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ORIGINAL ARTICLE

Usefulness of albumin bilirubin platelet score as a predictor tool for risk esophageal varices in patients with compensated cirrhosis presenting in a Tertiary Care Hospital.

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ABSTRACT… Objective: To determine the accuracy of albumin bilirubin platelet (ALBI-PLT) score to predict risk esophageal varices in patients presented with compensated cirrhosis in tertiary care hospital. **Study Design:** Cross-sectional study. **Setting:** Department of Gastroenterology, Liaquat National Hospital, Karachi, Pakistan. **Period:** February 2024 to August, 2024. **Methods:** Total 165 Patients of both genders were included. The albumin-bilirubin (ALBI) grade and platelet count were added to determine the ALBI-PLT score. The esophageal varices were expected as "present", when ALBL-PLT score >3. Data were compiled and analyzed using IBM-SPSS Statistics, version 26.0. Receiver operating characteristic (ROC) curve analysis of ALBI score grades and ALBI-PLT score grades was used for detection of the cutoff value. Sensitivity, specificity, and predictive values were calculated for the cut off. **Results:** In a total 165 patient, 149 (90.3%) had esophageal varices. Among these 165 patients, 57 (38.3%) had amall esogphageal varices. Mean ALBI, and ALBI-PLT were 0.017±0.300, and 4.28±0.75 respectively. ALBI-PLT was found to have excellent ability to diagnose patients with and without esophageal varices based on the ROC (AUC=0.916). The sensitivity, and specificity for ALBI-PLT ≥2.0, ALT-PLT≥3.50, and ALBI-PLT≥4.50 were 100% and 0%, 89.3% and 87.5%, and 51.7% and 100%, respectively. **Conclusion:** This study demonstrates that ALBI-PLT score was found to have excellent ability to diagnose patients with and without esophageal varices.

Key words: Accuracy, Albumin, Bilirubin, Cirrhosis, Esophageal Varices, Platelet.

INTRODUCTION

An increase in portal pressure caused the development of esophageal varices (EV), and the bleeding from these varices can be occurred when the hepatic venous pressure gradient (HVPG) is larger than 10 mmHg.[1,2] Approximately 60-80% of individuals with newly diagnosed cirrhosis have EV, and the 1-year risk of first variceal bleeding is roughly 5% for small EV and 15% for big EV.[3]

EVs depending on clinical stage may impact over 50% of individuals with cirrhosis, making them a significant consequence.[4,5] Between 30 and 40 percent of individuals with cirrhosis of compensated type and up to 85 percent of patients with cirrhosis of decompensated type have EVs.[6] New varices occur in people with compensated cirrhosis at a rate of 7% to 8% annually.[7] Patients with minor varices are more likely to experience bleeding because they can grow into major varices at a rate of 10-12% annually.[8]

Portal hypertension (PH) in patients with cirrhosis can be subclinical (HVPG <6 to 10mmHg) or clinically significant (CSPH) (HVPG greater than 10mmHg), which is further divided into severe (HVPG greater than 12mmHg) and extremely severe (HVPG greater than 16mmHg). Portal hypertension, or PH, causes a significant hemodynamic disturbance in advanced cirrhosis, which in turn causes noticeable splanchnic vasodilation and often high HPVG > 16 mmHg.[9,10] Stomach varices, variceal size, and portal hypertensive gastropathy can be identify by doing endoscopy.

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Variceal elimination techniques such band ligation and glue obturation of stomach varices are made possible by endoscopy.[11,12] Endoscopies are expensive and uncomfortable for patients, particularly if they are performed without conscious anesthesia. It is therefore necessary to use noninvasive techniques for variceal detection.

The albumin-bilirubin (ALBI) score was developed by Johnson et al.[13] in which he utilized bilirubin and albumin, the two laboratory variables, without the use of subjectively assessed (such ascites and encephalopathy) or otherwise acquired. In order to quantify liver function reserve, Roayaie et al.[14] suggested in recent years that the ALBI score be modified by adding the platelet (PLT) count.

Combining PLT count and albumin-bilirubin grade is a recently discovered, straightforward, and objective grading approach.[15] Albumin-bilirubin platelet (ALBL-PLT) count points and grade and are calculated to determine the ALBI-PLT score (1-point for PLT greater than 150,000/mm^3 and 2-points for PLT$\leq$ 150,000/mm^3).[16,17] In a study, one hundred and twenty patients had an ALBL-PLT score greater than three. Of these, 96 patients have high-risk varices (HRVs). Every HRV patient has an ALBL-PLT score greater than 3. Accordingly, an ALBL-PLT score greater than three offers 100% sensitivity, 78% specificity, 80% PPV, 100% negative predictive value, and 0.894 AUC in HRV prediction. With this score, 84 patients (41.1%) can avoid EGD because none of them had HRVs during endoscopy.[18] This study was done to determine whether individuals do not require endoscopic screening for EV and to confirm the value of the ALBI-PLT score in predicting HRV in patients with compensated cirrhosis.

METHODS

This cross sectional study was conducted at Department of Gastroenterology, Liaquat National Hospital and Medical College, Karachi during February to August, 2024. The research proposal was approved by the Research and Ethics Committee of Liaquat National Hospital (App#0974-2023-LNH-ERC). Participants were explained about the study purpose and its associated risk and benefits, before obtaining written and informed consent from participants. Total 165 patients were included in the study. The sample size was calculated by using prevalence of all grades EV 65%[18], sensitivity of ALBI-PLT score 77.34%[11], specificity 72.93%[11], and 95% confidence interval. A non-probability consecutive sampling was applied for sampling. Patients were not included with hepatic decompensation, child-Pugh C class, hepatocellular carcinoma's previous or recent history, on portal hypertension treatment, and positive portal vein thrombosis.

Patients of both genders having age between 30-70 years, diagnosed with compensated liver cirrhosis were analyzed. Laboratory investigations were done to calculate the ALBL-PLT. By adding the ALBI grade and PLT count, ALBI-PLT score was calculated. The formula [$-0.085 \times$ (albumin g/L) $+ 0.66 \times \log$ (bilirubin µmol/L)] was applied to construct the ALBI score. ALBI-1 was considered positive when ALBI score was ≤ -2.60, ALBI-2 was considered when the score was within the range from $-$ 2.59 to -1.39, and ALBI-3 was considered when score greater than -1.39.[17] The value 150,000/mm^3 is the cutoff value for PLT. A single number (1 point) was assigned if PLT$>$150,000/mm^3 and double number (2 points) were given if it was less than or equal to 150,000/mm^3. The range of the score was from 2 to 5.[19]

EV screening was done by endoscopy under the supervision of supervisor consultant Gastroenterologist. The Gastroenterologist examined the images to detect enlarged veins and graded them by size. Red wale sign was a sign of bleeding. EV were expected as "present", when the ALBL-PLT score >3. EV were expected "absent", when the ALBL-PLT score ≤ 3. High risk varices (HRVs) were classified in three categories according to size i.e. moderate, large, small with red wale sign.[8]

After six hours of fasting, liver stiffness was assessed using transient elastography (FibroScan). The tip of the M-size probe transducer was placed on the skin between the rib bones at the level of the liver's right lobe. Kilo Pascals (kPa) were used to determine the results;

a value of > 14 kPa indicated cirrhosis, whereas a value of < 14 indicated no cirrhosis. If ≥14 (kpa) valid readings were obtained, the test was deemed reliable.

Patient's data were analyzed by IBM-SPSS Statistics, version 26. On further evaluation of the data other variables analyzed by Shapiro wilk's test. Mean±SD was calculated for quantitative variables i.e. age, weight, hemoglobin, serum total bilirubin, serum albumin, serum creatinine, ALT, AST, PLT, ALBI score, and ALBI-PLT score. Median (IQR) was reported if the data was non normal. Frequency and percentage were computed for qualitative variables such as gender, obesity, anemia, smoking, HCV serology, Hbsag, ALBI score grades, and ALBI-PLT score grades. The cutoff value for the grading of EV was found using the receiver operating characteristic (ROC) curve analysis of ALBI score grades and ALBI-PLT score grades. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated for each cut off.

RESULTS

The current study comprised 165 patients in total, of whom 99 (60%) were male. The mean age, and weight were 55.83±11.69 years, and 71.92±15.49 kg, respectively. Thirty-six (21.8%) patients were obese, 117 (70.9%) had anemia, 80 (48.5%) had anti-HCV, 28 (17%) had HbsAg, 3 (1.8%) had both anti-HCV and HbsAg, and 149 patients (90.3%) had EV (Table-I).

Mean hemoglobin, Total bilirubin, Albumin, alanine transaminase, aspartate aminotransferase and PLT were 11.92±1.36 g/dl, 2.48±2.45 g/dl, 2.58±0.43 d/l, 1.04±0.87 mg/dl, 155.03±109.23 IU/L, 91.24±82.81 IU/L and 183.3±83.47/ µL respectively. In our study mean ALBI and ALBI-PLT was 0.017±0.300 and 4.28±0.75 respectively (Table-II).

ALBI-PLT was found to have excellent ability to diagnose patients with and without EV based on the ROC curve (AUC=0.916) as shown in Figure-1. From Table-3, the corresponding sensitivity and specificity for ALBI-PLT≥2.000, ALT-PLT≥3.50, and ALBI-PLT≥4.50 were 100% and 0%, 89.3% and 87.5%, and 51.7% and 100%, respectively.

	Frequency (%)
Gender	
Male	99(60)
Female	66(40)
Obesity	
Yes	36(21.8)
No	129(78.2)
Anemia	
Yes	117(70.9)
No	48(29.1)
Anti HCV	
Positive	80(48.5)
Negative	85(51.5)
Hbsag	
Positive	28(17)
Negative	137(83)
Anti HCV and Hbsag	
Positive	3(1.8)
Negative	60(36.4)
At least one positive	102(61.8)
Esophageal varices	
Yes	149(90.3)
No	16(9.7)
Esophageal varices severity (n=149)	
Small esophageal varices	57(38.3)
Medium esophageal varices	21(14.1)
Large esophageal varices	71(47.7)

Table-I. Descriptive statistics of qualitative characteristics (n=165)

	Mean ± Std. Dev	Min to Max
Age (years)	55.83±11.69	17 to 87
Weight(kg)	71.92±15.49	36 to 123
Haemoglobin (g/dl)	11.92±1.36	8.6 to 15.2
Total bilirubin (g/dl)	2.48±2.45	0.3 to 15.6
Albumin(g/dl)	2.58±0.43	1.3 to 3.5
Creatinine(mg/dl)	1.04±0.87	0.2 to 9.1
Alanine transaminase (IU/L)	155.03±109.23	32 to 739
aspartate aminotransferase (IU/L)	91.24±82.81	22 to 589
Platelet count	183.3±83.47	75 to 432
Albumin-Bilirubin	0.017±0.3	-0.94 to 1.9
Albumin-Bilirubin Platelet	4.28±0.75	3 to 5

Table-II. Descriptive statistics of demographic and laboratory parameters

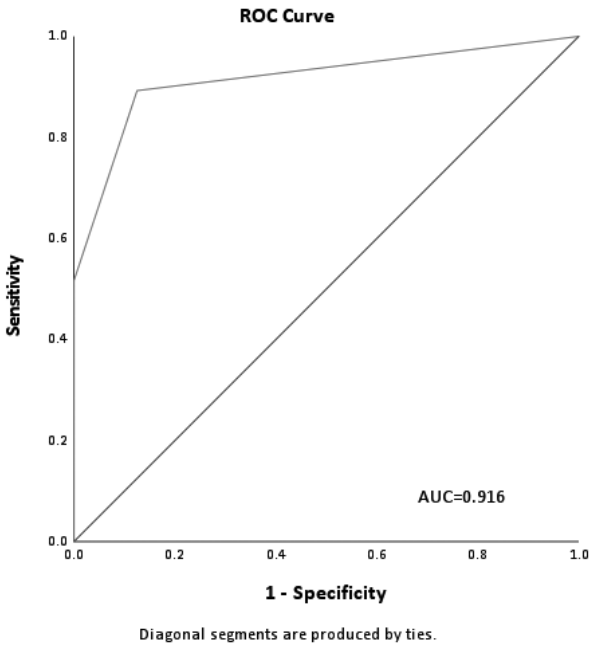

Figure-1. Receiver operating characteristic (ROC) curve for ALBI-PLT

Test Result Variable(s): ALBI-PLT score		
Positive if Greater Than or Equal To[a]	**Sensitivity (%)**	**Specificity (%)**
2.0000	100	0
3.5000	89.3	87.5
4.5000	51.7	100

Table-III. Predictive values of ALBI-PLT score for detection of esophageal varices

DISCUSSION

EV are one of the most frequent and dangerous complications, and more patients pass away from their bleeding each year.[21] The mortality rate can be considerably decreased by identifying the severity of gastric and EV as soon as possible and implementing preventive measures. The most effective method for detecting stomach and EV is gastroscopy. Nonetheless, prediction of gastric and EV and their degrees by non-invasive indexes has gained a lot of attention. One of the most prevalent symptoms of liver cirrhosis is a decreased PLT. Studies have demonstrated that the PLT can predict EV, and data indicate that around 84.0% of individuals with liver cirrhosis had low PLT count.[22]

According to a study, the PLT count in the group with EV was considerably lower than that of the group with non EV, and it progressively dropped as EV worsened. Additionally, Kumar et al.[23] discovered a substantial correlation between the PLT count and moderate and severe EV (large EV, or LEV), which was essentially in line with the findings of a prior research.[20]

Blood cell counts in individuals with EV bleeding (EGVB) and peptic ulcer bleeding (PUB) were studied by Zhang et al.[24] The EGVB group's PLT was discovered to be much lower than the PUB group's. It has a more accurate and dependable diagnostic value and is a promising biomarker to differentiate PUB from EGVB. Consequently, the degree of collateral veins and EV may be predicted using the PLT count level.

According to a different research, endoscopic results and the PALBI (plateletes-albumin-bilirubin) score were a reliable indicator of the existence of EV. In this sense, it had a good diagnostic accuracy and was sensitive. Patients with high-risk and EV had considerably higher mean PALBI scores.[25] The original purpose of this test was to forecast the results of hepatocellular cancer interventional treatment.[11] Few studies have examined the PALBI score as a marker of varices, despite the fact that it is believed to more accurately represent portal hypertension since it includes the PLT.[26]

The ALBI grade from I to grade III and PLT grade from I to grade II were combined by Chen et al.[19], resulting in a total between 2 and 5. ALBI grade II > I was frequently associated with HRVs. For the detection of HRVs, an ALBI PLT score more than 2 exhibited sensitivity 90%, specificity 27%, PPV 21%, and NPV 97%. Because ABLI-PLT can distinguish between individuals who have HRVs, it provides a straightforward non-invasive screening method that eliminates the need for needless endoscopy. In patients with EVs, elevated blood bilirubin, portal vein diameter, and reduced serum albumin, hemoglobin, WBCs, and PLT are indicative of PHTN, liver failure, and splenic sequestration or hypersplenism.[26]

According to our research, the ALBI-PLT score

had a high diagnostic accuracy for both EV and those without (AUC=0.916). It may be used on all CLD patients and is non-invasive and economical. Thus, in the future, these diagnostics may take the role of needless endoscopies.

CONCLUSION

ALBI-PLT score was found to have excellent ability to diagnose patients with and without esophageal varices based on the ROC curve. The corresponding sensitivity and specificity was high which supports our hypothesis. Therefore the platelet-to-white blood cell ratio is simple hematologic parameter that might be a good surrogate marker.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Baseer Ahmad:** Conceptualized the study, Involved in data collection, Initial manuscript writing.
2	**Rajesh Kumar:** Designed the study protocol, Critically revised.
3	**Shahid Karim:** Designed the study, Protocol initial manuscript draft.
4	**Mir Nosherwan Khan:** Involved in data collection, Initial manuscrupt writing.
5	**Baby Anbreen:** Involved in data collection, Data analysis and result writing.
6	**Mehreen Akmal:** Involved ind data collection, Data analysis and result writing.