

Original Article

Significance of AST to ALT Ratio in Predicting Esophageal Varices in Cirrhotic Patients taking Esophagogastroduodenoscopy as Gold Standard

Syed Zeeshan Ilyas,¹ Faisal Rasheed,¹ Irfan Younus,¹ Muhammad Afzal Choudhry,¹
Furqan Tahir,¹ Adnan Qadir²

¹Aziz Bhatti Shaheed Teaching Hospital Gujrat, ²Islamic international Medical College Rawalpindi

Abstract

Objective: To determine the significance of AST to ALT ratio in predicting esophageal varices taking esophagogastroduodenoscopy (EGD) as the gold standard in cirrhotic patients

Methods: This six-month cross-sectional study included 193 patients. It was conducted in medical ward of DHQ Teaching Hospital, Gujrat from 11th Jul, 2021 to 11th Jan, 2022. Proper history, examination and ultrasound abdomen was done of every patient to make the diagnosis cirrhosis. LFTs and EGD was done of every patient and all data was saved. AST/ALT was calculated and endoscopic presence or absence of esophageal varices was recorded. SPSS 23 was used to enter and analyze the data.

Results: Mean age (years) was 55.68±13.69, eighty-seven (45.1%) were male and 106 (54.9%) females. There were 74 (38.3%) patients of esophageal varices who had AST/ALT ratio more than > 1.12 and 119 (61.7%) patients with less than 1.12 value. On endoscopy 89 (46.1%) patients had esophageal varices. A 2 by 2 table was utilized to determine the diagnostic accuracy, sensitivity, specificity, PPV (positive predictive value) and NPV (negative predictive value) of AST to ALT ratio in predicting esophageal varices taking EGD as gold standard which was 65.28%, 54.02%, 74.53%, 63.51% and 66.39% respectively.

Conclusion: An effective non-invasive diagnostic tool for predicting esophageal varices in cirrhotic patients is the AST/ALT ratio.

Keywords: Esophageal Varices, Cirrhosis, Upper GI Endoscopy, AST, ALT

How to cite this:

Ilyas SZ, Rasheed F, Younus I, Choudhry MA, Tahir F, Qadir A. Significance of AST to ALT Ratio in Predicting Esophageal Varices in Cirrhotic Patients taking Esophagogastroduodenoscopy as Gold Standard. J Pak Soc Intern Med. 2024;5(3): 615-618

Corresponding Author: Dr. Irfan Younus

Email: irfanyounis7887@gmail.com

Received: 16-05-2024

Accepted: 07-08-2024

DOI: <https://doi.org/10.70302/jpsim.v5i3.2451>

Introduction

With a rising fatality rate, cirrhosis ranks as the eleventh most common cause of death worldwide.¹ It is the culmination of numerous long-term liver pathologies, such as persistent viral hepatitis, protracted enormous alcohol use and non-alcoholic fatty liver disease, which varies significantly by region.² The most common cause of cirrhosis in Pakistan is chronic viral hepatitis. With over 10 million individuals living with HCV, Pakistan ranks second globally in terms of the incidence of chronic hepatitis C infection, and the country is seeing an annual increase in the number of cirrhotic patients.³ A common side effect of severe liver cirrhosis, portal hypertension is crucial to the way the illness manifests clinically.

Esophageal varices are the most dangerous side effect of portal hypertension.⁴

One deadly side effect of liver cirrhosis is upper gastrointestinal hemorrhage from the rupture of esophageal varices. For this reason, it is clinically crucial to determine whether these varices are existing in cirrhotic patients in order to prevent variceal bleeding.⁵ Upper gastrointestinal endoscopy is considered the gold standard for the diagnosis of esophageal varices. However, the majority of patients are hesitant to have this procedure done because of its expense, invasiveness, and discomfort.⁶ At the time of diagnosis, almost half of the patients with cirrhosis has esophageal varices, mainly in Child-Pugh class C than in Child-Pugh class A patients (85%

versus 40%).^{7,8} Many non-invasive indicators of esophageal varices have recently been investigated in cirrhotic. The AST/ALT ratio is one of them. A prospective study discovered a strong correlation between the varices present during the first endoscopy and an AST/ALT ratio > 1.129.

In order to anticipate the esophageal varices in cirrhotic patients, this study intends to evaluate the predictive ability of a non-invasive test called the aspartate aminotransferase (AST) to alanine aminotransferase (ALT) ratio. This study aims to assess the predictive power of a non-invasive measure known as aspartate aminotransferase to alanine aminotransferase (AST/ALT) ratio. The results of this study may assist prevent unnecessary endoscopies. No such study had been previously conducted in this hospital and in this part of the country. In the future, this study might be useful to medical students and practitioners in the assessment of patients with cirrhosis.

Methods

The study, which was cross-sectional in nature, was carried out at the Aziz Bhatti Shaheed Teaching Hospital in Gujrat's medical department. The trial ran for six months, from July 11, 2021, to January 11, 2022. By adopting the sequential sampling (non-probability) technique, a total of 103 individuals, both male and female, with confirm diagnosis of liver cirrhosis without past history of upper gastrointestinal bleeding were incorporated in the study. Patients not included in the research were: (1) Chronic B or C hepatitis treatment history, (2) patients with portosystemic shunt, (3) A history of gastrointestinal cancers, such as hepatocellular carcinoma (HCC), and/or gastrointestinal surgeries, (4) Splenic or portal vein thrombosis, (5) Past or present history of lymphoproliferative disease.

The Hospital Ethical Committee gave its permission before informed written consent was obtained for study project participation. Every patient had a complete history, upper gastrointestinal endoscopy, and liver function tests (LFTs). The endoscopic presence or absence of esophageal varices was noted, and the AST/ALT ratio was computed.

For data entry and analysis, SPSS Version 22 was utilized. We used descriptive statistics to measure both qualitative and quantitative parameters. Every qualitative feature was noted, including gender, the AST/ALT ratio, and whether or not esophageal varices were visible during an endoscopy. The calculation of the mean and standard deviation was done for continuous variables, such as age. Based on patient data that was obtained, the diagnostic accuracy of the AST/ALT ratio was evaluated by calculating the sensitivity and specificity using a two-by-two table. Data was categorized according to

child Pugh class, age, gender, and the length of cirrhosis. After stratification, a chi-square test was used, and a p-value of less than 0.05 was regarded as significant.

Results

Mean age was 55.68±13.69 years ranging from 30 to 70 years. Males were 87 (45.1%) while 106 (54.9%) were female. In patients having esophageal varices, the frequency of the AST/ALT ratio was measured.

There were 74 (38.3%) patients of esophageal varices who had AST/ALT ratio more than > 1.12 and 119 (61.7%)

Table 1: distribution according to age, gender, ast/alt ratio and esophageal varices on endoscopy

Variable	Number (n = 193)	Percentage
Age (years)		
Mean ± SD	55.68±13.69	
Range (min-max)	30-70	
Gender		
Male	87	45.1%
Female	103	54.9%
AST/ALT ratio		
> 1.12 (positive)	74	38.3%
< 1.12 (negative)	119	61.7%
Esophageal varices on endoscopy		
Present	89	46.1%
Absent	104	53.9%

patients with less than 1.12 value. On endoscopy 89 (46.1%) patients had esophageal varices (Table. No. 01)

The diagnostic accuracy, sensitivity, specificity, PPV,

Table 2: 2 X 2 table showing Diagnostic Accuracy of AST to ALT ratios in predicting Esophageal Varices in Cirrhotic patients taking Upper GI Endoscopy as Gold Standard

		Esophageal varices on endoscopy		Total
		positive	Negative	
AST/ALT ratio	> 1.12 (positive)	52.8%	26.0%	38.3%
	< 1.12 (negative)	47.2%	74.0%	61.7%
Total		89	104	193

and NPV of the AST to ALT ratio were determined using a 2×2 table, and the results were 65.28%, 54.02%, 74.53%, 63.51%, and 66.39% respectively. (Table No. 02)

The study investigated the diagnostic accuracy of

AST to ALT ratio in predicting esophageal varices in cirrhotic patients undergoing EGD as the gold standard, with effect modifiers such as age (years), duration (months), and child Pugh class (A, B, and C) stratified and compared. (See Table No. 3) Age, duration, and

Table 3: Role of effect modifier like Age, duration of cirrhosis and Child Pugh classes in predicting Esophageal Varices in Cirrhotic patients on the basis of AST/ALT ratio

Age, years	Esophageal varices on endoscopy		p-value
	Present	Absent	
30-50			
AST/ALT ratio	19 (57.6%)	11 (28.9%)	0.015
> 1.12 (positive)	14 (42.4%)	27 (71.1%)	
< 1.12 (negative)			
51-70			
AST/ALT ratio	28 (50.0%)	16 (24.2%)	0.003
> 1.12 (positive)	28 (50.0%)	50 (75.8%)	
< 1.12 (negative)			
Duration of cirrhosis			
1-3 months			
AST/ALT ratio			0.042
> 1.12 (positive)	16 (88.9%)	3 (50.0%)	
< 1.12 (negative)	2 (11.1%)	3 (50.0%)	
4-6 months			
AST/ALT ratio			0.009
> 1.12 (positive)	31 (43.7%)	24 (24.5%)	
< 1.12 (negative)	40 (56.3%)	74 (75.5%)	
Child Pugh Class			
A			
AST/ALT ratio			0.118
> 1.12 (positive)	10 (62.5%)	6 (35.3%)	
< 1.12 (negative)	6 (37.5%)	11 (64.7%)	
B			
AST/ALT ratio			0.000
> 1.12 (positive)	21 (63.6%)	9 (22.0%)	
< 1.12 (negative)	22 (36.4%)	32 (78.0%)	
C			
AST/ALT ratio			0.170
> 1.12 (positive)	16 (40.0%)	12 (26.1%)	
< 1.12 (negative)	24 (60.0%)	34 (73.9%)	

Child Pugh Classes were the impact modifiers that were compared using the chi-square test. The resulting P-values are displayed in Table 3.

Discussion

The yearly occurrence of de novo creation of varices is 5%, and it is more common in people who continue to drink alcohol or whose liver function is deteriorating¹⁰. Once they form, varices expand from tiny to large at a

rate of 5-12% annually and bleed at a rate of 5–15% year¹¹. Large varices, defined as those with a diameter of more than 5 mm, are associated with the highest risk of bleeding. The presence of red wale markings on varices during endoscopy and the severity of liver disease, as assessed by the Child-Pugh score, both have an effect.¹² Therefore, in order to categorize "high-risk varices," these criteria should also be taken into account.

Research on primary prophylaxis makes it abundantly evident that, for large esophageal varices, the risk of variceal bleeding can be reduced from around 50% to 15%. This highlights the significance of early varices diagnosis prior to the onset of bleeding.¹³

According to current guidelines, at the time of diagnosis, all patients with cirrhosis should have a varices screening. Depending on the severity of their liver disease, patients without varices should follow up every two to three years. Patients with tiny varices should follow up every one to two years to see if they require preventive medication in case their varices enlarge.¹⁴ In order to minimize the number of upper GI endoscopies non-invasive tests are particularly important in underdeveloped nations where endoscopy is few, financing is scarce, and there is a strong desire to rationalize funding.¹⁵

In this study, we found a significant relationship between a greater AST/ALT ratio and the presence of esophageal varices, a marker of severe liver fibrosis. Different research carried out at the Mayo Hospital in Lahore had nearly identical findings.¹⁶

In our study, 119 (61.7%) patients had an AST/ALT ratio of less than 1.12 and 74 (38.3%) patients had esophageal varices. This is comparable to a prospective study that discovered a strong correlation between the existence of varices at first endoscopy and an AST/ALT ratio > 1.12. The participants in that study were 58.87+11.97 years old, while the mean age (years) in our study was 55.68+13.69. There were 106 (54.9%) female patients and 87 (45.1%) male patients in our study. In that study, there were 69% male patients and 31% female patients. While the prevalence of esophageal varices was 50% in that study, there were 46% of positively diagnosed patients with esophageal varices in our study.¹⁷

For the diagnosis of esophageal varices in patients with cirrhosis, we continued to use EGD as the gold standard. Based on the AST to ALT ratio, the diagnostic accuracy, sensitivity, specificity, PPV, and NPV were 65.28%, 54.02%, 74.53%, 63.51%, and 66.39%, in that order. In contrast, a different study discovered 89.2% NPV (negative predictive value), 42.3% PPV (positive predictive value), 87% specificity, and 47.8% sensitivity.¹⁸

Conclusion

An effective non-invasive diagnostic tool for predicting esophageal varices in cirrhotic patients is the AST/ALT ratio.

Conflict of Interest: *None*

Funding Source: *None*

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