, Gao S, Zhang M, Wang Y, Li P, Zhao H, Yu H, Cao J, Ke G, Chen M. Efficacy and safety of EUS-guided coil embolization combined with endoscopic cyanoacrylate injection versus balloon-occluded retrograde transvenous obliteration for gastric varices with high-risk ectopic embolism: A multicenter and retrospective cohort study. *Endosc Ultrasound* 2023; **12**: 74-83 [PMID: 36510863 DOI: 10.4103/EUS-D-21-00260]
- 30 **Chandan S**, Nguyen AK, Mohan BP, Deliwala S, Ramai D, Kassab LL, Muthusamy A, Facciorusso A, Kamal F, Bilal M, Samanta J, Adler DG. EUS-guided therapies for primary and secondary prophylaxis in gastric varices-An updated systematic review and meta-analysis. *Endosc Ultrasound* 2023; **12**: 351-361 [PMID: 37795350 DOI: 10.1097/eus.000000000000017]
- 31 **Miyamoto Y**, Enomoto H, Nishikawa H, Nishimura T, Iwata Y, Nishiguchi S, Iijima H. Association of the Modified ALBI Grade With Endoscopic Findings of Gastroesophageal Varices. *In Vivo* 2021; **35**: 1163-1168 [PMID: 33622916 DOI: 10.21873/in vivo.12364]
- 32 **Navadurong H**, Thanapirom K, Wejnaruemarn S, Prasoppokakorn T, Chaiteerakij R, Komolmit P, Treeprasertsuk S. Validation of the albumin-bilirubin score for identifying decompensation risk in patients with compensated cirrhosis. *World J Gastroenterol* 2023; **29**: 4873-4882 [PMID: 37701131 DOI: 10.3748/wjg.v29.i32.4873]
- 33 **Zhu Q**, Chen D, Lou Y, Xie X, Wu Y, Wang Z, Sun H. Baseline ALBI Grade Predicts Benefits After Splenectomy for Cirrhotic Patients with Hypersplenism. *J Gastrointest Surg* 2023; **27**: 1130-1140 [PMID: 36759386 DOI: 10.1007/s11605-023-05610-2]
- 34 **Zhang W**, Liu C, Tan Y, Tan L, Jiang L, Yang J, Yan L, Wen T. Albumin-Bilirubin Score for Predicting Post-Transplant Complications Following Adult-to-Adult Living Donor Liver Transplantation. *Ann Transplant* 2018; **23**: 639-646 [PMID: 30201946 DOI: 10.12659/AOT.910824]
- 35 **Bernardi N**, Chedid MF, Grezzana-Filho TJM, Chedid AD, Pinto MA, Leipnitz I, Prediger JE, Prediger C, Backes AN, Hammes TO, Guerra LT, de Araujo A, Alvares-da-Silva MR, Kruel CRP. Pre-transplant ALBI Grade 3 Is Associated with Increased Mortality After Liver Transplantation. *Dig Dis Sci* 2019; **64**: 1695-1704 [PMID: 30637547 DOI: 10.1007/s10620-019-5456-6]
- 36 **Ma T**, Li QS, Wang Y, Wang B, Wu Z, Lv Y, Wu RQ. Value of pretransplant albumin-bilirubin score in predicting outcomes after liver transplantation. *World J Gastroenterol* 2019; **25**: 1879-1889 [PMID: 31057301 DOI: 10.3748/wjg.v25.i15.1879]
- 37 **Chou SE**, Rau CS, Su WT, Tsai CH, Hsu SY, Hsieh CH. The Association of Albumin-Bilirubin (ALBI) Grade with Mortality Risk in Trauma Patients with Liver Injuries. *Risk Manag Healthc Policy* 2023; **16**: 279-286 [PMID: 36875171 DOI: 10.2147/RMHP.S397210]



Published by **Baishideng Publishing Group Inc**  
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

**Telephone:** +1-925-3991568

**E-mail:** [office@baishideng.com](mailto:office@baishideng.com)

**Help Desk:** <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

