Original Article
DOI: https://doi.org/10.70749/ijbr.v3i4.2462

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://ijbr.com.pk
ISSN: 2960-2793/ 2960-2807

Platelets Count /Spleen Diameter Ratio in Prediction of Esophageal Varices in Patients with Liver Cirrhosis

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ARTICLE INFO

Keywords: Cirrhotic Patients, Esophageal Varices, Platelet Count, Spleen Diameter, Sensitivity.

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Declaration
Authors' Contribution
All authors equally contributed to the study and approved the final manuscript

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 19-01-2025 Revised: 03-04-2025
Accepted: 18-04-2025 Published: 30-04-2025

ABSTRACT

Objectives: Endoscopy is the gold standard for determining the diagnostic accuracy of the platelet count/spleen diameter ratio in predicting esophageal varices in individuals with liver cirrhosis. **Study Type:** Cross-sectional (validation) study. **Settings:** Department of Medicine, Allied Hospital, Faisalabad. **Study Period:** 24th June 2024 to 23rd December 2024. **Methodology:** The study comprised 199 patients aged 18 to 80 years presenting with liver cirrhosis having suspected esophageal varices. Patients with a h/o previously treated esophageal varices, hepatocellular cancer, and portal vein thrombosis were excluded. Every patient had a blood sample taken for the platelet count, which was then forwarded to the hospital lab for analysis. The ratio of platelet count to spleen diameter was computed for each patient using the formula PSR=platelet count (N/mm3)/spleen diameter (mm). For esophageal varices, a PSR ratio of less than 0.909 was considered favorable. The diagnostic accuracy of the platelet count/spleen diameter ratio was computed and compared with the results of endoscopy. **Results:** PSR values with sensitivity of 87.50%, specificity of 89.32%, PPV of 88.42%, NPV of 88.46%, and diagnostic accuracy of 88.44% were used to identify the esophageal varices. **Conclusion:** According to our findings, the platelet count/spleen diameter ratio is a reliable indicator of whether EV is present or absent in individuals with hepatic cirrhosis.

INTRODUCTION

Cirrhosis is a long-term liver condition that causes extensive fibrosis and changes in the liver's normal acinar and/or lobular structure. This can happen with or without the production of nodules, regeneration, or degeneration.[1] In individuals with cirrhosis, oesophageal varices are common (60–80%) and a substantial cause of bleeding in 25–30% of cases.[2] The fatality rate from variceal hemorrhage varies from 17% to 57%. Therefore, lowering morbidity and mortality requires early diagnosis of esophageal varices.[3]

Endoscopy is still the most reliable method for both diagnosing and treating esophageal varices. Although screening endoscopy for varices is recommended, its cost-effectiveness for individuals with compensated cirrhosis has not yet been established.[4] It would be easier to limit endoscopic procedures to patients who have a high likelihood of having esophageal varices if noninvasive techniques were used to detect their presence. In low-risk situations, recent research has highlighted the use of non-invasive techniques to identify patients with the goal of avoiding endoscopy.[5]

One of the greatest non-invasive predictors of EVs is the platelet count/spleen diameter ratio (PSR), which Giannini et al. proposed with a cutoff value of 90.9. Since then, a growing number of studies have assessed PSR's accuracy in detecting varices, while their findings have been mixed.[6]

For cirrhosis patients, Zafar SA et al. looked into the diagnostic accuracy of PSR for detecting esophageal varices. In cirrhosis patients, 131 (60.93%) have esophageal varices. The calculated accuracy rate, sensitivity, specificity, PPV, and NPV were, in that order, 96.95%, 95.24%, 96.88%, 91.95%, and 94.88%.[7]

Some clinicians are hesitant whether or not to use PSR because it may not be invasive or expensive, but there is disagreement over its results and local statistics. The goal of this study was to find out how well the ratio of platelet count to spleen diameter can tell if a person with cirrhosis has esophageal varices. If the platelet count/spleen

diameter ratio is shown to be a good way to find esophageal varices in patients, we will suggest that our clinical practice use it as part of the diagnostic workup for cirrhotic patients.

METHODOLOGY

199 patients with live cirrhosis who presented to the medicine department of Allied Hospital in Faisalabad between the ages of 18 and 80 were the subjects of this cross-sectional validation study. The diagnosis of cirrhosis will be made based on the following criteria: radiological parameters (Nodular liver cirrhosis, contracted liver) biochemical parameters (high bilirubin, SGOT, SGPT, and low albumin), and clinical features (symptoms like jaundice and skin yellowing, upper right abdominal pain, nausea, vomiting, and nausea). With a sensitivity and specificity of 95%, a prevalence of HCC esophageal varices of 60.93%[7], an absolute precision of 5%, an expected sensitivity of 96.95%[7], an expected specificity of 95.24%[7], and a sample size of 199, the sample size was determined using a sample size calculator. Patients were selected using a non-random consecutive sampling technique. Patients with a h/o previously treated esophageal varices, hepatocellular cancer, and portal vein thrombosis were not included.

Following institutional ethical review committee and CPSP permission, the trial was initiated. Before being included in the study, all parents gave their informed consent after being informed of its goals and assured of the confidentiality of the data. Name, age, sex, and address were among the demographic details that were noted. Every patient had a blood sample taken for the platelet count, which was then forwarded to the hospital lab for analysis. The radiology department performed the ultrasound to determine the spleen's diameter. The ratio of platelet count to spleen diameter was computed for each patient using the formula PSR=platelet count (N/mm3)/spleen diameter (mm). For esophageal varices, a PSR ratio of less than 909 was considered favorable. Positive and negative labels were applied to the patients. Consultant gastroenterologists performed endoscopy and labeled any esophageal varices that were found. These were classified using the Paquet grading system as either convoluted, occasionally grape-like varices that occupied the esophagus lumen or conspicuous varices that were locally coil-shaped and partially occupied the lumen. For every patient, the existence and extent of esophageal varices were assessed and documented. The diagnostic accuracy of the PSD ratio was computed and compared with the results of endoscopy.

SPSS version 25 was used to transfer and analyze all of the gathered data. For every quantitative measure, including age, the mean and standard deviation were determined. All qualitative variables, including gender, the cause of liver cirrhosis, and esophageal varices, had their frequencies and percentages determined. To calculate sn, sp, PPV, NPV, and DA, a 2x2 table was constructed as follows: Accuracy of diagnosis was also computed. Using stratification, effect modifiers like age, gender, and etiology were computed. Diagnostic accuracy after stratification was computed. A P value of 0.05 or less was considered significant. The ROC curve was also computed.

Diagnosis on PSR		Diagnosis on endoscopy	
		Yes	No
	Yes	**TP**	**FP**
	No	**FN**	**TN**

Diagnostic sensitivity, or the PSR's capacity to identify patients with esophageal varices, was used to gauge diagnostic accuracy.

Specificity: PSR's capacity to rule out people without esophageal varices.

Patients with esophageal varices on both PSR and endoscopy are considered true positives.

Patients with no esophageal varices on endoscopy or PSR are considered true negatives.

Patients with esophageal varices on PSR but not on endoscopy are considered false positives.

False Negative (FP): Patients who have endoscopy but no esophageal varices on PSR.

The likelihood that a patient with a positive PSR will in fact develop esophageal varices was known as the Positive Predictive Value.

The likelihood that a patient with a negative PSR test does not, in fact, have esophageal varices was known as the negative predictive value.

RESULTS

Participants in the study ranged in age from 18 to 80 years old, with a mean age of 50.69 ± 12.31 years. Of the patients, 107 (53.77%) were between the ages of 50 and 80, according to Table I. Of these 199 patients, 112 (56.28%) were male and 87 (43.72%) were female, resulting in a male to female ratio of 1.3:1. The PSR level was 0.86 ± 0.42 on average. Table I displays the distribution of patients with different factors.

While 84 patients (True Positive) had esophageal varices on both the PSD and the endoscopy, 11 patients (False Positive) had none at all. Twelve (False Negative) and ninety-two (True Negative) of the 104 patients with negative PSR values had esophageal varices on endoscopy, respectively (p=0.0001), according to Table II. PSR values with sensitivity of 87.50%, specificity of 89.32%, PPV of 88.42%, NPV of 88.46%, and diagnostic accuracy of 88.44% were used to identify the esophageal varices. Table III displays the diagnosis accuracy stratification by cause, age, and gender.

Table I

Distribution of patients with different variables (n=140)

Variables		Frequency	%age
Age (years)	18-50	92	46.23
	51-80	107	53.77
Gender	Male	112	56.28
	Female	87	43.72
Etiology	Hep B	104	52.26
	Hep C	54	27.14
	Others	41	20.60

Table II

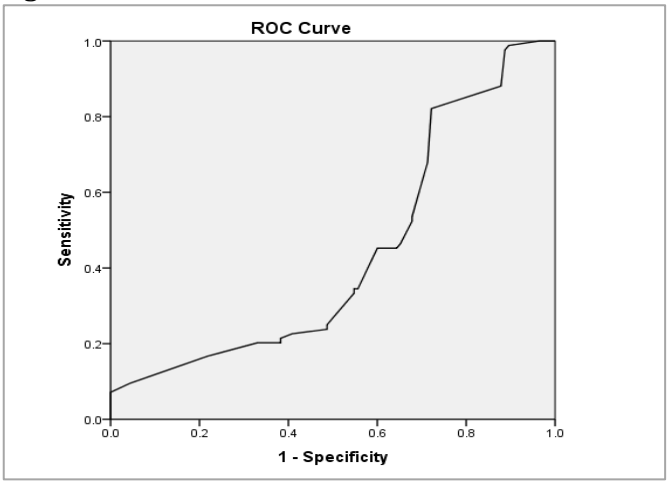
Diagnostic accuracy of platelets count /spleen diameter ratio in prediction of esophageal varices in patients with liver cirrhosis taking endoscopy as gold standard.

	Endoscopy findings (+ive)	**Endoscopy findings (-ive)**	**P-value**
PSR (+ive)	84 **(True positive)**	11 **(False Positive)**	**0.0001**

PSR (-ive)	**12 (False negative)**	**92 (True Negative)**

Sensitivity: 87.50%
Specificity: 89.32%
Positive Predictive Value (PPV): 88.42%
Negative Predictive Value (NPV): 88.46%
Diagnostic Accuracy: 88.44%

Figure 1



Area under the curve = 0.438

Table III
Stratification of diagnostic accuracy with respect to age, gender and etiology.

		Sensitivity	Specificity	PPV	NPV	DA	
Age (years)	**18-50**	85.19%	97.44%	97.87%	82.61%	90.32%	0.001
	51-80	90.48%	84.38%	79.17%	93.10%	86.79%	0.001
Gender	**Male**	88.46%	81.67%	80.70%	89.09%	84.82%	0.001
	Female	86.36%	100.0%	100.0%	87.76%	93.10%	0.001
	Hep B	85.19%	94.0%	93.88%	85.45%	89.42%	0.001
Etiology	**Hep C**	96.0%	82.76%	82.76%	96.0%	88.89%	0.001
	Others	82.35%	87.50%	82.35%	87.50%	85.37%	0.001

DISCUSSION

25% to 35% of patients with cirrhosis may experience gastroesophageal variceal hemorrhage.[8] EGD is recommended for EV diagnosis and risk classification by a number of society guidelines, such as the AASLD and the Baveno VII consensus.[9,10] There aren't many noninvasive diagnostics that can predict EV, though. The PSD ratio is a viable choice among these. It has a number of benefits, including excellent predictive value in detecting high-risk patients, accessibility, and ease of use.

Several studies have shown that when the PSD ratio is higher than 909.[11-13], EV can be accurately forecasted. A PSR ratio ≤0.909 had 92% sensitivity, and 87% specificity for esophageal varices prediction, according to a meta-analysis of 20 investigations.[14] With a sensitivity of 87.50% and a specificity of 89.32%, our analysis found a higher cutoff value of ≤0.909. This result is in line with what Jamil et al.[15] found in their study, where they set a cutoff value of 1077 (sn: 89%, sp: 81%). Patil et al.[16] indicated a PSR ratio of less than 1400 for predicting EV in an Indian population (sn: 90%, sp: 82%). Chawla et al. conducted a comprehensive review and meta-analysis and found that, using the PSR ratio of 909, the pooled sensitivity (89%) and the pooled specificity (74%).[17] Even if pooled findings yielded acceptable test results, the current data quality was insufficiently strong to justify the PSR ratio of 909 as a cut-off value. Other clinical characteristics, such as various PSR cut-off values and alternative predictive modalities, could be beneficial to incorporate into a prediction model. However, compared to other non-invasive prediction techniques, the PSR ratio assessment appears to be simpler and less expensive.[17] Similar findings have also been obtained from another investigation carried out in Africa.[18]

According to earlier research, splenomegaly may serve as a reliable predictor of EV. In line with our results and those of other studies, Ashraf et al[19] found that a spleen size > 130 mm produced 87.7% sensitivity and 83.3% specificity for esophageal varices prediction.[20] According to this study, there is a correlation between SD and big EV. The results showed a satisfactory accuracy with a sensitivity (61%) and a specificity (81%) for an SD > 142.5 mm. On the other hand, the PSR ratio did not do as well in predicting big EVs. These results are in line with those of Duah et al.[21], found not significant correlation between PSD ratio and the detection of big EV. Barrera et al.'s investigation, however, produced conflicting findings[22]. A PSR ratio < 830.8 found 76.9% sensitivity and 74.2% specificity, demonstrating higher accuracy in comparison to our investigation, even if the sensitivity was comparable.[22,23]

The purpose of this study was to assess the PSR ratio's sensitivity and specificity in detecting EV in cirrhosis patients. According to our research, the PC/SD ratio provides better accuracy than both PC and SD. Our study's cutoff value differs from that of a related survey carried out in Gondar, Ethiopia, by Gebregziabiher et al.[23] Lower cutoff values were found in their study: 145 mm for SD, 121000 for PC, and 818 for the PC/SD ratio. It's interesting to note that our research showed that patients with compensated cirrhosis had higher predictive value for these noninvasive markers. This observation runs counter to Gebregziabiher et al.'s findings above.[23]

Study limitations

Because the study is cross-sectional, we are unable to account for confounding variables that could be uncovered with proper patient selection and randomization procedures. The severity and length of cirrhosis are examples of confounding factors that may affect the results. Replicating this work in a prospective trial with these confounding variables controlled is recommended.

CONCLUSION

According to our findings, the platelet count/spleen diameter ratio is a reliable indicator of whether esophageal varices is present or absent in individuals with hepatic cirrhosis. A predictor function that demonstrated a moderate level of success in anticipating the existence of EV can be computed using this parameter. To confirm the effectiveness of this prediction function, more research in patients with liver cirrhosis is required. If its effectiveness is shown, it might make it possible to prevent initial variceal bleeding in individuals with liver cirrhosis without the need for expensive and intrusive tests like EGD by instituting preventative treatments like beta-adrenergic antagonists.

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