

## A Study on Aspartate Platelet Ratio Index (APRI) Versus Splenic Bipolar Diameter Ratio in Predicting Oesophageal Varices in Patients with Cirrhosis in a Rural Medical College Hospital

M. Venkatesh<sup>1</sup>, R.Suresh<sup>2</sup>, A. Karthikeyan<sup>3</sup>, R. Gopinath<sup>4</sup>, R. Jegatheesh<sup>5\*</sup>

<sup>1</sup>Associate Professor of General Medicine, Government Theni Medical College and Hospital, Theni, Tamil Nadu-625512

<sup>2,3,5</sup>Assistant Professor of General Medicine, Government Theni Medical College and Hospital, Theni, Tamil Nadu-625512

<sup>4</sup>Scientist B, Department of Microbiology-VRDL, Government Theni Medical College and Hospital, Theni, Tamil Nadu-625512

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Corresponding author: Dr. R. Jegatheesh

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### Abstract:

Cirrhosis presents a significant health burden globally, often leading to morbidity and premature mortality. Esophageal varices, a complication of cirrhosis, necessitate early identification to prevent potential bleeding complications. This prospective study, conducted at Government Medical College Hospital, Theni, aimed to evaluate non-invasive diagnostic markers for esophageal varices in cirrhotic patients. 75 patients diagnosed with liver cirrhosis were included after obtaining consent and meeting specific criteria. The study focused on assessing the utility of Aspartate Platelet Ratio Index (APRI) and Platelet Count to Splenic Diameter ratio in diagnosing esophageal varices. Statistical analyses were conducted using SPSS 1.0.0.1406, employing descriptive statistics, Chi-square, student t-tests, and ROC curves. The majority of the patients (89%) were male, predominantly in the age group of 50 to 60 years. Alcoholism was a prevalent etiology (89.33%) among the study cohort. Parameters such as platelet count, splenic diameter, and their ratio exhibited significant associations with the presence of esophageal varices. Notably, the Platelet Count to Splenic Diameter ratio demonstrated higher sensitivity (96%) and specificity (90.48%) in predicting esophageal varices compared to APRI. A cut-off value of <909 for this ratio exhibited robust positive and negative predictive values (88.8% and 90.4% respectively), indicating its potential as a reliable non-invasive marker for identifying esophageal varices. The study underscores the promising utility of the Platelet Count to Splenic Diameter ratio as a non-invasive parameter for diagnosing esophageal varices in cirrhotic patients. Validation of these findings in larger, multi-center studies could potentially reduce the necessity for invasive endoscopic procedures and aid in early identification and management of at-risk patients.

**Keywords:** Cirrhosis, Esophageal varices, APRI (Aspartate Platelet Ratio Index), Non-invasive diagnosis, Diagnostic markers

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### Introduction

Cirrhosis has pronounced morbidity and a major reason for premature mortality [1]. Cirrhosis can be seen at any age [2]. The commonest etiologies around the globe are chronic alcoholism and viral hepatitis [3]. Portal hypertension is a complication of cirrhosis. Prevalence of oesophageal varices due to cirrhosis is 50- 60% [4]. Screening endoscopy is suggested for all cirrhotic patients at the time of diagnosis. If there are no varices, screening should be done every 2 years. If there are small varices, endoscopy should be done every year to detect progression of varices. If high-risk varices are detected, endoscopic or pharmacological measures can be initiated to prevent first bleeding [5].

Routine screening endoscopy has limitations such as placing burden on medical resources and lack of adherence to surveillance and screening. Empirical beta-blocker therapy to all cirrhotic patients can lead to unwanted and harmful side effects. Hence, parameters that could noninvasively diagnose esophageal varices would benefit the patients by identifying those at risk and decreasing the number of patients who will be given avoidable beta-blocker therapy [6]. Routine screening endoscopy is invasive as well as puts financial burden on the patient. This can be tackled by using non-invasive parameters which when combined have positive predictive value for oesophageal varices, thus

resulting in a very minimal number of patients undergoing an invasive procedure and preventing needless intervention [7]. Here the study aims in comparing Aspartate Platelet Ratio Index (APRI) and Platelet Count to Splenic Diameter in identifying oesophageal varices in cirrhotic patient.

### Materials and Methods:

#### Study design and population

This Prospective study was carried out among 75 Patients admitted in Government Medical College Hospital, Then from June 2021 to December 2021. Patients were explained about the study in their own language. Patients willing to participate are included into the study after getting consent for the study. Ethical approval for this study was obtained from the Institutional Human Ethics Committee.

#### Inclusion criteria

1. Age above 18 years,
2. Those with ultrasonographic features of cirrhosis of liver.
3. Those willing for undertaking screening endoscopy on being diagnosed with cirrhosis.
4. Cirrhosis patients who never underwent screening endoscopy for esophageal varices.

#### Exclusion criteria:

1. Active upper gastrointestinal hemorrhage,
2. Underwent previous endoscopic variceal band ligation or sclerotherapy,
3. Underwent procedure for portal hypertension (stents),
4. Previous history of beta-blocker prophylaxis or treatment.

#### Statistical analysis

Statistical analysis was performed using SPSS 1.0.0.1406. Descriptive Statistics were expressed in percentage and frequencies.

Results of continuous measurements are expressed on Mean  $\pm$  Standard Deviation. Chi square and student t tests were used to analyse the association between platelet count, splenic diameter, Platelet Count to Splenic Diameter ratio and APRI with presence of oesophageal varices.

A 'p' value of <0.05 was taken as statistically significant. ROC curve was used to determine the sensitivity and specificity for different variables.

#### Results:

Majority of our patients in our study were aged between 50 to 60 years. The oldest patient was 58 years and the youngest patient was 31 years. In this study, males amounted to about 89% and females amounted to about ~11% and hence males predominated in this study. 67 out of a total of 75 patients were alcoholics with intake of >180ml/day of Alcohol. Alcoholics constitute a total of 89.33 % and non-alcoholics constitute a total of 10.67%. A Hemoglobin of less than 11 gram% was seen in 37 out of 75 patients whereas 38 out of 75 patients had a hemoglobin of more than 11 gram%. 56% of the patients had a serum bilirubin between 2.1 to 3 mg/dl in this study. Most of the patients presented with jaundice. 57 patients had a serum bilirubin less than 3 gm/dl. Since liver is the major site of albumin production, in cirrhosis of liver albumin is low and there is reversal of albumin: globulin ratio. 44 out of 56 patients with a splenic bipolar diameter of >150 mm had oesophageal varices (88%) with a p value of <0.012, which is statistically significant. Although significant, this is lesser than that of the association between platelet count / splenic bipolar diameter ratio with presence of OGV. 43 out of 75 patients with a platelet count below 1.25 lakhs/cu.mm had oesophageal varices, which constituted a total of 86%. The p value is <0.027. This association is statistically significant although less than the association between PC/SBD and oesophageal varices.

#### Platelet count / splenic bipolar diameter with oesophageal varices

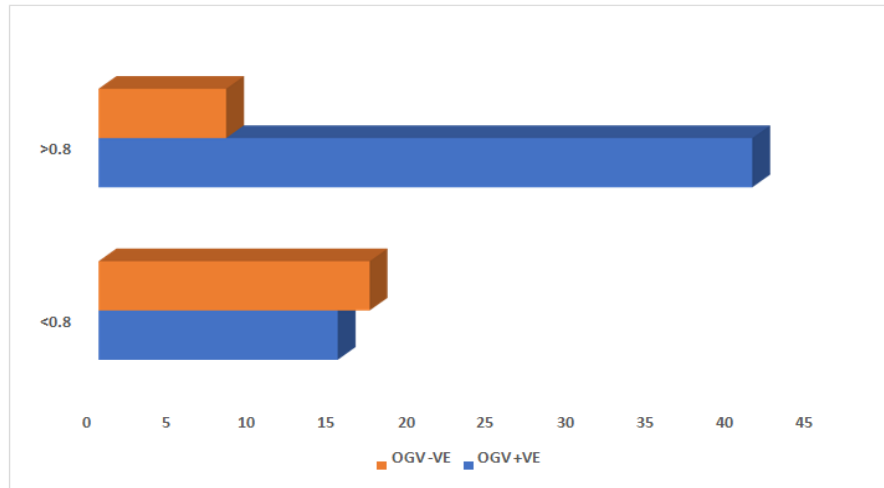
50 out of 75 patients in our study had oesophageal varices. 48 out of these 50 patients who had oesophageal varices had a Platelet count / splenic bipolar diameter ratio less than 909.

The p value is <0.007 with a sensitivity of 96% and a specificity of about 90.48%. The negative predictive value of the study is 90.4% and the positive predictive value is 88.8%. 41 out of 50 patients with oesophageal varices were above a cut-off value of  $\geq 0.8$  and the remaining 9 patients had <0.8 (Fig.1). The sensitivity of test was 82 % and the specificity was 68%.

The p value was <0.03 which is statistically significant but it is much less compared to the statistical significance of Platelet Count to Splenic Diameter ratio for predicting oesophageal varices (Table.1). The positive predictive value was 81.39% and the negative predictive value was 53.12%.

**Table 1: Platelet count/splenic diameter and oesophageal varices**

Ratio	OGV Positive	OGV Negative	P value
<909	48	6	<0.03
>909	2	19	
Total	50	25	



**Figure 1: APRI and oesophageal varices**

### Discussion

Chronic HCV infection, which affects about 2%-3% of the global population, or 130-170 million people worldwide, is a major health problem confronting the medical community today [8]. Cirrhosis is the end stage of chronic liver disease, which is ultimately complicated by portal hypertension [9], the main cause of esophageal varices in more than half (60%-80%) of cirrhotic patients [10,11]. As a result, these varices are prone to rupture and bleeding, with a devastatingly high mortality rate of 10%-20% [12]. Current guidelines recommend that all cirrhotic patients be screened for esophageal varices using endoscopy at the time of diagnosis [13]. However, the invasive nature of this maneuver, as well as the subsequent complications, have prompted the search for more accurate and non-invasive techniques to assess the presence of esophageal varices caused by portal hypertension in these cirrhotic patients. This Study has been done on cirrhosis patients for non-invasive predictors of oesophageal varices, especially platelet count to splenic bipolar diameter ratio.

This aids in decreasing monetary and social burden for patients with cirrhosis and enhances patient compliance. Decreased platelet count in patients with cirrhosis of liver can be explained by decreased thrombopoietic production, decreased survival of platelets and hypersplenism leading to splenic sequestration. Hence, the concept involving platelet count and bipolar diameter of the spleen for non-invasive prediction of oesophageal varices, since using platelet count alone cannot be completely explained by portal hypertension and using it can lead to misinterpretation. Incidence, for cirrhosis of liver, was maximum above 50 years of age. Mean age – 45.94 and standard deviation – 8.4. The oldest patient was 58 years and the youngest was 29 years of age in this study. 68 out of 75 patients with cirrhosis of liver were males and 8

out of 75 patients were females. 89% patients with cirrhosis of liver were contributed by males. Blood transfusion history was present in among 12 % of the patients. 89% of patients were alcoholics, with intake of alcohol more than 180 ml/day.

Sanyal et al. were the first to propose that APRI could be related to the presence of EV [14]. The platelet count of most patients ranged between in 85,000 cells/ cubic mm to 1,25,000 cells/ cubic mm. In this study, the mean platelet count is around  $1,21,360 \pm 17,315$ . But the significance is less compared to platelet count to splenic bipolar diameter ratio. The long axis of spleen was measured with Ultrasonogram of the abdomen and the measurement was taken as splenic bipolar diameter. In this study, the values were between 140mm to 180mm. The mean splenic bipolar diameter is  $157 \pm 12.89$ . On UGIscopy, 50 patients out of total 75 patients with cirrhosis had oesophageal varices. Among these 50 patients, 48 patients were found to have a platelet count to splenic bipolar diameter ratio  $<909$ . The other 2 patients with oesophageal varices had a platelet count to splenic bipolar diameter ratio  $>909$ .

Berzigotti et al., discovered a link between APRI and clinically significant portal hypertension (hepatic venous gradient pressure 10 mmHg), but not with EV [15]. Castéra et al., on the other hand, proposed a cut-off of 1.3 for APRI as a predictor of EV [16]. In this study, 54 patients out of total 75 patients with cirrhosis of liver had a platelet count to splenic bipolar diameter ratio of less than 909. Out of these 54 patients, oesophageal varices were present in 48 patients and they were absent in 6 patients. The mean value of platelet count to splenic bipolar diameter ratio in patients with oesophageal varices was about 689.62 and for those that did not have oesophageal varices, the mean was 961.98. When a cut-off ratio of 909 was used, 96% of cirrhosis patients with varices were detected. The sensitivity was 96% and the

specificity was 90.48%. This parameter had a positive predictive value of 89% and a negative predictive value of 90.4%. In this study, APRI has a strong association in detecting oesophageal varices in patients with cirrhosis of liver with a p value of <0.03 which is statistically significant. With a cut-off of 0.8, the sensitivity was 82% and the specificity was 68%. The positive predictive value was 81.39% and the negative predictive value was 53.12%.

### Conclusion

In this study, there is correlation between decreased platelet count, increased size of the spleen, higher APRI values and a low Platelet Count to Splenic Diameter ratio and the presence of oesophageal varices. Out of these parameters, platelet count to splenic bipolar diameter ratio had strong association with presence of oesophageal varices when compared to APRI and this ratio had the most sensitivity and specificity as a non-invasive predictor for oesophageal varices. The presence of a higher APRI value and / or a lower Platelet Count to Splenic Diameter ratio can help to identify the subset of cirrhosis patients who have higher chance for presence of varices and can be referred to endoscopic units for screening endoscopy in resource-poor settings. This subset of patients can also be started on prophylactic beta-blocker therapy to prevent variceal hemorrhage. Apart from being non-invasive, these parameters are relatively inexpensive and patient compliance will be better.

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