

Association of Platelet Count/Spleen Size Ratio in Relation with Grades of Esophageal Varices and Severity of Chronic Liver Disease

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ABSTRACT

Background: Most serious complication of portal hypertension in patients with liver diseases is esophageal varices. This study was conducted to evaluate non-invasive predictors of large esophageal varices in comparison with small or absent varices in patient with cirrhosis.

Objective: To assess the association of platelet count/spleen size ratio in relation with severity of varices and to compare with Child Pugh's score of chronic liver disease.

Methodology: A Hospital based cross section study was conducted in Department of General Medicine and Gastroenterology. The study population is of 90 who were diagnosed to have chronic liver disease based of ultrasonogram and biochemical test.

Results: Incidence of large varices was seen in 34.4%. On multivariate analysis, only spleen diameter is independent predictors for the presence of large varices with mean size of 14.2cm. The sensitivity of PC/SD Ratio of ≤ 909 in predicting presence of esophageal varices in our study was 61.29 and specificity was 61.02%. However, the mean PC/SD to predict the large esophageal varices in our study was ≤ 962.3 and small and absent varices was 1172.7. Although there is significant reduction in PC/SD ratio between the two groups it was not statistically significant.

Conclusion: From our study we conclude that presence of splenomegaly and lower PC/SD ratio determine the presence of higher grades of varices and can hence identify the patients who require endoscopy for the prophylactic management of esophageal varices.

Key words: platelet count/spleen size ratio, esophageal varices, Child Pugh's score, chronic liver disease

INTRODUCTION

Portal hypertension is the most common and deadly complication of chronic liver disease.¹ As the consequence, Gastro esophageal varices, ascites, hepatic encephalopathy, hepatorenal syndrome, hepatopulmonary syndrome and hypersplenism can develop. Portal hypertension is associated with increase in hepatic venous pressure gradient to $>5\text{mmHg}$ and is considered as the major complication of cirrhosis. Serious complication of portal hypertension is variceal bleed which is associated with high mortality. 60-80% of cirrhotic liver patients has varices with 25-35% of bleeding risk.²

The best way to detect varices is endoscopic evaluation of upper GI system. However, inconvenience, patient intolerance, contraindication, cost and lack of equipment justifies the need for development of noninvasive methods. Noninvasive method among them is platelet count/spleen diameter ratio which showed high sensitivity for prediction of large varices.³ Overall, large spleen size, low platelet count, or their combination (platelet count to spleen diameter ratio), fibro scan, portal vein size or presence of collaterals on ultrasound, hypersplenism and Child Pugh

score were the predictors of esophageal varices either directly or indirectly linked to portal hypertension.⁴The platelet count to spleen diameter ratio was the only parameter with the highest accuracy for identifying the presence of Esophageal varices in cirrhosis patients; it was consistently associated with the presence or absence of Esophageal varices.

OBJECTIVE

“Association of platelet count/spleen size ratio in relation with grades of esophageal varices and severity of Chronic liver disease”

MATERIALS AND METHODS

Study design: Hospital based cross sectional study

Study area: Department of General Medicine, Sri Manakula Vinayagar Medical College, Pondicherry.

Duration of study: 18 months from date of approval of Human Ethics Committee.

Study Participants: Patients admitted under Department of General medicine and Department of Gastro-enterology with features suggestive of Chronic Liver Disease in Sri Manakula Vinayagar Medical College and Hospital, Pondicherry.

Sample Size: Sample size was calculated to be 90 using software nMaster version 2.0 using sensitivity as 94% from previous study with 95% confidence interval and 5% absolute precision.⁵

Inclusion Criteria: All patients with chronic liver disease in Medicine and Gastroenterology ward.

Exclusion Criteria:

- Active bleeding
- Previous endoscopic sclerosis or band ligation of EV.
- Previous surgery for portal hypertension or TIPSS placement.
- Patients who were on primary prophylaxis for EV.

Source of Data: Patients who admitted in Medicine and Medical Gastroenterology ward, SMVMCH with clinical suspicion or

biochemical abnormality suggestive of portal hypertension and chronic liver disease.

Methodology: All patients underwent biochemical tests, like liver function tests, complete blood counts, renal function tests, prothrombin time, ultrasonography of the abdomen to confirm the presence of cirrhosis and to record the spleen bipolar diameter and ascites. Upper GI endoscopy was done in all patients to confirm the presence of varices and to grade them. We tried to identify non-invasive parameters for predicting the severity of esophageal varices in Cirrhotic patients. We assessed the role of Platelet count/Splenic diameter ratio for predicting esophageal varices in cirrhotic patients

RESULTS

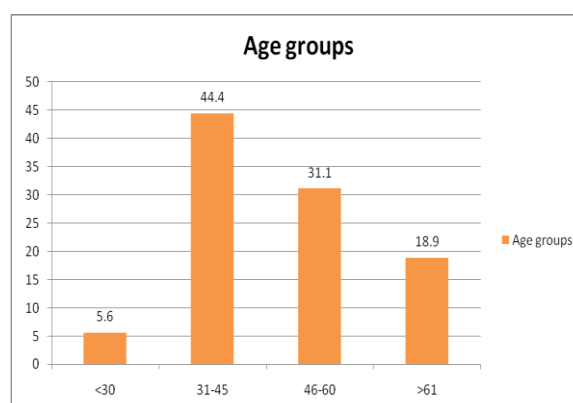


Fig 1. Most of the study participants belongs to 31-45 years of age followed by 46-60years

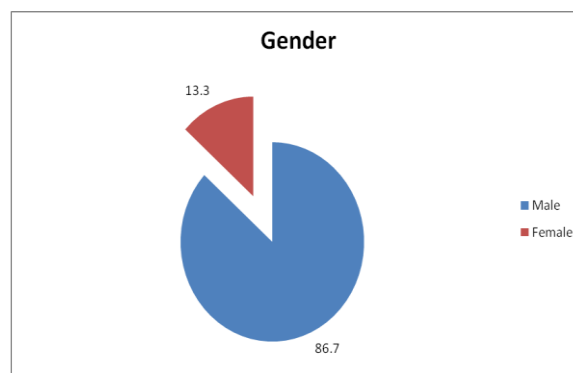


Fig 2. Most of the study participants are male, percentage 86.7 % and female is 13.3%

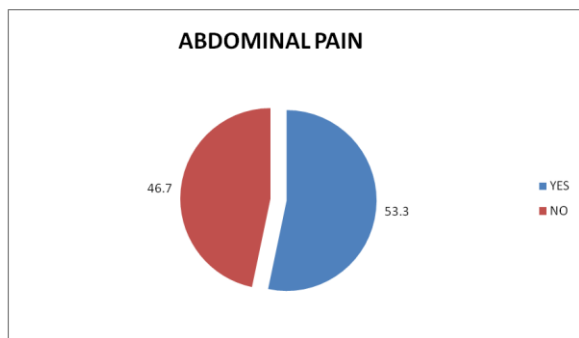


Fig 3. 48 out of 90 patients, 53.3% had presented with abdominal pain as chief complaint.

Presence of Melena	Frequency	Percent
Yes	52	57.8
No	38	42.2
Total	90	100.0

The above table 1 shows that, 52 out of 90 patients i.e.57.8% had history for malena as predominant symptom.

Presence of Hematemesis	Frequency	Percent
Yes	11	12.2
No	79	87.8
Total	90	100.0

From the above table 12.2% of study participants had complaints of hematemesis

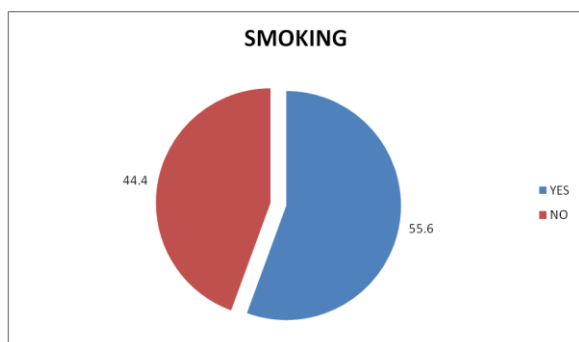


Fig 5. 55.6%, 50 out of 90 of study participants had smoking history.

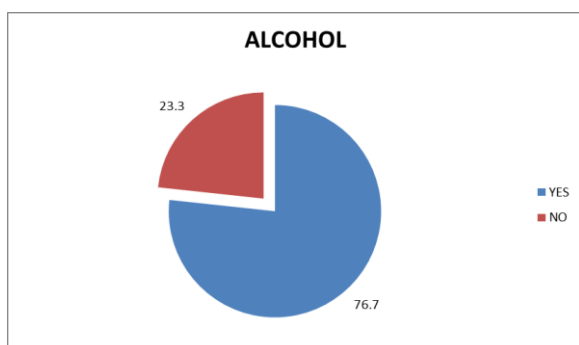


Fig 6. 76.7% of study participants were chronic alcoholic patients

History of Diabetes	Frequency	Percent
Yes	11	12.2
No	79	87.8
Total	90	100.0

History of Hypertension	Frequency	Percent
Yes	3	3.3
No	87	96.7
Total	90	100.0

12.2% were having history of diabetes and 3.3% were having history of hypertension.

Signs of LF	Frequency	Percent
Yes	55	61.1
No	35	38.9
Total	90	100.0

61.1% of participants were presented with signs of liver cell failure

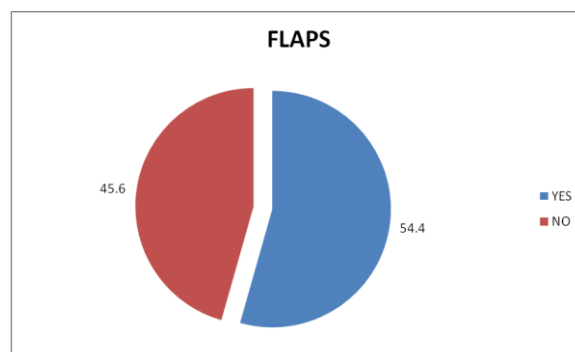


Fig 7. 54.4% of study participants were presented with flapping tremors

H/O Hep B	Frequency	Percent
Yes	5	5.6
No	85	94.4
Total	90	100.0

UGI scopy (grade)	Frequency	Percent
0	6	6.7
1	21	23.3
2	32	35.6
3	29	32.2
4	2	2.2
Total	90	100.0

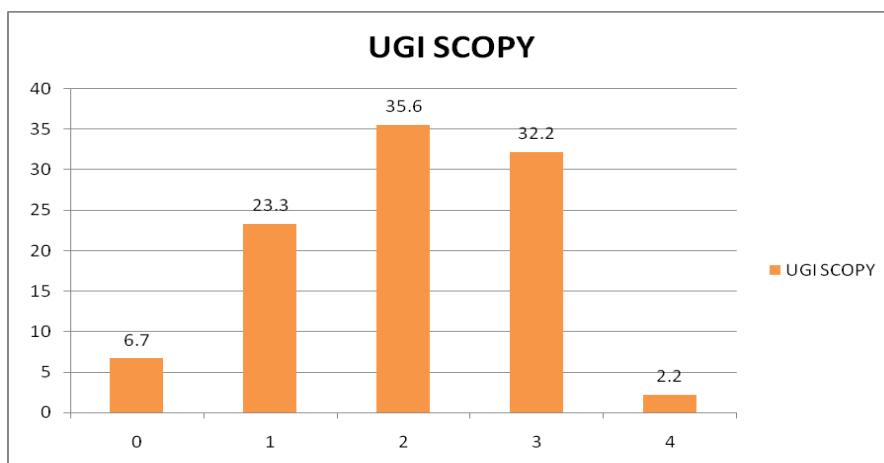


Fig 8. Most participants 35.6% of patients were having Grade 2 varices followed by 32.2% with Grade 3 varices.

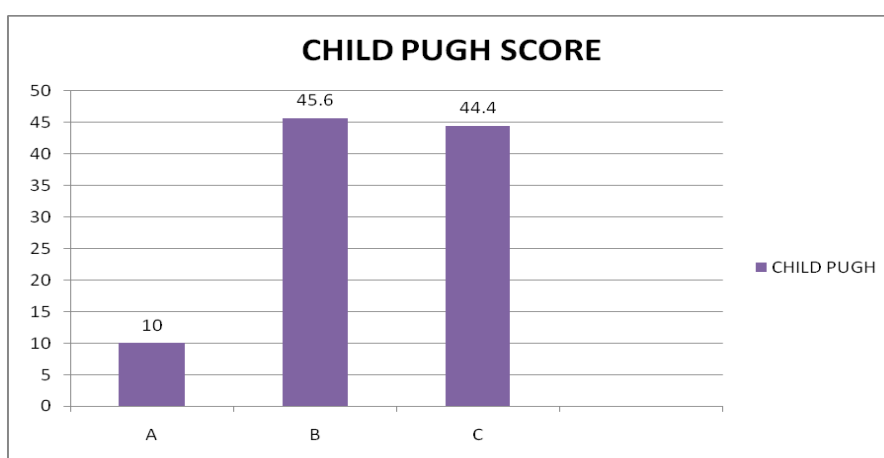


Fig 9. 41 out of 90 participants, 45.6% belongs to Child B score and 44.4% belongs to Child C score.

Platelet count	Frequency	Percent
<50000	7	7.8
50000-100000	17	18.9
1,00,001-1,50,000	35	38.9
>1,50,001	31	34.4
Total	90	100.0

38.9% of participants were having platelet count between 1,00,000 to 1,50,000.

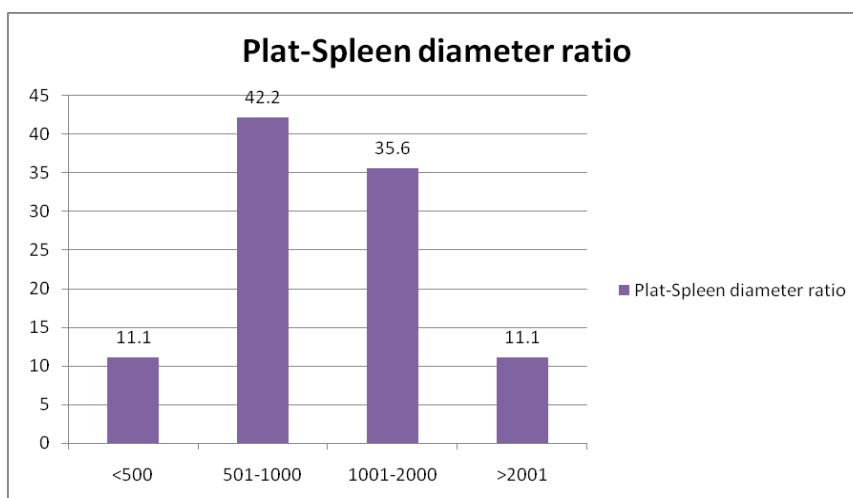


Fig 10. Most study participants, 42.2% were having PC/SD ratio of 500-1000 followed by 35.6% with 1000-2000.

Table 9. Distribution of study participants who had Large Varices

Varices	Frequency	Percent
Yes	59	65.6
No	31	34.4
Total	90	100.0

65.6% of study participants, 59 out of 90 participants were having large varices.

Table 10. Association between variables and varices

Variables	Presence of varices		P value
	Large Mean (S.D)	Small/absent Mean (S.D)	
Pulse rate	90.13 (12.6)	85.32 (12.14)	0.08
Systolic BP	93.16 (8.66)	99.32 (13.5)	0.02
Diastolic BP	64.65 (6.09)	66.31 (7.6)	0.3
Random blood sugar	127.1 (78.86)	126.58 (54.81)	0.96
Urea	27.77 (12.8)	27.41 (16.3)	0.91
Creatinine	0.96 (0.30)	0.92 (0.38)	0.57
Hemoglobin	8.99 (2.7)	10.01 (2.5)	0.08
Total count	6896 (4090.1)	8272 (4249.0)	0.14
SGOT	83.87 (119.3)	75.22 (56.06)	0.6
SGPT	37.13 (31.52)	30.21 (16.1)	0.17
ALP	193.7 (102.3)	176.19 (117.1)	0.48
BT	4.13 (4.4)	5.4 (6.5)	0.3
BD	2.21 (3.2)	2.84 (3.9)	0.4
Protein	7.21 (0.66)	7.3 (0.73)	0.52
Albumin	3.44 (0.69)	3.46 (0.70)	0.91
Prothrombin time (T)	20.57 (7.08)	20.04 (5.2)	0.89
PT©	13.73 (2.5)	13.34 (0.7)	0.27
INR	1.522 (0.44)	1.56 (0.47)	0.67
Platelets	134677.42 (76616.1)	146423.73 (83130.18)	0.51
Spleen diameter	142.9 (24.20)	127.2 (15.6)	0.01
Platelet/spleen diameter ratio	962.3 (564.3)	1172.7 (698.95)	0.15
	N= 31	N=58	

Table 11. Association between Platelet count, Spleen bipolar diameter and PC/SD ratio with severity of varices

Variables	Presence of varices		Total	
	Large	Small/absent		
Platelets count				
<50000	5 (16.1)	2 (3.4)	7	
50,001-100000	5 (16.1)	12 (20.3)	17	0.17
100001-150000	10 (32.3)	25 (42.4)	35	
>150001	11 (35.5)	20 (33.9)	31	
Spleen Bipolar diameter				
<100	2 (6.5)	3 (5.1)	5	
101-200	28 (90.3)	56 (94.9)	84	0.36
>201	1 (3.2)	0 (0.0)	1	
Platelet count/Spleen diameter ratio				
<500	2 (6.5)	8 (13.6)	10	
501-1000	13 (41.9)	25 (42.4)	38	0.67
1001-2000	13 (41.9)	19 (32.2)	32	
>2001	3 (9.7)	7 (11.9)	10	

Table 12. Correlation of child Pugh grade with UGI scopy findings

	Child pugh score	UG endoscopy				Total	
		0	1	2	3		
1	A	2 (33.3)	3 (14.3)	3 (9.4)	1 (3.4)	0 (0.0)	9 (10.0)
2	B	3 (50.0)	8 (38.1)	16 (50.0)	14 (48.3)	0 (0.0)	41 (45.6)
3	C	1 (16.7)	10 (47.6)	13 (40.6)	14 (48.3)	2 (100.0)	40 (44.4)

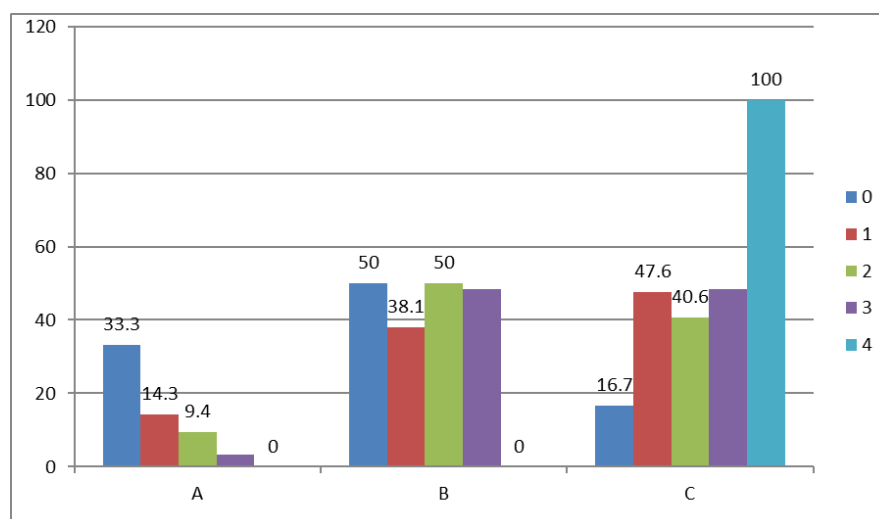


Fig 11. Most Child B and Child C participants were having Grade 2 and Grade 3 esophageal Varices

DISCUSSION

On comparing with platelet count majority of patients, 38.9% that is 35 of study participants had platelet count between 1,00,000 to 1.50,000 followed by 34.4% of participants has more than 1,50,000. Of PC/SD ratio, majority of patients belonged to category of 500-1000 which is 42.2% of study participants. 35.6% of participants has ratio between 1000-2000.

Relationship between noninvasive parameters like Serum Bilirubin, transaminases, Serum albumin, Hemoglobin, Platelet count, spleen bipolar diameter, PC/SD ratio to presence of varices was studied. Of these only spleen diameter ($P < 0.05$) had statistical significance.

Studies by Chalasani et al (1999), Sanjay Kumar et al (2006), Torres et al (1996) state that splenomegaly is an independent predictor of presence of varices. Although there is a significance difference between two groups in PC/SD ratio, it is not statistically significant.

From the above comparison table, it is evident that majority of the patients with esophageal varices had platelet count between 1,00,000 to 1,50,000 with 35 patients, 5 patients (16%) with large varices had platelet of $< 50,000$ whereas only 2 patients (3.4%) had small varices. and Spleen bipolar diameter in the range of 100-200mm constituting 84% and the Platelet count/ Spleen diameter ratio less

than 1000 in 48% but there was no significant difference in ratio between patients with large varices and small varices.

The platelet count/ spleen diameter ratio was deemed to be the appropriate parameter to be used as splenomegaly is implicated in thrombocytopenia of cirrhosis with spleen size being inversely correlated with platelet count. The use of this ratio normalizes platelet count to splenic sequestration since platelet count alone may be misleading and cannot be solely attributed to portal hypertension.

Therefore, noninvasive methods have been developed to predict the presence and size of varices. in a study conducted in Mexico by González-Ojeda et al., they demonstrated that P/S ratio could predict the presence of varices with 84% sensitivity and 70% specificity. Sarangapani et al. reported that P/S ratio could predict large esophageal varices with higher sensitivity and specificity. Meta-analysis performed by Ying et al. included 20 studies with 3063 patients demonstrated that P/S ratio could predict esophageal varices with 92% sensitivity.

In our study 9 out of 90 participants belongs to child A score of which only one had large varices and 14 patients in child B and 16 patients in child C had large varices. The accuracy of the platelet count/spleen diameter ratio was maintained across the

whole spectrum of disease severity. In particular, the platelet count/spleen diameter ratio obtained very good results even when the prevalence of EV was low as in Child-Pugh class A patients. This is not a negligible result, because prophylaxis of first bleeding is especially important in these patients.

CONCLUSION

From our study we conclude that presence of splenomegaly and lower PC/SD ratio determine the presence of higher grades of varices and can hence identify the subset of patients who require endoscopy for the prophylactic management of esophageal varices. Therefore, reduce the burden on the endoscopy units, avoiding unnecessary screening endoscopies and as well may reduce the cost of management of bleeding varices.

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