

## NON-INVASIVE PREDICTORS OF ESOPHAGEAL VARICES IN PATIENTS WITH CIRRHOSIS

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### ABSTRACT

**Background:** Esophageal varices (EVs) is one of the main complications of liver cirrhosis which carries a significant risk of hemorrhage, the leading cause of morbidity and mortality in cirrhotic patients.

**Objective:** The aim of this study was to evaluate various biochemical and ultrasonographic parameters in predicting the presence of EVs in cirrhotic patients compared to Esophagogastrosopy, the method of choice for identifying the varices. **Materials and Methods:** This is Cross sectional study conducted in the department of Gastroenterology in Tishreen University Hospital-Lattakia -Syria from September 2019 to September 2020. Patients with liver cirrhosis who aged 14 years and older were evaluated for presence EVs. **Results:** 88 patients were included in this study, median age :57(range:21-83 years).65.9% were male with a male/female ratio of 1.9/1.The etiology of liver cirrhosis was unknown in 36.4% of cases, 83% of patients were found to have EVs. Portal diameter and spleen size were greater in patients with EVs in comparison with those without EVs ( $p < 0.05$ ), whereas platelet count and platelet count/spleen size ratio were lower in patients with EVs. Platelet count/spleen diameter ratio had the highest accuracy(77.3%) in comparison with the other parameters. ROC curve showed an area under curve of 0.78, a cut off of 902 with sensitivity 77% and specificity 75% **Conclusion:** Platelet count/spleen diameter ratio has the best diagnostic accuracy for presence EVs in cirrhotic patients. It might be useful in clinical practice by decreasing the use of invasive Esophagogastrosopy.

**KEYWORDS:** Esophageal varices, cirrhosis, mortality, Esophagogastrosopy.

### INTRODUCTION

Most cirrhotic patients develop EVs as a consequence of portal hypertension with a lifetime incidence as high as 80-90%. The grade of EVs often correlates with the severity of liver disease.<sup>[1,2]</sup>

Approximately one third of cirrhotic patients with EVs develop an episode of esophageal hemorrhage, which has a high morbidity and mortality.<sup>[3]</sup> Therefore detection EVs in those patients and prevention of the first hemorrhage is crucial to minimize complications.<sup>[4]</sup> Esophagogastrosopy is the gold standard procedure used in the diagnosis of EVs but it is invasive with many disadvantages including: bleeding, risk of aspiration, and expensive.<sup>[5,6]</sup>

As a result , identify patients with high probability of having EVs by non-invasive methods with high sensitivity and specificity at the time of registration

would restrict the performance of endoscopy.<sup>[7]</sup>

The aim of the present study is to determine the accuracy of platelet count as well as the parameters obtained by ultrasound imaging in predicting the existence and the grade of EVs in cirrhotic patients.

### MATERIALS AND METHODS

#### Study design and data collection

We studied patients with liver cirrhosis aged 14 years and older who presented to the department of Gastroenterology in Tishreen University Hospital – Lattakia-Syria from September 2019 to September 2020. Patients with non-cirrhotic portal hypertension were excluded.

Demographic data including age, sex, causes of liver cirrhosis and biochemical parameters were recorded. All patients were underwent to Esophagogastrosopy to

determine presence EVs and its Grade. Ultrasound of the abdomen was done to measure portal diameter, spleen size, and looking for presence ascites in patients.

**Definitions**

**Liver cirrhosis:** It is defined as fibrosis and inflammation of the liver leading to metabolic hepatic failure as well as portal hypertension.<sup>[8]</sup>

**Portal hypertension:** A persistent pressure elevation of > 12 mmHg in the portal vein circulation, dilation of the portal vein to > 13 mm or an increase in the portal pressure gradient of >7 mmHg.<sup>[9]</sup>

**Esophageal varices(EVs):** It is the direct consequence of spontaneous formation of collateral vessels between portal vein and esophageal veins and represents a common complication of advanced cirrhosis. It is graded as I-IV according to their size using the Paquet grading system.<sup>[10]</sup>

**Ascites:** It is defined as the presence of excessive fluid in the peritoneal cavity. Ascites in cirrhosis result from portal hypertension.<sup>[11]</sup>

**Statistical Analysis**

Statistical analysis was performed by using IBM SPSS

version 20. Basic Descriptive statistics included means, standard deviations(SD) Frequency and percentages.

Differences of distribution examined by using chi-square test or Fisher exact test if it need. Independent t student test was used to compare 2 independent groups, and one way Anova to compare between the three groups. Receiver operating curve (ROC) analysis was performed to determine a cut-off point predicting of presence EVs with the best sensitivity and specificity. Variables with p less than 0.05 were included in the model.

**RESULTS**

Between September 2019 and September 2020, 88 consecutive patients with liver cirrhosis were admitted to the Department of Gastroenterology and underwent to Esophagogastrosocopy. The baseline characteristics of patients are as given in table(1).

The median age was 57 years, 65.9% were male, 36.4% of the liver cirrhosis cases were unknown origin. 73(83%) of the patients had EVs (15.1% grade I, 41.1% grade II, 34.2% grade III, 9.6% grade IV).

**Table 1: Demographic characteristics of the study population.**

<b>Variables</b>	
Age(years)	57(21-83)
<b>Sex</b>	
Male	58(65.9%)
Female	30(34.1%)
<b>Disease origin</b>	
Unknown	34(36.4%)
Alcoholism	15(17%)
Hepatitis B virus	12(13.6%)
Hepatitis C virus	9(10.2%)
Autoimmune hepatitis	5(5.7%)
Non-alcoholic steatohepatitis	3(3.4%)
Wilson's disease	2(2.3%)
Secondary biliary cirrhosis	5(5.7%)
Others	5(5.7%)
<b>Ascites</b>	
Present	57(64.8%)
Absent	31(35.2%)
<b>Esophageal varices(EVs)</b>	
Present	73(83%)
Absent	15(17%)
<b>EVs grade</b>	
I	11(15.1%)
II	30(41.1%)
III	25(34.2%)
IV	7(9.6%)

As shown in Table 2,there was significance difference in the parameters between the two groups of patients(without EVs) in which portal diameter and spleen size

were greater in patients with EVs, whereas platelet count and platelet count/spleen size ratio were lower in those patients in comparison with the group2. There was no

significance difference between the two groups in regard to sex and age.

**Table 2: Demographic characteristics and echographic findings of the study population by comparison of the two groups.**

Variables	Group1 Cirrhotic patients with EVs n 73= (83%)	Group2 Cirrhotic patients without EVs n 15= (17%)	p-value
Age(year)	56[25-83]	60[21-76]	0.9
<b>Sex</b>	50(68.5%)	8(53.5%)	0.2
Male Female	23(31.5%)	7(46.7%)	
Portal diameter(mm)	14.35±3.3	11.82±1.8	0.005
Spleen diameter (cm)	16.98±4.3	14.08±2.7	0.002
Platelet count(cell/10 <sup>3</sup> )	100.95±72.7	175.33±73.7	0.001
Platelet count/spleen size ratio	674.13±541.8	1342.4±738.2	0.0001

All parameters were in the normal range in patients without EVs. Portal diameter and spleen size were increased in presence EVs in particular in large EVs,

whereas platelet count and platelet count/spleen size ratio are decreased in presence EVs in particular in large EVs Table(3).

**Table 3: Comparison of parameters in cirrhotic patients according to size of EVs.**

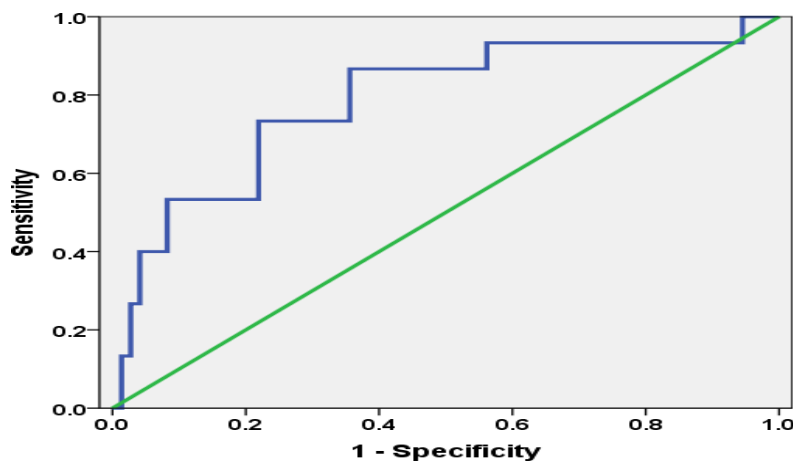
Variables	Without EVs	Small EVs	Large EVs	P-value
Portal diameter(mm)	11.8±1.8	14.1±3.1	14.7±3.4	0.01
Spleen size(cm)	14.08±2.7	16.6±3.6	17.5±5.1	0.03
Platelet count(cell/10 <sup>3</sup> )	175.3±73.7	102.8±61.8	98±86.8	0.003
Platelet count/spleen size ratio	1342.4±738.2	687.2±695.5	663.9±391.4	0.0001

Table4,shows the sensitivity, specificity, positive and negative predictive value of various parameters in predicting EVs, and the optimum cut off is mentioned along with the variables. Platelet count/spleen size ratio

was the best parameter with the accuracy 77.3% for determining presence of EVs in cirrhotic patients. A cut off of 902 yielded a sensitivity and specificity of 77% and75% respectively.

**Table 4: Comparison of accuracy of the parameters in predicting the presence of EVs.**

variable	Sensitivity	Specificity	PPV	NPV	Accuracy	P-value
Spleen size>13.5	80.8%	40%	86.7%	30%	73.8%	0.08
Platelet count<100	63%	73.3%	92%	28.9%	64.7%	0.01
Portal diameter>13	67.1%	80%	94.2%	33.3%	69.3%	0.02
Platelet count/spleen size ratio<909	78%	73.3%	93.5%	40.7%	77.3%	0.001



**Fig. 1: Receiver operating curve of platelet count/ spleen size ratio: AUC 0.78[0.65-0.92]**

**DISCUSSION**

This Cross sectional study demonstrated the high

prevalence of EVs in cirrhotic patients. Portal diameter and spleen size were greater in patients with EVs,

whereas platelet count and platelet count/spleen size ratio were lower in those patients in comparison with the other group (without EVs), and these changes are associated with the size of EVs. The cutoff of platelet count/ spleen size ratio 902 was the optimal value for accurate prediction of EVs with AUC of 0.78 and this value corresponded to sensitivity: 77%, specificity: 75%. The results of our study were comparable with previous study.

Baig et al (2008) in his study of 150 cirrhotic patients who underwent screening endoscopy found EVs in 70.6%. The platelet count/ spleen size ratio had the highest accuracy for diagnosis EVs in which the area under the ROC curve was 94% which was significantly greater as compared with the accuracy of other indices.<sup>[12]</sup>

According to Mohamed et al study (2010) in Egypt which showed that platelet count/ spleen size ratio has excellent accuracy (96.5%) in the assessment of EVs in cirrhotic patients.<sup>[13]</sup>

Maria et al (2014) found in the study conducted in Mexico that non-invasive parameters (platelet count/ spleen size ratio, spleen size, portal vein diameter) were predictive factors for presence of large EVs, and the best predictive factor was platelet count/ spleen size ratio < 909 (OR = 2.2; 95% CI -1.3 to 1.8, p = 0.003).<sup>[14]</sup>

Hong et al (2009) reported that portal vein diameter and spleen width rather than platelet count may predict presence of EVs in patients with cirrhosis related to hepatitis B, in which accuracy values were 76.7%, 72.6% for portal vein diameter, spleen width respectively.<sup>[15]</sup>

Thomas et al (2001) study of 300 patients with liver cirrhosis demonstrated that low platelet count was associated with the presence of varices (OR: 2.3; 95%).<sup>[16]</sup>

## CONCLUSION

Platelet count/ spleen size ratio may be proposed as a good noninvasive diagnostic tool to conventional Esophagogastrosocopy for screening EVs in cirrhotic patients and improving prognosis.

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