

**Research Article**

## **Diagnostic accuracy of Platelet Count to Spleen Diameter ratio as non invasive parameter in patients with suspected esophageal Varices taking gastroscopy as gold standard**

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**ABSTRACT**

**Objectives:** To determine the diagnostic accuracy of Platelet Count to Spleen Diameter ratio as non invasive parameter in patients with suspected esophageal Varices taking gastroscopy as gold standard.

**Material and methods:** This cross sectional study was conducted at Department of Medicine, Bahawal Victoria Hospital, Bahawalpur from January 2016 to June 2016. Total 134 patients who have liver cirrhosis (associated with hepatitis C) on ultrasonography both male and female having age 20 to 60 years were included in this study.

**Results:** Total 134 patients with cirrhosis of liver were selected for the study. Mean age of the patients was  $55.56 \pm 9.33$  years. Male patients were 71 (53%) and female patients were 63 (47%). Esophageal varices were found in 96 (72%) patients by using Platelet count to spleen diameter ratio.

**Conclusion:** In present higher rate of grade-IV esophageal varices was observed. Most of the patients belonged to Child-Pugh Grade B group. Results of this study also revealed higher sensitivity and specificity rate by using Platelet count to spleen diameter ratio while taking Endoscopy as gold standard.

**Key words:** Child-pugh, esophageal varices, portal hypertension, endoscopy

**INTRODUCTION**

The serious consequence of portal hypertension is varices and incidence of variceal bleeding occurring upto 30% in patients with liver cirrhosis.<sup>1</sup>In spite of improvement in diagnosis and therapy, rate of mortality reaches upto 20% from acute variceal bleeding and it is the second common most cause of death in patients with cirrhosis.<sup>2</sup>Nonselective  $\beta$ -blockers given to cirrhotic patients without a history of variceal bleeding reduce the risk of first bleeding and the mortality rate and probably, isosorbidedimonitrate or band ligation may also be used for preventing the first episode of bleeding in the cases of intolerance or contraindications to  $\beta$ -blockers.<sup>3-4</sup> The most

accurate and reliable method to detect the presence of large esophageal varices is an upper gastrointestinal endoscopy.<sup>5</sup> It is now recommended that all patients with established cirrhosis should be screened by upper gastrointestinal endoscopy for the presence of varices at the time of diagnosis.<sup>5</sup> Patients with large varices should be treated with nonselective  $\beta$ -blockers to reduce the incidence of first variceal bleeding.<sup>4</sup> Also, patients with small varices or without varices should be re-endoscoped every 1-3 years.<sup>4</sup>

However, less than 50% patients of cirrhosis have varices at the screening endoscopy and the majority have small-sized varices, which carry a

very low risk of bleeding.<sup>5</sup> Also a substantial number of patients will not develop large varices during screening and therefore will undergo unnecessary endoscopies which are uncomfortable, invasive and costly.<sup>3</sup> Over the years, a great effort has been made either to introduce less invasive, alternative to standard endoscopy diagnostic methods or to restrict the performance of endoscopy in high-risk patients by using a variety of noninvasive predictors.<sup>4</sup>

Video capsule endoscopy could be a minimally invasive method for detecting gastroesophageal varices. Although overall agreement between endoscopy and video capsule endoscopy in detecting and grading varices is relatively high and esophageal capsule endoscopy is well tolerated, it is still not equivalent to standard endoscopy and its cost effectiveness compared to upper endoscopy remains to be determined.<sup>6</sup>

The factors related to the presence of varices are not well defined, but it is known that they appear after the hepatic venous pressure gradient has increased to at least 10–12 mmHg.<sup>7</sup> Because minimally invasive methods cannot replace endoscopy, many studies have tried to determine whether clinical or laboratory non endoscopic parameters could predict the presence of large esophageal varices, and whether it is possible to identify a subgroup of cirrhotic patients with a high probability of large varices, in order to improve the cost effectiveness and avoid patients' discomfort by overusing screening endoscopy.<sup>8</sup>

The platelet count/ bipolar spleen diameter ratio has excellent accuracy in the noninvasive assessment of Esophageal varices in patients with liver cirrhosis. It is easy to predict and can lower the financial burden of unusual gastroscopy, especially in developing countries like Pakistan.

## OPERATIONAL DEFINITION

### Esophageal Varices:

Esophageal varices are extremely dilated sub-mucosal veins in the lower esophagus.

### Platelet Count/Spleen Diameter Ratio:

This ratio is calculated by dividing the platelet number/mm<sup>3</sup> by the maximum spleen bipolar

diameter in mm as estimated by abdominal ultrasound. Platelet Count/Spleen Diameter Ratio cut off values is 909. Patients having ratio 909 or below most likely have esophageal varices in liver cirrhotic patients. (Noninvasive parameter)<sup>11</sup>

## MATERIAL AND METHODS

This cross sectional study was conducted at Department of Medicine, Bahawal Victoria Hospital, Bahawalpur from January 2016 to June 2016. Total 134 patients who have liver cirrhosis (associated with hepatitis C) on ultrasonography both male and female having age 20 to 60 years were included in this study. Patients with band ligation, taking alcohol, having previous endoscopic sclerosis, taking  $\beta$ -blocker therapy were excluded from the study.

An approval was taken from institutional review board and written consent was taken from every patient. Platelet count and bipolar spleen diameter ratio will be calculated after taking platelet count by laboratory and bipolar spleen diameter by ultrasonography values. Gastroscopy was done for the confirmation and grading of esophageal varices on all patients and findings of the gastroscopy was taken as gold standard. Demographic data like age, gender entered in predesigned Performa.

Data was entered on computer software SPSS version 10. The quantitative variables were presented as mean  $\pm$  SD. The qualitative variables were presented as frequency and percentage. The prediction of varices was confirmed by gastroscopy as Gold Standard. To calculate the diagnostic accuracy, 2 x 2 table was plotted.

## RESULTS

Total 134 patients with cirrhosis of liver were selected for the study. Mean age of the patients was  $55.56 \pm 9.33$  years. Male patients were 71 (53%) and female patients were 63 (47%). (Fig. 1)

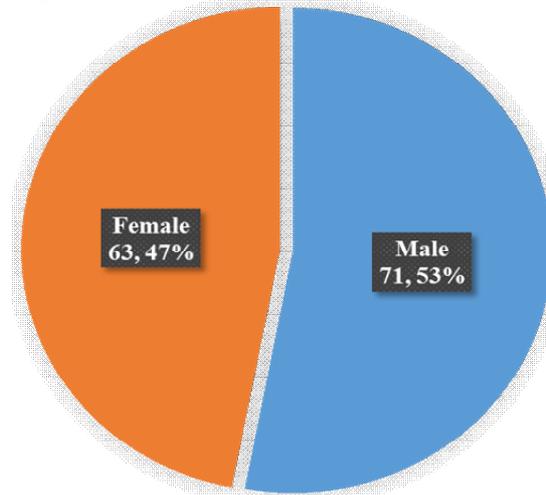
Esophageal varices were found in 96 (72%) patients by using Platelet count to spleen diameter ratio. (Fig. 2)

On endoscopy total 94 patients were positive for esophageal varices, grades of Esophageal varices was done. Total 3 (3.19%) patients were found

with Grade I varices followed by 21 (22.34%) Grade II, 30 (31.91%) with Grade III and 40 (42.55%) with Grade IV. (Fig. 3)

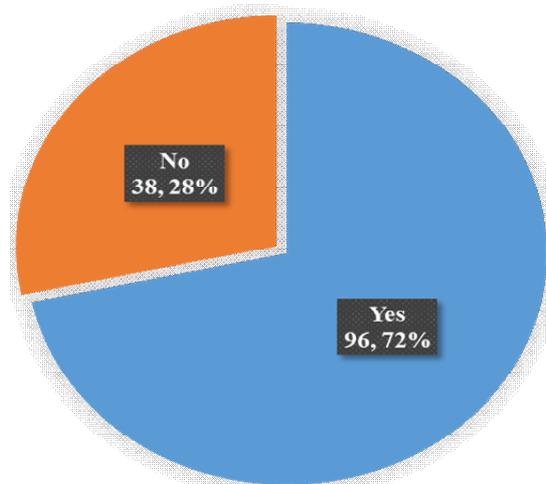
Child-Pugh Grading of all the patients was also done. Total 37 (28%) patients were found with Grade A, 53 (39%) Grade B and 44 (33%) Grade C. (Fig. 4)

**Fig. 1:** Gender Distribution of the patients

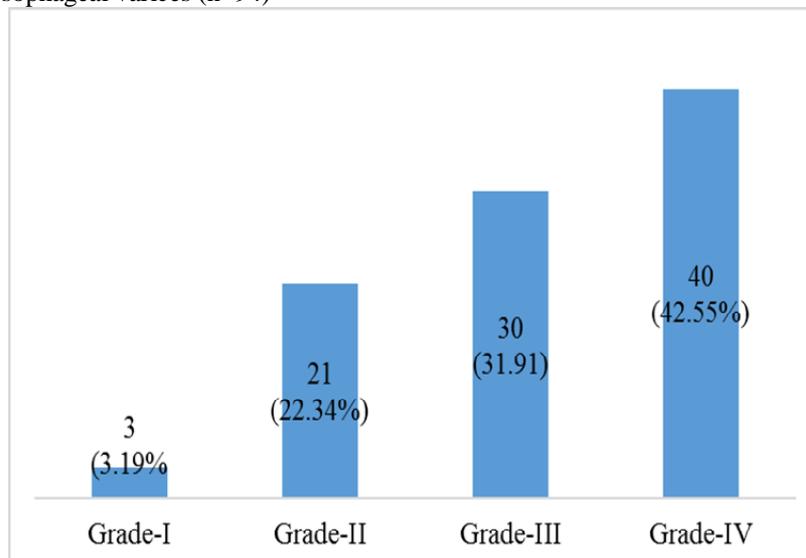


2 x 2 table was plotted to calculate the sensitivity and specificity of the test by using Endoscopy as gold standard. Sensitivity and specificity of the test was 91% and 75% respectively. Positive predictive value was 90% and negative productive value was 79%.

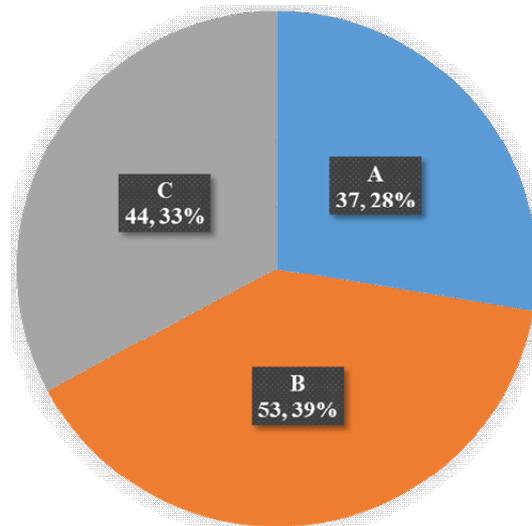
**Fig. 2:** Frequency of esophageal varices



**Fig. 3:** Grades of esophageal varices (n=94)



**Fig. 4:** Distribution of patients according to Child-Pugh Grade (n=194)



**Table 1:** Results of Platelet count to spleen diameter ratio (Endoscopy as gold standard)

Platelet count to spleen diameter ratio (Considering >909 as normal) Test Result	Endoscopic Findings		Total
	Varices Present (Disease)	Varices Absent (No Disease)	
Varices Present Ratio < 909	True positive (a) 86	False positive (b) 10	a + b 96
Varices Absent Ratio > 909	False negative (c) 8	True negative (d) 30	c + d 38
<b>Total</b>	a + c 94	b + d 40	a + b + c + d 134

**Validity:**

- Sensitivity =  $a / (a + c) \times 100 = 91\%$
- Specificity =  $d / (b + d) \times 100 = 75\%$
- PPV =  $a / (a + b) \times 100 = 90\%$
- NPV =  $d / (c + d) \times 100 = 79\%$

**DISCUSSION**

At the time of a liver cirrhosis diagnosis, EVs are present in approximately 40% of patients with early disease and in approximately 60% of those with decompensated disease.<sup>9</sup>

The yearly incidence of gastrointestinal bleeding is 1% to 2% in patients without EVs, 5% in those with small EVs and 15% to 20% in patients with large EVs.<sup>10</sup> Endoscopy is recommended every two to three years in patients without varices, and every one to two years in patients with small varices.<sup>11</sup> In an attempt to reduce the increasing burden on endoscopy units, several studies have been performed to identify the noninvasive parameters that can predict the presence of EV in liver cirrhosis.<sup>4</sup>

The management of patients with liver cirrhosis has advanced over the past few decades, resulting in improved survival.<sup>12</sup> However, bleeding from ruptured EVs is still the leading cause of death in patients with cirrhosis. In recent studies, mortality figures were between 11% and 20% within six weeks of the bleeding episode.<sup>10</sup> Therefore, prevention of variceal bleeding should be an important goal. The first crucial step in the prevention of variceal bleeding is to identify the patients at risk for bleeding from EVs, so that they can be selected for prophylactic treatment. Varices eventually develop in all patients with liver cirrhosis and they tend to increase in size with time and bleeding. We also know that the prevalence of varices is higher in decompensated than in compensated cirrhosis, and that large varices

have a higher propensity to bleed than small varices.<sup>6</sup>

In the present study, we attempted to validate the platelet count to spleen diameter ratio as a screening test for EVs in patients with cirrhosis of liver. In present study esophageal varices were found in 96 (72%) patients by using Platelet count to spleen diameter ratio. Total 3 (3.19%) patients were found with Grade I varices followed by 21 (22.34%) Grade II, 30 (31.91%) with Grade III and 40 (42.55%) with Grade IV. Baiget al<sup>9</sup> study the 150 cirrhosis patients and EV found in 106 patients which is correlate with our findings. Among the patients with EVs, 36 patients had grade 1 varices, 54 had grade 2 varices and 16 had grade 3 varices. Findings of this study in agreement with our study.

In another study by Sarangapani et al,<sup>13</sup> EV was noted in 72.6% patients of liver cirrhosis by using platelet count/spleen diameter ratio which is comparable with our findings. In our study, sensitivity and specificity of the test was 91% and 75% respectively. Positive predictive value was 90% and negative productive value was 79%. In one study by Sarangapani et al,<sup>13</sup> Platelet spleen diameter ratio 909 had a sensitivity and specificity of 88.5%, 83% respectively. These findings are in agreement with our findings.

ZAFAR et al<sup>14</sup> recorded 124(57.67%) true positive, 4(1.86%) false positive, 80(37.21%) true negative and 7(3.26%) were false negative, sensitivity, specificity, positive predictive value, negative predictive value and accuracy rate was calculated as 96.95%, 95.24%, 96.88%, 91.95% and 94.88% respectively. A local study showing the sensitivity and specificity of PC/SD with cut off 909, 96.07% and 93.75% respectively.<sup>15</sup>

Another study who used the cut off value of platelet count/spleen diameter ratio of 909 was used by Giannini E et al in Genova Italy, to predict the presence of esophageal varices, the sensitivity was 100% specificity was 93%. Positive and negative predictive values for a platelet count/spleen diameter ratio diameter ratio with a cut off value of 909 was 98%.<sup>11</sup>

Another study at medical wards of Allied Hospital, Faisalabad, sensitivity is 89.70%, specificity is 81.48%, positive predictive value

is 92.42% and negative predictive value is 75.86%.<sup>16</sup>

## CONCLUSION

In present higher rate of grade-IV esophageal varices was observed. Most of the patients belonged to Child-Pugh Grade B group. Results of this study also revealed higher sensitivity and specificity rate by using Platelet count to spleen diameter ratio while taking Endoscopy as gold standard.

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