

## STUDY OF PLATELET COUNT-SPLEEN DIAMETER RATIO AS A NON-INVASIVE PREDICTOR OF OESOPHAGEAL VARICES IN PATIENTS WITH CIRRHOSIS OF LIVER

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### ABSTRACT

#### BACKGROUND

Most cirrhotic patients will develop oesophageal varices over their lifetime and the annual rate of oesophageal haemorrhage is 5 to 15%. Current guidelines recommend using Upper Gastrointestinal Endoscopy (UGIE) to screen all cirrhotic patients at diagnosis for identification of varices at a high risk of bleeding. In a limited resources setting like ours where financial constraints are a major problem predicting the presence and grade of varices by non-invasive methods serves to help a lot in various ways.

The aim of the study is to find out the relevance of platelet count-spleen diameter ratio as a non-invasive predictor of oesophageal varices in patients with hepatic cirrhosis.

#### MATERIALS AND METHODS

The present study was conducted on 100 patients admitted with a diagnosis of cirrhosis of liver in general medicine wards of M.K.C.G. Medical College, Brahmapur, during the period of 2 years. All the patients underwent detailed clinical evaluation, total platelet count, ultrasound abdomen and varices were graded by upper GI endoscopy with Paquet's grading.

Statistical Analysis- All data were entered in Excel 2007 and statistical analysis was performed using the statistical software SPSS 16.0. Data were expressed as frequency (in percentages), median values (with range (minimum, maximum)). For continuous variables, Mann-Whitney U test was performed to find the differences between two groups.

Study Design- Cross-sectional analytic study.

#### RESULTS

100 patients with hepatic cirrhosis were evaluated with upper GI endoscopy, ultrasound abdomen and total platelet count. Median platelet count in large varices group was 90,100 and in small varices group was 2 lakhs. Large varices were significantly correlated with increasing spleen size, median value - 182.5 mm. Platelet count-spleen diameter ratio was significantly low in patients with higher grade of oesophageal varices.

#### CONCLUSION

This study shows significant association between low platelet count, higher spleen size and lower platelet count-spleen diameter ratio with the presence of large oesophageal varices. These parameters can be used as non-invasive predictors of oesophageal varices in patients with hepatic cirrhosis, but never comparable with upper GI endoscopy in terms of sensitivity and specificity in prediction of variceal haemorrhage.

#### KEYWORDS

Cirrhosis, Oesophageal Varices, Platelet Count-Spleen Diameter Ratio, Upper GI Endoscopy.

**HOW TO CITE THIS ARTICLE:** Minz NT, Sethy G, Kuttikrishnan A. et al. Study of platelet count-spleen diameter ratio as a non-invasive predictor of oesophageal varices in patients with cirrhosis of liver. J. Evid. Based Med. Healthc. 2018; 5(2), 132-134. DOI: 10.18410/jebmh/2018/29

#### BACKGROUND

Most cirrhotic patients will develop oesophageal varices over their lifetime. Despite improved diagnosis and treatment for

*Financial or Other, Competing Interest: None.*

*Submission 19-12-2017, Peer Review 27-12-2017,*

*Acceptance 03-01-2018, Published 05-01-2018.*

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*DOI: 10.18410/jebmh/2018/29*

variceal haemorrhage, the mortality rate still remains high (20%-35%). Even though Upper Gastrointestinal Endoscopy (UGIE) is believed to be the gold standard to diagnose oesophageal varices, the use of UGIE has its own limitations. Some non-invasive means have been proposed for prediction of oesophageal varices in order to restrict UGIE to the population with high risk of variceal bleeding. The platelet count to spleen diameter ratio proposed by Giannini et al<sup>1</sup> appears to be the best non-invasive predictor of EVs that has been developed so far. This study aims to check the relevance of platelet count-spleen diameter ratio for the



prediction of oesophageal varices in patients with cirrhosis of liver.

**MATERIALS AND METHODS**

The present study was conducted on 100 patients admitted with a diagnosis of cirrhosis of liver at General Medicine Wards of M.K.C.G. Medical College, Brahmapur, during the period of 2 years. Diagnosis of cirrhosis was based on clinical, biochemical and ultrasonographic findings. Individuals presenting with variceal bleed, those with a past history of bleed and who had undergone sclerosis or band ligation of oesophageal varices, portal vein thrombosis, hepatoma, those who are on current or past treatment with beta-adrenergic receptor blockers were excluded. All the patients underwent detailed clinical evaluation, blood investigations (including total platelet count), imaging studies (ultrasound abdomen) and upper GI endoscopy. At UGI endoscopy, the oesophageal varices was graded as large (grade III-IV) or small (grade I-II), based on Paquet’s grading system (grade 1 varices are small and flattened by insufflations of air; grade 2 varices are slightly larger and do not flatten; grade 3 varices are larger, but do not touch in the middle of the lumen; grade 4 varices are large and touch each other in the middle of the lumen).

All data were entered in Excel 2007 and statistical analysis was performed using the statistical software SPSS 16.0. Data were expressed as frequency (in percentages), median values (with range (minimum, maximum)). For continuous variables, Mann-Whitney U test was performed to find the differences between two groups.

**RESULTS**

Out of 100 total patients, 56 had small varices and 44 had large varices.

In small varices group, median age was 48 (17-72). In large varices group, median age was 50 (26-73). In small varices group, 40 patients were male and 16 patients were female. In large varices group, 34 patients were male and 10 patients were female.

All three parameters (i.e., platelet count, spleen diameter and platelet count-spleen diameter ratio) were significantly different between the two groups, i.e. patients with small or no varices and those with large varices (Tables 1, 2 and 3). However, the platelet count to spleen diameter ratio was the parameter with the highest accuracy for identifying the presence of EVs in cirrhosis patients. The sensitivity and specificity of predicting large oesophageal varices were also calculated for the platelet count-spleen diameter ratio cut-off of 909 (obtained in the original study by Giannini et al); the values obtained in the present study were 87% and 68%, respectively. These values were lower than those of the study by Giannini et al, but were still acceptably high.

	Varices Grade			
	Small (Grade I-II) or No varices		Large Varices (Grade III-IV)	
	N=56		N=44	
	Median	Range	Median	Range
Platelet count	2,00,000	(42,000 - 4,42,000)	90,100	(28,000 - 2,45,000)
p-value	p <0.005 (significant)			

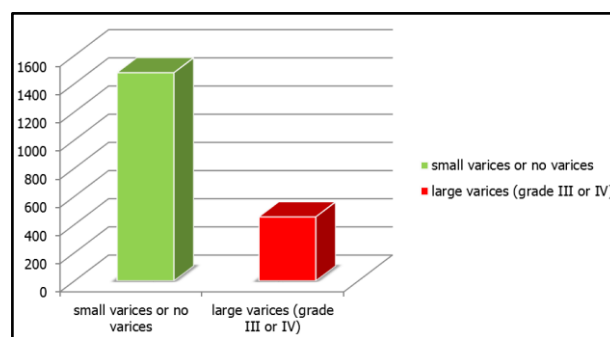
**Table 1. Total Platelet Count and Grade of Varices**

	Varices Grade			
	Small (Grade I-II) or No Varices		Large Varices (Grade III-IV)	
	N=56		N=44	
	Median	Range	Median	Range
Spleen size (mm)	142.0	(92-218)	182.5	(140-258)
p-value	p <0.001 (significant)			

**Table 2. Maximum Spleen Diameter and Grade of Varices**

	Varices Grade			
	Small (Grade I-II) or No Varices		Large Varices (Grade III-IV)	
	N=56		N=44	
	Median	Range	Median	Range
Platelet count\spleen diameter ratio	1477.6	(300.0 - 4804.3)	454.1	(144.3 - 1601.3)
p-value	P <0.001 (significant)			

**Table 3. Correlation of Varices Grades with Platelet Count/Spleen Diameter Ratio**



**Median Platelet Count/Spleen Diameter Ratio Vs. Varices Grade**

**DISCUSSION**

Approximately, 30% of patients with oesophageal varices will bleed within the first year after diagnosis. 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>2</sup> The presence of gastroesophageal varices correlates with the severity of liver disease. 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>3</sup>

The use of UGIE has its own limitations. Diagnosis of oesophageal varices by UGIE depends on the performance of individual endoscopists. Most of the patients who undergo screening UGIE don’t have varices. Unnecessary UGIE screening also increases the associated healthcare costs. Also, the application of UGIE is an unpleasant procedure to

patients. Lastly, it may have detrimental effects such as increasing the risk of bleeding and infection.

Many studies<sup>4-10</sup> have shown that platelet count and spleen diameter correlate well with the presence of EVs. But, in patients with chronic liver disease, the presence of a decreased platelet count may depend on several factors other than portal hypertension such as shortened mean platelet lifetime, decreased thrombopoietin production or myelotoxic effects of alcohol or hepatitis viruses.<sup>11</sup> For this reason, Giannini et al attempted to devise a new parameter that might be more consistent with the non-invasive diagnosis of EVs in cirrhotic patients.

The parameter connects thrombocytopenia to splenomegaly to introduce a variable that takes into consideration the decreased platelet count most likely attributed to hypersplenism caused by portal hypertension.<sup>11</sup> Giannini et al reported the platelet count/spleen diameter ratio to be the only independent variable associated with presence of oesophageal varices on multivariate analysis and identified a cut-off value of 909 giving high sensitivity and specificity. The present study with the same cut-off predicts the presence of large varices (grade III-IV) with a sensitivity and specificity of 87% and 68%, respectively.

## CONCLUSION

Most current guidelines<sup>12-14</sup> recommend that all cirrhotic patients be screened by upper gastrointestinal endoscopy for the presence of EVs at the time of diagnosis. Though this study comprise a small number of patients still shows significant association between low platelet count-spleen diameter ratios with the presence of large oesophageal varices. In a developing country like India, where resources are limited and endoscopy facilities are not available everywhere, these parameters can be used as non-invasive predictors of oesophageal varices in patients with hepatic cirrhosis, but never comparable with upper GI endoscopy in terms of sensitivity and specificity in prediction of variceal haemorrhage.

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