VOLUME - 14, ISSUE - 06, JUNE - 2025 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Internal Medicine

"STUDY OF ASPARTATE TRANSAMINASE: ALANINE TRANSAMINASE RATIO IN PATIENTS OF CHRONIC LIVER DISEASE: AN OBSERVATIONAL STUDY"

Manish Sharma Associate Professor, Department of Medicine, Gajra Raja Medical College, Gwalior, M.P.

Piyus Biloniya Department Of Medicine, Gajra Raja Medical College, Gwalior, M.P., India

ABSTRACT

Background : Chronic liver disease (CLD) represents a formidable global health challenge, accounting for approximately 2 million deaths annually. In India the burden of CLD is particularly pronounced, since an estimated 18.3% of these global deaths were from the country. The spectrum of CLD encompasses diverse aetiologies, including alcoholic liver disease (ALD), non-alcoholic fatty liver disease (NAFLD), viral hepatitis, and autoimmune conditions **Objectives:** study of aspartate transaminase: alanine transaminase ratio in patients of chronic liver disease **Patients And Methods:** The present study Was carried out in the Department of Medicine in J.A. Group of Hospitals, Gwalior by the Team of trained residents under the guidance of senior consultant, on in and outpatient Of CLD. **Conclusion:** the AST/ALT ratio, a key marker of liver injury, did not significantly differ across all CLD aetiologies, a notable trend towards higher values was observed in ALD, particularly compared to NASH. This suggests a potential role for this ratio in differentiating between these two common forms of CLD.

KEYWORDS :

INTRODUCTION

Chronic liver disease (CLD) represents a formidable global health challenge, accounting for approximately 2 million deaths annually. In India, the burden of CLD is particularly pronounced, since an estimated 18.3% of these global deaths were from the country. The spectrum of CLD encompasses diverse aetiologies, including alcoholic liver disease (ALD), non-alcoholic fatty liver disease (NAFLD), viral hepatitis, and autoimmune conditions[1]. Despite advances in diagnostic and therapeutic modalities, CLD remains a leading cause of morbidity and mortality, often progressing insidiously to advanced stages such as fibrosis and cirrhosis[2]. The accurate and timely identification of the underlying cause of CLD is pivotal for guiding management strategies and predicting patient outcomes. However, establishing a definitive diagnosis can be challenging, as the clinical presentation of CLD Is often nonspecific and may overlap with other systemic disorders. Additionally, the complex interplay of environmental and genetic factors contributes to the heterogeneous nature of CLD, further complicating diagnostic and prognostic assessments. The assessment of liver function has a long and evolving history, with early markers such as bilirubin and albumin providing valuable insights Into liver health. However, these markers often lacked specificity and sensitivity in detecting early or mild liver damage. The understanding of liver disease took a significant leap forward with the recognition of enzymes as potential indicators of liver injury. In the mid-20th century, the discovery of aspartate aminotransferase (AST) and alanine 1 aminotransferase (ALT) as enzymes predominantly found in the liver paved the way for a more specific and sensitive approach to diagnosing liver diseases[3]. In 1955, De Ritis et al. introduced the concept of the AST/ALT ratio, a simple yet powerful tool that revolutionized the interpretation of liver enzyme tests. This ratio, calculated by dividing the serum AST level by the serum ALT level, was initially found to be useful in differentiating between acute viral hepatitis (where ALT is typically higher than AST) and alcoholic hepatitis (where AST is often higher than ALT)[4]. This landmark discovery laid the foundation for the widespread use of AST/ALT ratio in the diagnosis and prognosis of various liver diseases. The utility of AST and ALT in diagnosing liver injury stems from their distinct patterns of elevation in different types of liver damage. In hepatocellular injury, which results from direct damage to hepatocytes (e.g., viral hepatitis, drug-induced liver injury), both AST and ALT levels rise significantly, often with ALT being more elevated than AST. This ALT predominance is attributed to its higher concentration in the hepatocyte cytoplasm, making it more readily released upon cellular damage. In contrast, cholestatic injury, characterized by impaired bile flow (e.g., biliary obstruction), typically presents with milder elevations of AST and ALT. Instead, a more pronounced increase in alkaline phosphatase (ALP) and gamma-glutamyl transferase (GGT), enzymes associated with the biliary system, is observed. Mixed patterns of liver injury, involving both hepatocellular and cholestatic components, may exhibit variable AST/ALT ratios, depending on the dominant process. However, AST and ALT are not without their limitations as markers of liver function. One significant drawback is their lack of specificity, as elevated levels can also be seen in conditions unrelated to liver disease, such as muscle injury or haemolysis. Furthermore, the correlation between AST/ALT levels and the severity of liver damage is not always consistent. Normal or minimally elevated levels may not necessarily rule out significant liver disease, particularly in chronic conditions where ongoing damage is slow and insidious.

These limitations underscore the need for additional biomarkers and diagnostic tools to complement AST and ALT in the comprehensive assessment of liver health. Combining these enzymes with other markers, such as ALP, GGT, and imaging modalities, can provide a more nuanced understanding of liver disease and facilitate accurate diagnosis, prognosis, and tailored treatment strategies.

Aims And Objectives

- **Prediction Of Aspartate Transaminase:** ALANINE TRANSAMINASE ratio in patients of Alcoholic Chronic liver disease in males and females.
- **Prediction Of Aspartate Transaminase:** ALANINE TRANSAMINASE ratio in patients of NON Alcoholic Chronic liver disease in males and females .

Patients And Methods

The present study Was carried out in the Department of Medicine in J.A. Group of Hospitals, Gwalior By Team of trained residents under the guidance of senior consultant on in and outpatient Of CLD from AUGUST 2022 to MARCH 2024.

Study Design: The study was a hospital based observational study will include indoor and outdoor patients diagnosed as CLD based on a combination of history, clinical findings, liver function tests(lft) ,usg whole abdomen, ascitic fluid r/m ,urine r/m cbc and rft.

Sample Size - 100 patients

USG findings suggestive of chronic liver disease like-

- Nodular irregular surface of liver
- Distorted vascular pattern
- Ascites
- Signs of portal hypertension (splenomegaly or dilated portal venous system)

Inclusion Criteria:

1. Patients age 18 years and above with diagnosed cases of chronic liver disease

Exclusion Criteria:

1. Patients taking hepatotoxic drugs.
2. Patients suffering from any kind of benign/malignant tumor.

Statistical Analysis:

Statistical Analysis shall be done using SPSS 2.0 and graphs shall be generated by Microsoft Excel and Word. p value of less than 0.05 shall be considered significant

OBSERVATION AND RESULTS

Distribution Of Patients According To The Age Group

The largest proportion of patients (37%) falls within the 41-50 years age group, followed by the 51-60 and ≥61 groups, each representing 15% of the total sample. The youngest age 35 group (≤30) and the 31-40 group each account for 14% and 15% of the patients, respectively. The sample includes a total of 100 patients.

Distribution Of Patients According To The Gender

Out of the 100 patients in the sample, a majority (86%) were male, while 14% were female. This Indicates a male predominance in the study population.

Mean aspartate aminotransferase to alanine aminotransferase (ast/alt) ratio across chronic liver disease etiologies

Table 1

Etiology	N	Mean SGOT:SGPT Ratio	SD	T statistic	P value
Alcoholic liver disease	56	2.448	1.609	1.127	0.348
Non alcoholic fatty liver disease	31	1.838	1.193		
Viral Hepatitis	11	1.867	1.217		
Autoimmune Hepatitis	1	1.315	.		
Cardiac cirrhosis	1	2.139	.		
Total	100	2.181	1.455		

Table 1 presents the mean AST/ALT ratio across various etiologies of chronic liver disease (CLD). The data indicates that patients with alcoholic liver disease (ALD) had the highest mean AST/ALT ratio (2.448), followed by cardiac cirrhosis (2.139), viral hepatitis (1.867), and non-alcoholic fatty liver disease (NAFLD) (1.838). The patient with autoimmune hepatitis had an AST/ALT ratio of 1.315. However, the ANOVA test yielded a p -value of 0.348, indicating that the differences in mean AST/ALT ratio across the different CLD etiologies are not statistically significant. This suggests that while there might be numerical differences in the AST/ALT ratio among the groups, these differences are likely due to chance and not a true reflection of differences in underlying liver injury patterns.

Distribution of patients according to the clinical findings observed in CLD patients

Table 2

S No	Clinical findings	No of Patients	Percentage
1	Ascites	90	90.0
2	Splenomegaly	81	81.0
3	Pallor	66	66.0
4	Icterus	67	67.0
5	Average built	52	52.0
6	Abdominal veins	45	45.0
7	Clubbing	39	39.0
8	Bleeding tendencies	13	13.0
9	Asterixis	12	12.0
10	Hepatomegaly	3	3.0
11	Raised JVP	2	2.0
12	Murmur	0	0.0

Table 2 summarizes the clinical findings observed in the patient cohort. Ascites was the most common finding, present in 90% of patients, followed closely by splenomegaly (81%). Pallor and icterus were also frequently observed, with 66% and 67% o f patients exhibiting these signs, respectively. Over half of the patients (52%) were of average build, while abdominal veins and clubbing were noted in 45% and 39% of patients, respectively. Less common findings included bleeding tendencies (13%), asterixis (12%), hepatomegaly (3%), and raised jugular venous pressure (JVP) (2%). No patients presented with a murmur. This distribution highlights the high prevalence of signs and symptoms associated with advanced liver disease, such as ascites and splenomegaly.

Distribution of patients according to the etiology of CLD with respect to alcohol intake and LFT/RFT parameters and Total Platelet count

Table 3

LFT	Group		t statistic	P value
	Alcoholic Liver Disease	Non-Alcoholic causes of CLD		
	Mean (SD)	Mean (SD)		
SGOT	84.82 (76.56)	94.45 (88.19)	-0.584	0.561
SGPT	43.79 (48.50)	62.80 (62.41)	-1.716	0.089
SGOT:SGPT Ratio	**2.44 (1.60)**	**1.84 (1.16)**	**2.112**	**0.037**
Serum ALP	94.25 (47.43)	148.59 (147.44)	-2.595	0.011
Total Serum Bilirubin	2.61 (2.86)	3.30 (4.01)	-1.009	0.315
Total Direct Bilirubin	1.12 (2.04)	1.31 (2.33)	-0.513	0.609
Serum BUN	37.64 (27.47)	35.47 (27.49)	0.391	0.697
Serum Creatinine	2.35 (8.04)	1.32 (1.21)	0.843	0.401
Total Platelet Count	138875 (804716.20)	154000 (117345.04)	-0.763	0.447

Table 3 reveal Overall The main difference between the two groups was the significantly higher SGOT/SGPT ratio in ALD patients, suggesting a pattern of liver Injury more indicative of hepatocellular damage compared to NAFLD. The significantly higher ALP levels in the NAFLD group might indicate a greater degree of cholestatic injury or biliary obstruction. However, larger studies are needed to confirm these findings and explore their clinical implications.

CONCLUSION

In conclusion, this comprehensive study of chronic liver disease (CLD) elucidates the diverse clinical and biochemical profiles associated with various etiologies. The data underscores a significant association between gender and CLD type, with alcoholic liver disease (ALD) being predominantly prevalent in males and non-alcoholic steatohepatitis (NASH) in females.. While the AST/ALT ratio, a key marker of liver injury, did not significantly differ across all CLD etiologies, a notable trend towards higher values was observed in ALD, particularly compared to NASH. This suggests a potential role for this ratio in differentiating between these two common forms of CLD. This suggests a potential difference in the predominant type of liver injury, with ALD leaning towards hepatocellular damage (typically

associated with higher AST/ALT ratios). The study provides a comprehensive overview of clinical, laboratory, and demographic characteristics in patients with various CLD etiologies.

limitations of study is Single centre study, Smaller sample size.

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