ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 02 | February - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

THE SIGNIFICANCE OF TRANSAMINASES AND DERITIS RATIO FOR PREDICTING ALCOHOLIC LIVER DISEASE

Biochemistry

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ABSTRACT

Background: A significant public health issue is alcoholic liver disease (ALD). At any stage of the disease, the Deritis ratio (AST/ALT) is more sensitive than other standard criteria in detecting biochemical abnormalities in ALD. This study's objective was to evaluate the importance of transaminases and the Deritis ratio as well as their potential prognostic value in alcoholic liver disease patients. **Materials and Methods:** It was a hospital-based retrospective study that used information kept in the Biochemistry department of Sri Venkateswara Medical College in Tirupati. Age, gender, total protein, albumin, AST, ALT, and AST/ALT ratio were the factors that was gathered. Descriptive statistics and hypothesis testing was analysed. Software tools EPI INFO and SPSS 23 was used to examine the data. **Results:** The percentage of ALD among the 50 patients was projected with 50 controls. Odds Ratio=3.2, p=0.0001, was 3.2 times more likely to develop above 40yrs of age. In ALD patients, the mean AST value (171.5 SD 94.46 IU/L) was substantially higher than the ALT value (85.12 SD 58.24 IU/L), resulting in a higher AST/ALT ratio (2.01 SD 0.58). When comparing the Deritis ratio in controls and cases, mean values are 0.78 with CI (1.02, 1.06) and 2.01 with CI (1.49, 1.69) respectively which showed higher significance(p=0.001) in cases. An AST:ALT ratio >2 with CI (93.9%, 99.9%) was present in 96.9% of individuals with alcoholic liver disease. Each variable's mean value in cases was considerably higher than in controls (p 0.001). **Conclusion:** Due to its widespread use, ethanol consumption causes various liver illnesses, each of which is extremely serious. Equally crucial is to know its complication and to know its magnitude of impact. To grasp the extent of damage in alcoholic liver disease rationally, the assessment of the Deritis ratio is helpful.

KEYWORDS

Transaminases, Deritis ratio, Alcohol Liver Disease.

INTRODUCTION

The quantity and duration of alcohol consumption are the main risk factors for developing alcoholic liver disease, and other potential risk factors include the kind of alcohol, drinking habits, gender, ethnicity, and genetics. From alcoholic fatty liver (steatosis) to alcoholic cirrhosis, the range of alcohol-related liver damage ranges. Most drinkers who have liver disease consume at least 80g of alcohol each day over time[1].

Fatty liver develops in about 90% of individuals who drink more than 60g/day of alcohol. Although this condition is reversible with abstinence after about 4–6 weeks. A daily alcohol intake of 60g/day in men is associated with an increased relative risk of developing cirrhosis and it is most severe form of alcoholic liver injury. A prospective study conducted by Shrestha NM showed that the risk threshold for developing ALD was 30g ethanol/day and the risk increase was dose dependent[2].

The aminotransferases and Deritis ratio (AST/ALT) at any stage of alcoholic liver illness is one of the most sensitive tests for identifying alcohol-related liver cell damage. This study's main goal is to assess the importance of transaminases and Deritis ratio among patients with alcoholic liver disease as well as their prognostic implications[3].

MATERIALS AND METHODS

It was a hospital based retrospective study from the data's maintained in the Department of Biochemistry, SVMC, Tirupati. The variables collected were age, gender, total protein, albumin, AST, ALT and AST/ALT ratio. Data was analyzed using EPI INFO and SPSS 23 software. Approval for the study was obtained from the institutional research ethical committee.

Total proteins were determined by Biuret method. The albumin was measured by BCG method. The total and direct bilirubin was estimated by Diazo method. The transaminases (AST and ALT) were estimated by IFCC method. All these laboratory parameters were analysed using ERBA reagent kits and with semi-auto analyser.

Analysis was done using descriptive statistics and testing of hypothesis. The Chi-square test was used to examine the association between different variables. Z-test was used to compare the significance difference between two variables. A p-value of < 0.05 (two-tailed) was used to establish statistical significance.

Inclusion & Exclusion Criteria:

1. 50 patients with brief history of alcoholism with chief complaints related to hepatomegaly, jaundice or ascites. 50 healthy males and females with normal liver profile.
2. Patients with features of malnutrition, who have undergone major surgeries related to gall stones, liver biopsies, sepsis, renal disorders were excluded from the study.

RESULTS

Table 1 shows increased frequency among people ages >40years (3.2 times) (Odds Ratio=3.2, p=0.0001) in alcoholic liver disease patients.

Table 1:

Variables	Alcoholic Liver Disease			p value
		Yes	No	
Gender	Male	50	50	0.0001
Age group	0-40	14	35	0.0001
	41-100	36	15	

Statistically significant (p value < 0.05).

Table 2 depicts that mean value of each variable in cases was significantly elevated as compared to controls (p=0.001). The lowering of serum total proteins and albumin in patients of ALD indicates impaired liver function (p=0.002). The ALT level is a more specific indicator of hepatic injury than AST.

Table 2:

Variables	ALD (50)	Controls (50)	p value
	Mean + SD	Mean + SD	
Age	53.58 + 14.93	42.65 + 20.80	0.001
Total proteins	6.72 + 0.85	6.96 + 0.69	0.002
Albumin	3.56 + 0.53	3.81 + 0.44	0.001
AST	171.5 + 94.46	27.07 + 12.21	0.001
ALT	85.12 + 58.24	34.6 + 10.67	0.001

Ratio AST/ALT	2.01 + 0.58	0.78 + 0.20	0.001
Total bilirubin	2.69 + 1.46	0.85 + 0.14	0.001
Direct bilirubin	1.44 + 0.97	0.23 + 0.08	0.001

p <0.05 statistically significant.

However, in alcoholic patients, ALT level is usually elevated to a lesser degree than AST level. In cases, mean value of AST (131.5 ± SD 94.46 IU/L) was markedly increased in comparison to ALT (85.12 ± SD 58.24 IU/L) leading to significantly higher AST/ALT ratio (1.92 ± SD 0.58). Mean value of Deritis ratio in cases was 1.92 with CI (1.49, 1.69) which was significantly higher as compared to controls 0.78 with CI (1.02, 1.06) (p=0.001). 96.9% of patients with alcoholic liver disease had an AST:ALT ratio of > 1.0 with CI (93.9%,99.9%).

In healthy adults, virtually all the measured serum bilirubin is unconjugated. In contrast, in patients with alcoholic liver disease, serum bilirubin levels are frequently elevated, with widely variable degrees of conjugation. The mean values of total and direct bilirubin were raised in cases and showed statistical significance as compared to controls.

DISCUSSION

Alcoholic liver disease (ALD) includes a variety of injuries, from straightforward steatosis through cirrhosis or chronic hepatitis with fibrosis. Steatosis (fatty change), lobular inflammation, periportal fibrosis, Mallory bodies, nuclear vacuolation, bile ductal proliferation, perivenular, and perisinusoidal fibrosis are among the histological alterations[4].

In the current study, emphasis has been placed on early laboratory diagnosis (Deritis ratio) of alcohol misuse since intervention may be more efficient and less expensive. A rise in serum aminotransferase concentrations may be a sensitive sign of liver cell damage and is useful in identifying hepatocellular diseases such cirrhosis, hepatitis, and alcoholic liver disease (ALD)[5].

The main contributors to elevated liver transaminases are cirrhosis, alcoholism, and viral hepatitis. There is no single laboratory variable that is 100% sensitive or specific for ALD. Serum transaminases in alcoholic patients were somewhat increased, according to biochemical testing. Among all types of hepatic damage, an increase in aspartate amino transferase has a specificity of 82% and an increase in alanine amino transferase of 86%[6].

In seminal research by Cohen and Kaplan, patients with ALD had an AST/ALT ratio of > 1 in 92% of cases and > 2 in 70% of cases. The elevated ratio reflects patients with alcoholic liver disease having low blood alanine aminotransferase activity. This decline was brought on by a pyridoxal 5-phosphate deficit related to alcohol[7].

Aspartate transaminase (AST) levels may also rise because of mitochondrial damage, necrosis, and increased cell membrane permeability, particularly in patients who consume large amounts of alcohol[8]. According to the current study, patients with alcoholic liver disease had a moderate reduction in blood total protein and albumin. The albumin/globulin ratio was reversed, and the AST/ALT ratio increased, which makes it easier to diagnose alcoholic liver disease[9].

In ALD patients, the levels of total and direct bilirubin were slightly elevated, indicating liver cell damage. Results of a 1992 study by Magarian GJ et al.[10] demonstrated that individuals with alcoholic liver disease frequently had elevated blood bilirubin levels with greatly varied degrees of conjugation.

The results of the current investigation were consistent with those of Scott et al[11] in that there were quantitatively slight gender differences in the relationships between each variable, but they were not statistically significant.

A decent level of diagnostic and prognostic accuracy can be obtained by combining liver biopsy with easily available biochemical assays. 90% of patients with liver diseases that were histologically established and a Deritis ratio of at least 2:1 had alcoholic liver disease. More sensitive (93.4%) and specific (71.9%) than any of the common liver tests (AST:ALT ratio, GGT) is carbohydrate deficient transferrin.

The main disadvantage is that it is not generally accessible for usage in clinical settings. A Deritis ratio of more than two is particularly predictive of cirrhosis and alcoholic hepatitis. A valuable measure, the Deritis ratio, may be used to differentiate between non-alcoholic and alcoholic liver disease[12]. Deritis ratio can be considered as an alternative to GGT (Gamma Glutamyl Transferase) in case of identifying alcoholic liver disease (ALD). To provide initial insight into a differential diagnosis, the amount and rate of change of aminotransferase alteration in everyday practise.

CONCLUSION

Due to its extensive use, alcohol use causes a variety of liver illnesses, the significance of which is increased. The early reversibility of alcohol-related harm suggests that patients who stop drinking at any point have a better prognosis. Early diagnosis and treatment are crucial. Though GGT is being the confirmatory marker for ALD, Deritis ratio also have a role in identifying alcoholic patients in early stage. It is the ability to precisely gauge the severity of alcoholism issues once they have been detected. As a result, calculating the Deritis ratio helps one appreciate the severity of alcoholic liver disease from a logical standpoint.

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