Original Article

The significance of De Ritis ratio in alcoholic hepatitis patients

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Abstract

Background: Alcoholic hepatitis (AH) is an acute hepatic inflammation associated with significant morbidity and mortality. It is observed that in AH, the serum transaminase levels are elevated due to acute liver injury. It is also found that the serum aspartate aminotransferase (AST) level are higher compared to serum alanine aminotransferase (ALT) level which may be attributed to mitochondrial leakage where mitochondrial AST (mAST) would be released along with release of cytosolic AST (cAST). Subsequently there is elevated AST/ALT ratio (De Ritis ratio) observed in alcoholic hepatitis. **Methods:** 44 cases of alcoholic hepatitis patients who are regular consumers of alcohol for a minimum period of 3 years were included in the study. Serum AST and ALT levels were estimated in all subjects by using commercial kits from Beacon diagnostics, India. The readings were taken on a semiautoanalyzer (Roboniks). Statistics was done using Microsoft excel. **Results:** It is observed that serum AST/ALT ratio was above 1.0 indicative of alcoholic hepatitis. **Conclusion:** The findings of the present study indicated that in alcoholic hepatitis there is elevated De Ritis ratio (above 1.0). De Ritis ratio is a simple and reliable diagnostic marker for alcoholic hepatitis.
Keywords: Alcoholic hepatitis, ALT, AST, De Ritis ratio.

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INTRODUCTION

Hepatitis is defined as the inflammation of the liver cells caused by viruses and toxins which include alcohol. Viral hepatitis is broadly classified into 5 types, (Hepatitis A to E) based on the viral genotypes. The most prevalent type of non viral hepatitis is alcohol induced hepatitis which is referred as alcoholic hepatitis. Alcoholic hepatitis is a most common form of hepatitis and may lead to alcohol induced liver injury[1]. Alcoholic hepatitis can be of acute form in the initial stages which may progress to chronic state in accordance with the extent of alcohol consumption. Alcoholic liver disease (ALD) is a complex process that includes a wide spectrum of hepatic lesions, from steatosis to cirrhosis[2]. Alcoholic hepatitis is the most severe form of all the alcohol induced liver lesions. Most of the hepatitis cannot be distinguished based on pathology but some do have particular features suggestive of particular diagnosis. For instance the presence of micronodullary cirrhosis, mallary bodies and fatty change within a single biopsy are highly suggestive of alcoholic liver injury along with other notable features like perivenular and pericellular fibrosis appeared by Von Giesen's stain[3]. There are various physical examinations and medical history in conjunction with blood tests, liver biopsy and imaging in differential diagnosis of hepatitis. Liver chemistry test appear to be a reliable indicator in assessing severity of hepatitis in most cases which include assessing the level of serum transaminases

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namely Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) enzyme levels indicative of hepatocellular damage and other enzymes like Alkaline phosphatase (ALP) and gamma Glutamyl transferase (GGT) and bilirubin which are indicative of cholestasis. A serum AST to ALT ratio named as De Ritis ratio is found to be more sensitive during any phase of the disease associated with hepatitis[4]. It is found in a study that there is increased AST/ALT ratio in alcoholic liver disease compared to control[5]. A mild to moderate elevation of AST than ALT activity making De Ritis ratio greater than 2.0 supported by reversal of albumin/globulin (A/G ratio) facilitates the diagnosis suggestive of alcoholic liver disease. The De Ritis ratio is turned out to be a simple reliable and economically viable biochemical marker which helps in the diagnosis as well as prognosis of hepatitis[6]. Viral hepatitis is other form of liver inflammation indicated by severe hepatocellular damage where in the acute stages AST/ALT ratio was lesser than 1.0[7]. The reversal of AST/ALT ratio may be indicative of increased ALT activity over AST activity.

MATERIALS AND METHODS

It was a small pilot study carried out in the Department of Biochemistry of the Annaii Medical College, Pennalur, Chennai. The variables collected were age, sex, AST, ALT and AST/ALT ratio. The transaminases (AST and ALT) were estimated by Liqui UV test based on standard protocol[8]. All the biochemical parameters mentioned above were analyzed using Human reagent kits from Beacon with the help of semiautoanalyzer (Roboniks). Analysis was done using descriptive statistics and testing of hypothesis. The data was analyzed using Microsoft Excel.

Inclusion Criteria: People consuming alcohol for 1 to 3 years on a regular basis of the age group between 25 and 65 years.

Exclusion Criteria: Patients with history of antibiotic intake for the past three months or undergone major stories related to gall stones, liver biopsies, renal disorders, essential hypertension and lipid lowering drugs were excluded from the study group.

Sample collection and estimation: 5ml of blood was drawn by venipuncture under aseptic precaution in the fasting condition in a plain tube. The serum was separated and was transferred into a plastic tube. The estimation of serum AST and ALT was done by using commercial kits from Beacon diagnostics, India. The readings were taken on a semiautoanalyzer (Robonik).

RESULTS

In the present study, serum AST and ALT levels in the alcoholic hepatitis group are given in Table 1. The ratio of serum AST and ALT in the entire study group are given in table 2. The alcoholic hepatitis group had a ratio of 1.97 ± 1.55. The study group involved 44 patients. In the present study, we observed that the AST/ALT ratio was well above 1.0 supporting the previous findings that in alcoholic hepatitis there was increased AST level compared to ALT level in serum.

Table 1

Enzyme in serum	No of cases	Enzyme values in IU/L Mean ± SD
AST	44	172.48 ± 104.79
ALT	44	144.68 ± 118.62

Table 2

Disease group	AST/ALT ratio
Alcoholic hepatitis	1.97 ± 1.55

DISCUSSION

The present study has shown that the ratio of serum AST/ALT levels was above 1.5 which correlates well with previous reports that in alcoholic hepatitis AST activity was higher compared to ALT activity. Hence it may be deduced that subsequently the serum AST level would be higher compared to ALT which is responsible for high AST/ALT ratio, referred as De Ritis ratio in serum. The predominance of AST over ALT in alcohol related liver disease was first reported by *Harinasuta et. al* in 1967. Many authors later described AST/ALT ratios in serum greater than 1.5 or greater than 2.0 as highly suggestive of alcoholic hepatitis[9-12]. There are good numbers of studies which shows that AST/ALT ratio over 1.5 to 2.0 strongly indicates alcoholic hepatitis state[13,14]. However, in some of the studies it was reported that AST/ALT ratios was reversed, even below 1.0, which could conceivably be because some patients could have coexisting alcoholic as well as viral disease[15]. In an Australian clinical series of 190 patients with biopsy proven alcoholic cirrhosis one third of patients with cirrhosis exhibited an AST/ALT ratio below 1.0[16]. This could be due to a selection bias in this series which exclude patients with clinical evidence of cirrhosis but could be due to the AST/ALT data being recorded in connection with liver biopsies which would generally not be performed during an alcoholic binge and when performed in the following period of days the AST/ALT ratio might have declined because of the relatively short half life of AST (18 hrs) compared to ALT (36 Hrs). This evidence provides a rationale behind why so many patients who consume large quantities of alcohol display elevated serum aminotransferase level but do not show a high AST/ALT ratio[17]. One of the main reasons why acute alcoholic hepatitis has a relatively high AST/ALT ratio is because patients are often tested within 24 hours

of alcohol exposure where AST activity sustains in blood. The rationale for increased AST/ALT ratio in alcoholic liver injury could be attributed to i) decreased ALT activity[18] due to B6 depletion in liver alcoholics[19] and ii) mitochondrial damage occurs in relation to alcohol mediated liver injury leading to increased release of mitochondrial AST into serum[20-23]. In alcoholism mitochondrial AST (mAST) is preferentially released compared to cytosolic isozyme, cytosolic AST (cAST)[24]. Even with advanced medical technologies De Ritis ratio still remains the specific test for diagnosis for alcoholic hepatitis. It is also observed that chronic alcohol consumption do not have an AST/ALT ratio above 1 and the high AST/ALT ratio is suggestive of either recent exposure or advanced alcoholic liver disease[25]. Therefore, in our study we have found that the elevated AST/ALT ratio in serum is indicative of excessive alcohol exposure which may lead to advanced hepatic failure associated with alcoholism.

CONCLUSION

In summary, alcoholic hepatitis leads to a condition of elevated AST activity compared to ALT activity and consequently there is an elevated De Ritis ratio in serum. This is suggestive of alcoholic hepatitis condition and can be used as a reliable, simple and specific diagnostic marker for alcoholic hepatitis. There are so many documental evidences available with recent studies to support that alcoholic hepatitis is a serious health problem. It is astonishing view that 200-500 ml alcohol consumption per day for a prolonged period more than two years causes damage to the liver and may lead to multi organ failure. It would be great if we bring the awareness across the globe regarding the alcohol consumption and its consequences among the society. In view of this Deaddiction day is observed on June 26th to make the society aware of the harmful effects of alcohol along with other drug effects. The chronic consumption of alcohol lead to debilitating condition of alcoholic hepatitis and even other forms of hepatitis. The world hepatitis day is observed on July 28th to highlighten the consequences of hepatitis and hepatic failure.

REFERENCE

1. Liangpunsakul S, Clinical characteristics and mortality of hospitalized alcoholic patients in the united states. J.Clin Gastroenterol 2011 (45): 714 – 719.
2. Gao B, Bataller R. Alcoholic liver disease: pathogenesis and new therapeutic targets. Gastroenterology 2011 (141): 1572 – 1585.
3. Harinasuta U, Chomet B, Ishak K, Zimmerman HJ. Steatonecrosis-Mallory body type. Medicine (Baltimore) 1967 (46): 141 – 162.
4. Botros M, Sikaris KA. The Deritis ratio: The test of time. 2013 (34): 117 – 130.
5. Butt AR, Ahmed S, Haider N, Ditta A, Khokar AS, Khokhar MS, Tayyab M. Evaluation of AST/ALT ratio in patients with liver disease Pak J Med Sci 2001 (17): 225 -228.
6. De Ritis F, Coltorti M, Giusti G. An enzymatic test for the diagnosis of viral hepatitis: the transaminase serum activities. Clin Chim Acta 1957 (2): 70 – 74.
7. Deritis F, Giusti G, Piccinio F, Cacciatore L. Biochemical laboratory tests in viral hepatitis and other hepatic diseases. Bull world Health organ 1965 (32): 59 – 72.
8. Vassault A et.al; Protocole de validation de techniques, Ann Biol Clin 1986 (44): 686.
9. Cohen JA, Kaplan MM. The SGOT/SGPT ratio – an indicator of alcoholic liver disease. Dig Dis Sci 1979 (24): 835 – 838.
10. Correia JP, Alves PS, Camilo EA. SGOT-SGPT ratios. Dig Dis Sci 1981 (26): 284
11. Alves PS, Camilo EA, Correia JP. The SGOT/SGPT ratio in alcoholic liver disease. Acta Med Port 198 (3): 255 – 260.
12. Takahashi A, sekiya C, Yazaki Y, Ono M, Sato H, Hasebe C, et.al. [Hepatic GOT and GPT activities in patients with various liver diseases-especially alcoholic liver disease]. Hokkaido Igaku Zasshi 1986 (61): 431-436.
13. Sharpe PC. Biochemical monitoring and alcohol abuse and abstinence. Ann Clin Biochem 2001 (38): 652 – 654.
14. Hietala J, Puukkaa K, Koivisto H, Anntila P, Niemala O. Serum gamma-glutamyl transferase in alcoholics, moderate drinkers and abstainers: effect on gt reference intervals at population level. Alcohol Alcohol 2005 (40): 511 – 54.
15. Rosman AS, Lieber CS. Diagnostic utility of laboratory tests in alcoholic liver disease. Clin Chem 1994 (40): 1641 – 1651.
16. Hourigan KJ, Bowling FG. Alcoholic liver disease: a clinical series in an Australian private practice. J. Gasstroenterol Hepatol 2001 (16): 138-1143.
17. Nyblom H, Berggren U, Balldin J, Olsson R. High AST/ALT ratio may indicate advanced alcoholic liver disease rather than heavy drinking. Alcohol Alcohol 2004 (39): 336-339.
18. Matloff DS, Selinger MJ, Kaplan MM. Hepatic transaminase activity in alcoholic liver disease. Gastroenterology 1980 (78): 1389-1392.
19. Diehl AM, Potter J, Boitnott J, Van Duyn MA, Herlong HF, Mezey E. Relationship between pyridoxal 5'-phosphate deficiency and aminotransferase levels in alcoholic hepatitis. Gastroenterology 1984 (86): 632-636.
20. Nalpas B, Vassault A, Le Guillou A, Lessgourgues B, Ferry N, Lacour B, et.al. Serum activity of mitochondrial aspartate transaminase: a sensitive marker of alcoholism with or without alcoholic hepatitis. Hepatology 1984 (4): 893 – 896.
21. Rej R. Aspartate aminotransferase activity and isoenzyme proportions in human liver tissues. Clin Chem 1978 (24) 1971-1979.
22. Ishii H, Okuno F, Shiegata Y, Tsuchiya M. Enhanced serum glutamate oxaloacetic transaminase activity of

mitochondrial origin in chronic alcoholics. Curr Alcohol 1979 (5): 10-108.
23. Nalpas B, Vassault A, Charpin S, Lacour B, Berthelot P. Serum mitochondrial aspartate aminotransferase as a marker of chronic alcoholism: diagnostic value and interpretation in a liver unit. Hepatology 1984 (4): 893-896.
24. Okuno F, Ishii H, Kashiwazaki K, Takagi S, Shigeta Y, Arai M, et.al. Increase in mitochondrial GOT (m-GOT) activity after chronic alcohol consumption: clinical and experimental observations. Alcohol 1988 (5): 49-53.
25. Pujar S, Kashinakunthi SV, Kallaganad GS, Dambal A, Doddamani GV. Evaluation of Deritis in Alcoholic and non-alcoholic liver diseases – A case control study 2010 (4): 2463-2466.

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