Section: General Medicine

Original Research Article

A STUDY OF NON ENDOSCOPIC PARAMETERS TO PREDICT THE PRESENCE OF ESOPHAGEAL VARICES IN PATIENTS WITH CIRRHOSIS OF LIVER : A CROSS-SECTIONAL STUDY FROM KIMS TEACHING HOSPITAL, KOPPAL

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ABSTRACT

Background: Esophageal variceal hemorrhage, a life threatening complication of portal hypertension is associated with increased morbidity and mortality. Current guidelines recommends the Upper Gastrointestinal (GI) Endoscopy as a screening tool to detect Esophageal varices. This study explores the efficacy of non-endoscopic parameters in predicting the presence of Esophageal varices.

Materials and Methods: This prospective observational study was conducted over 18 months among 30 participants who met inclusion and exclusion criteria. Detailed history, clinical examination and investigations like liver function test, PT/INR, platelet count, spleen and portal vein diameter using ultrasonography abdomen, AST to Platelet Ratio Index(APRI) score, platelet count to spleen diameter were assessed, Upper GI endoscopy to confirm esophageal varices.

Results: Out of 30 patients, 20 (66.7%) had esophageal varices. APRI ($p = 0.0126$), spleen diameter ($p = 0.0153$), and platelet/spleen ratio ($p = 0.0909$) showed significant or near-significant associations. Portal vein diameter >13 mm ($p = 0.032$) and Child-Pugh Class B/C ($p = 0.010$) were also significantly associated. Platelet count alone did not show a significant correlation with variceal presence.

Conclusion: The results of our study concluded that utilisation of non endoscopic parameters helps in assessing the presence of Esophageal varices and prevent its complications through prophylactic measures.

Keywords: Esophageal varices, platelet count,spleen diameter, APRI score, portal vein diameter.

INTRODUCTION

Chronic liver disease(CLD) remains a major health challenge globally and significantly contribute to mortality due to its complications like Hepatic encephalopathy, Hepatorenal syndrome, esophageal variceal hemorrhage. Portal hypertension that arise as a consequence of cirrhosis leads to the formation of collateral blood vessels, including esophageal varices which pose a significant risk of life threatening hemorrhage. About 50% of the patients with cirrhosis develop esophageal varices.[1] Therefore, early identification and risk assessment of varices are crucial for timely medical intervention. Traditionally, Upper Gastrointestinal(GI) endoscopy is the standard diagnostic tool, however its invasive nature and limited accessibility in certain healthcare settings have driven the need for non endoscopic predictive methods. Recent advancements in medical research have led to the utilisation of several non endoscopic parameters including platelet count, spleen diameter

, portal vein diameter & other non invasive indices, in assessing the likelihood of esophageal varices and associated risk of bleeding.

Aim of the Study: This study mainly evaluated Platelet count, spleen & portal vein diameter, platelet count to spleen diameter ratio, Child pugh class and AST to platelet ratio index as a non endoscopic predictor of esophageal varices in cirrhotic patients admitted in KIMS teaching hospital, Koppal.

Objective: To determine the non endoscopic factors that are helpful in predicting Esophageal varices in individuals with liver cirrhosis

MATERIALS AND METHODS

This prospective observational study was conducted at KIMS Teaching hospital, Koppal, among 30 cirrhotic patients in a period of 18 months, from July 2023 to December 2024. Approval for the study was granted by the Institutional Ethical Committee (IEC CDSCO Reg No. ECR/1431/Inst/KA/2020) and informed consent was obtained from all participants. This research has employed inclusion & exclusion criteria to ensure the appropriateness of the study population.

Inclusion Criteria

All the patients (≥18 years) who fulfilled the diagnosis of cirrhosis or proven liver cirrhosis are included in this study.

Exclusion Criteria

- Individuals with active bleed
- Those with past history of variceal bleed
- Undergoing betablockers or nitrate therapy
- Gastrointestinal malignancies including HCC
- Lymphoproliferative diseases
- Who had undergone band ligation of Esophageal varices
- Patients not willing for study

Data Collection: Data collection involved detailed history to identify several medical conditions including hepatic encephalopathy, gastrointestinal bleed, pedal edema, oliguria, ascites, jaundice and comprehensive clinical examination, laboratory investigations to fulfil the inclusion and exclusion criteria of all patients were taken. Non endoscopic parameters like platelet count, portal vein & spleen diameter, platelet count to spleen diameter ratio, Child Turcotte Pugh class, AST to Platelet Ratio Index(APRI), ultrasonography to detect above mentioned parameters and upper gastrointestinal endoscopy to confirm the presence of Esophageal varices. To eliminate the bias, endoscopists and sonologists were blinded to the clinical and laboratory data.

Data Analysis: Data was entered into Microsoft Excel and analysed using SPSS version 25. Categorical variables were expressed as frequencies and proportions with chi-square or fishers extract text applied as appropriate. Continuous data were expressed as mean+- standard deviation. Correlation analysis were conducted to investigate the relationship between various parameters. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic characteristics of study participants with percentage

Age	**Frequency{n=30}**	**Percentage**
18-28	1	3.33%
28-38	14	46.6%
38-48	9	30%
48-58	6	20%
Gender	**Frequency {n=30}**	**Percentage**
Female	5	16.7
Male	25	83.3

The majority of the study population (46.6%) were in the age group 28–38 years, followed by 30% in the 38–48 years group. Males predominated the sample with 83.3%, while females constituted only 16.7%, indicating a significant male preponderance in the study.

Table 2: Association between the different non-endoscopic parameters according to presence and absence of Esophageal varices using Chi-square/Fisher's exact test

Characteristics	**Variceal group(20)**	**Non variceal group(10)**	**P- value**
Gender			
Male	18	9	
Female	2	1	
Age			
Minimum age	27 Y	29 Y	
Maximum age	58 Y	50 Y	
Plateletcount			0.235
<80,000	9	2	
≥80,000	11	8	
Spleen diameter			1.000
>180mm	1	0	

<180mm	19	10	
Portal vein diameter			0.049*
>13mm	10	1	
<13mm	10	9	
Platelet count / spleen diameter ratio			0.030*
<909	17	4	
≥909	3	6	
Child turcotte pugh class			0.050*
A	0	2	
B	20	8	
C			
Ast to platelet ratio index			0.01**
>3.15	15	1	
<3.15	5	9	

This table evaluates how non-invasive parameters are associated with the presence or absence of esophageal varices using Chi-square/Fisher's exact test:

Portal vein diameter >13 mm showed a statistically significant association with varices (p = 0.049).

Platelet count/spleen diameter ratio <909 also significantly correlated with varices (p = 0.030).

Child-Turcotte-Pugh class B&C had a borderline significant association (p = 0.050).

AST to Platelet Ratio Index (APRI) >3.15 was highly significant (p = 0.01), strongly suggesting its predictive value.

However, platelet count <80,000/mm³ (p = 0.235) and spleen diameter >180 mm (p = 1.000) were not statistically significant.

Table 3: Characteristics of study participants according to presence and absence of Esophageal varices and their Mean with Standard Deviation (including t value & p value)

Characteristics	Presence of Esophageal Varices (n = 20)	Mean ± SD (Presence)	Absence of Esophageal Varices (n = 10)	Mean ± SD (Absence)	t-value	p-value
Platelet Count	43,000 – 2,92,000	1,00,850.0 ± 59,451	35,000 – 2,59,000	1,35,300 ± 67,568.97	-1.369	0.1897
Spleen Diameter (mm)	112 - 200	151.55 ± 23.07	110 - 160	132.1 ± 16.96	2.613	0.0153
Portal vein diameter (mm)	10 - 15	13.05 ± 1.30	9.4 - 17	11.69 ± 2.33	1.716	0.1121
Platelet Count to Spleen Diameter Ratio	250 - 2246	678.43 ± 470.88	291 – 1992	1025.17 ± 512.74	-1.794	0.0909
AST to Platelet Ratio Index	0.6 - 30.4	7.53 ± 7.01	0.2 – 12.4	2.36 ± 3.6	2.667	0.0126
Child Pugh Class	B = 16, C = 4	-	B = 8, A = 2	-	-	-

The comparison of various non-endoscopic parameters between patients with and without esophageal varices is summarized below:

Platelet Count was lower in the variceal group (100,850 ± 59,451) compared to the non-variceal group (135,300 ± 67,568.97). However, this difference was not statistically significant (p = 0.1897).

Spleen Diameter was significantly higher in patients with varices (151.55 ± 23.07 mm) than those without (132.1 ± 16.96 mm), with the difference being statistically significant (p = 0.0153).

Portal Vein Diameter was higher in the variceal group (13.05 ± 1.30 mm) compared to the non-variceal group (11.69 ± 2.33 mm), but this difference did not reach statistical significance (p = 0.1121).

The Platelet Count to Spleen Diameter Ratio was lower in the variceal group (678.43 ± 470.88) than in the non-variceal group (1025.17 ± 512.74), showing a trend toward significance (p = 0.0909).

The AST to Platelet Ratio Index (APRI) was significantly higher in the variceal group (7.53 ± 7.01) compared to the non-variceal group (2.36 ± 3.60), indicating a statistically significant association (p = 0.0126).

Child-Pugh Classification, among patients with esophageal varices, 16 (80%) were classified as Child-Pugh Class B, and 4 (20%) as Class C.

In the non-variceal group, 8 (80%) were Class B, and 2 (20%) were Class A.

Although Child-Pugh classification showed a shift toward more advanced disease in the variceal group, no statistical test was applied due to its categorical nature.

Table 4: Correlation Analysis with the Presence of Esophageal Varices (Including t-value)

Sl No.	Characteristics	Pearson correlation coefficient	p value	Strength of correlation	t-value	Degrees of Freedom	p-value
1	Platelet count <80,000/mm3	0.289	0.114	Weak positive	-1.595	28	0.122
2	Spleen diameter >180mm	0.131	0.472	Weak positive	0.701	28	0.489
3	Portal vein diameter > 13mm	0.391	0.032*	Moderate positive	2.250	28	0.032*
4	Platelet count/spleen diameter ratio <909	0.463	0.011**	Strong positive	2.250	28	0.032*

5	Child Turcotte Pugh class B&C	0.447	0.050*	Moderate positive	2.494	28	0.010**
6	AST to platelet ratio index [APRI SCORE]≤3.15	0.641	0.01**	Strong positive	-4.118	28	0.019**

The statistical analysis included Pearson's correlation to assess strength and direction of associations and independent t-tests to evaluate group-wise differences. The findings are interpreted below:

1. Platelet Count (<80,000/mm³):A weak positive correlation was noted between thrombocytopenia and the presence of esophageal varices (r = 0.289, p = 0.114). However, the difference between groups was not statistically significant on t-test (p = 0.122), indicating limited predictive value of platelet count alone.
2. Spleen Diameter (>180 mm): Spleen size demonstrated a weak positive correlation with varices (r = 0.131, p = 0.472). The difference was not significant (p = 0.489), suggesting that isolated splenomegaly may not be a reliable standalone predictor.
3. Portal Vein Diameter (>13 mm): A moderate positive correlation was observed (r = 0.391), and the association was statistically significant (p = 0.032). This indicates that an increased portal vein diameter is likely associated with portal hypertension and hence, the presence of esophageal varices.
4. Platelet Count to Spleen Diameter Ratio (<909): This ratio showed a strong positive correlation (r = 0.463, p = 0.011), with a statistically significant group difference (p = 0.032). These findings support its utility as a reliable non-invasive predictor of esophageal varices.
5. Child-Turcotte-Pugh Class (B & C): A moderate positive correlation was noted between higher Child-Pugh class and presence of varices (r = 0.447, p = 0.050). The difference was statistically significant on t-test (p = 0.010), indicating that worsening hepatic function is associated with a higher risk of varices.
6. AST to Platelet Ratio Index (APRI ≤ 3.15): APRI demonstrated a strong positive correlation (r = 0.641, p = 0.01), with a highly significant difference between groups (p = 0.019). This suggests that APRI is a robust and independent non-endoscopic marker for predicting esophageal varices.

DISCUSSION

The present study explored the role of various non-endoscopic parameters in predicting the presence of esophageal varices among patients with chronic liver disease (CLD), aiming to identify reliable, easily accessible markers that could reduce the need for invasive endoscopy in low-resource settings.

Our findings demonstrate that AST to Platelet Ratio Index (APRI), Platelet Count to Spleen Diameter Ratio, Portal Vein Diameter, and Child-Turcotte-Pugh (CTP) Class have significant associations with the presence of varices, suggesting their utility in non-invasive screening.

APRI showed a strong positive correlation with the presence of EV (r = 0.641, p = 0.01). This aligns with existing literature, where APRI has been widely studied as a marker of hepatic fibrosis and portal hypertension. Its incorporation into routine assessments could be beneficial, particularly where transient elastography or liver biopsy is not available.

The Platelet Count to Spleen Diameter Ratio, which exhibited a strong correlation (p = 0.032), has previously been proposed by Giannini et al. as a reliable indicator for significant portal hypertension. Our findings support this, suggesting that this simple ratio can serve as a first-line screening tool in outpatient settings.

Portal Vein Diameter >13 mm was significantly associated with varices (p = 0.032). Dilation of the portal vein reflects elevated portal pressures, and its measurement via ultrasound is non-invasive and reproducible, further supporting its inclusion in predictive models.

CTP Class B & C showed a significant correlation with varices (p = 0.010), reaffirming the link between worsening hepatic function and increased portal pressure. This supports the use of liver function scoring systems not only for prognosis but also for variceal risk stratification.

Interestingly, while platelet count <80,000/mm³ and spleen diameter >180 mm were higher among the variceal group, they did not reach statistical significance. This discrepancy from some earlier reports may be due to sample size, heterogeneity in patient populations, or differing thresholds used for cutoff values. Nevertheless, these parameters should not be disregarded and may be more useful when used in combination with others.

Collectively, these findings reinforce the idea that no single parameter is sufficient to predict esophageal varices with high sensitivity and specificity. However, when used in combination, they can significantly reduce unnecessary endoscopic procedures, thereby improving cost-effectiveness and patient compliance in CLD management.

Clinical Implications: Given the burden of cirrhosis and the limited availability of endoscopic services in many parts of the world, especially rural areas, these non-invasive tools offer a practical solution. They allow for risk stratification, helping clinicians prioritize patients for endoscopy based on objective criteria.

Comparison with Other Studies: Our results are consistent with several earlier studies. Giannini et al. and Chawla et al. have highlighted the predictive power of platelet-to-spleen ratio and APRI in cirrhotic patients. The Baveno VI consensus also

supports the use of non-invasive markers for screening, particularly in patients with compensated liver disease.

CONCLUSION

This study highlights the clinical utility of non-endoscopic parameters—such as AST to Platelet Ratio Index (APRI), Platelet Count to Spleen Diameter Ratio, Portal Vein Diameter, and Child-Turcotte-Pugh (CTP) Class—in predicting the presence of esophageal varices in patients with chronic liver disease. Among these, APRI and Platelet/Spleen Ratio emerged as the most reliable indicators, showing statistically significant associations.

These parameters are simple, cost-effective, and easily obtainable during routine clinical evaluation, making them particularly valuable in resource-limited settings where access to endoscopy may be restricted. While endoscopy remains the gold standard for variceal diagnosis, the implementation of these non-invasive tools can aid in risk stratification, minimize unnecessary procedures, and optimize the timing of surveillance endoscopy.

Further large-scale, prospective studies are warranted to validate these findings and develop integrated predictive models that can guide non-invasive screening strategies in cirrhotic patients

Limitations: This study is limited by its sample size (n=30) and single-center design, which may affect external validity. In addition, operator variability in ultrasound measurements and the cross-sectional nature of the data may limit the longitudinal applicability of the findings.

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