

“Ratio of AST/ALT and serum gamma glutamyl transferase (GGT) activity in chronic alcoholics and acute viral hepatitis”

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Abstract

Background: Liver enzymes AST, ALT, GGT (Gamma Glutamyl Transferase), ALP levels in serum was measured in Chronic alcoholics and acute viral hepatitis and controls. Analysis was done to find out the significance of liver associated enzyme levels among the chronic alcoholics and viral hepatitis.

Materials and Methods: Fifty one chronic male alcoholics aged between 30-60 years and thirty six patients with viral hepatitis who were admitted to the medicine ward at Govt. Medical College, Jagdalpur, Chhattisgarh during March 2014 to December, were the subjects. Forty eight age-matched, normal, healthy controls were also included in the study. GGT, ALT, AST and ALP were assayed in the clinical biochemistry laboratory using auto analyser by kit method (By Accurex Co. kinetic method).

Results: Chronic alcoholics (n=51) subjects show increased serum levels of GGT (185.42±58.32), ALT (83.43±32.48), AST (139.29±64.34), ALP (173.42±31.62), (p values < 0.05) as compared to controls which was statistically significant. In Acute Viral hepatitis (n=36), all enzymes levels were statistically increased significant as compared to controls. But the levels of GGT (108.47±31.54) & ALT (293.43±54.62) (p value < 0.01) were more significant in viral hepatitis as compared to controls and chronic alcoholics. Ratio of AST/ALT was significantly increased (1.66, p value < 0.05) as compared to controls (0.92). But the ratio of AST/ALT was more significantly decreased (0.49, p value < 0.01) in acute viral hepatitis as compared to chronic alcoholics.

Conclusion: Serum GGT and the ratio of AST/ALT increased much more in chronic alcoholics than viral hepatitis. ALT level increased much more significantly in viral hepatitis, while the ratio of AST/ALT more significantly decreased.

Keywords: Gamma Glutamyl Transferase, Viral hepatitis, Chronic alcoholics

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Introduction

Gamma Glutamyl Transferase (GGT), also known as Gamma Glutamyl Transpeptidase, is a microsomal enzyme with extensive tissue distribution. GGT is present on the cell wall of many tissue such as the kidneys, bile

duct, pancreas, gallbladder, spleen, heart, brain, and seminal vesicles^[1]. It is involved in transfer of amino acids across the cell membrane^[2], leukotriene metabolism^[3] and glutathione metabolism^[4,5]. GGT is predominantly used as a diagnostic marker for liver disease. Latent elevations in GGT are in most cases visible in patients with chronic viral hepatitis infections, often taking twelve months or more to present.^[6]

Serum GGT may also increase in liver, pancreas and biliary tract diseases that are similar to alkaline phosphatase (ALP) in detecting the disease of biliary tract. GGT and ALP correlate well but less data

available regarding the sensitivity of the GGT^[7,8]. In most cases, ALP continues to be the primary scan for biliary sickness. ALP may also can be multiplied in designated bone diseases, however GGT will not be.^[8] It was found recently that slight increase in serum GGT correlate with the cardiovascular disease. GGT accumulate in atherosclerotic plaques,^[9] indicating the pathogenic role in cardiovascular diseases.^[10]

Patients with chronic alcoholics may exhibit increased serum activities of various enzymes including gamma- glutamyl transferase (GGT),^[11] alkaline phosphatase (ALP),^[12] aspartate aminotransferase (AST)^[11,13] alanine aminotransferase (ALT)^[11] and glutamate dehydrogenase (GDH)^[11]. A few population studies^[14-17] have examined the relationship between serum GGT and all-cause mortality, focusing on GGT as an indicator of alcohol consumption. Serum GGT has been found to predict morbidity and mortality independent of alcohol consumption and liver pathology^[18].

Ratio of AST/ALT is useful in medical diagnosis to differentiate between causes of liver damage or hepatotoxicity.^[19,20,21] Most causes of liver cell injury are associated with an AST that is lower than the ALT. The ratio of AST to ALT 2:1 or greater is suggestive of alcoholic liver ailment, particularly in the environment of an elevated gamma-glutamyl transferase.^[22] Sometimes the ratio is increased in patients with non-

alcoholics steatohepatitis and frequently increased in patients with viral hepatitis C who have developed cirrhosis. Patients with Wilson's disease or cirrhosis due to viral hepatitis may have an increased AST than the ALT, though the ratio is not greater than two.

The aim of present study is to find out the stages of liver related enzymes and their diagnostic significance in Chronic Alcoholics and Viral Hepatitis.

Materials and Methods

Fifty one chronic male alcoholics (with a history of alcohol abuse for five years or more) aged between 30-60 years and thirty six patients with viral hepatitis who were admitted to the medicine ward, were the subjects. Patients, who had severe somatic complications, necessitating treatment, were excluded. Forty eight age-matched, normal, healthy controls were also included in the study. GGT, ALT, AST and ALP were assayed in the clinical biochemistry laboratory using auto analyser by kit method.

Ethical approval obtained from college ethical committee and informed consent was taken from each participant.

Statistical Analysis: Biostatistical Analysis was done by using Microsoft Office Excel with Windows operating system and using Graph Pad Prism software. Outcome expressed as (mean \pm SD). Comparison between controls and chronic alcoholics, viral hepatitis groups were performed with student t-test. The p values < 0.05 were considered statistically significant.

Results

Chronic alcoholics (n=51) subjects (Table 1) & (Fig. 1) shows increase in serum levels of GGT (185.42 \pm 58.32), ALT (83.43 \pm 32.48), AST (139.29 \pm 64.34), ALP (173.42 \pm 31.62), as compared to controls which was statistically significant. In Acute Viral hepatitis (n=36), all enzyme levels were statistically increased significant as compared to controls. But the levels of GGT (108.47 \pm 31.54) & ALT (293.43 \pm 54.62) were more significant in viral hepatitis as compared to controls and chronic alcoholics.

Ratio of AST/ALT was significantly increased (1.66) as compared to controls (0.92). But the ratio of AST/ALT was more significantly decreased (0.49) in acute viral hepatitis as compared to chronic alcoholics (Fig. 2).

Table 1: Enzyme levels (mean \pm SD) among controls, chronic alcoholics and viral hepatitis patients

Enzymes(U/L)	Control(48)	Chronic Alcoholics(51)	Viral Hepatitis(36)
GGT	29.73 \pm 3.92	185.42 \pm 58.32*	108.47 \pm 31.54**
ALT	13.28 \pm 2.38	83.43 \pm 32.48*	293.43 \pm 54.62**
AST	12.32 \pm 4.25	139.29 \pm 64.34*	145.72 \pm 47.63
ALP	41.47 \pm 8.48	173.42 \pm 31.62*	218.34 \pm 71.47
AST/ALT	0.92	1.66*	0.49**

*p- value significant change as compared to controls.

**p-value more significant change as compared to chronic alcoholics.

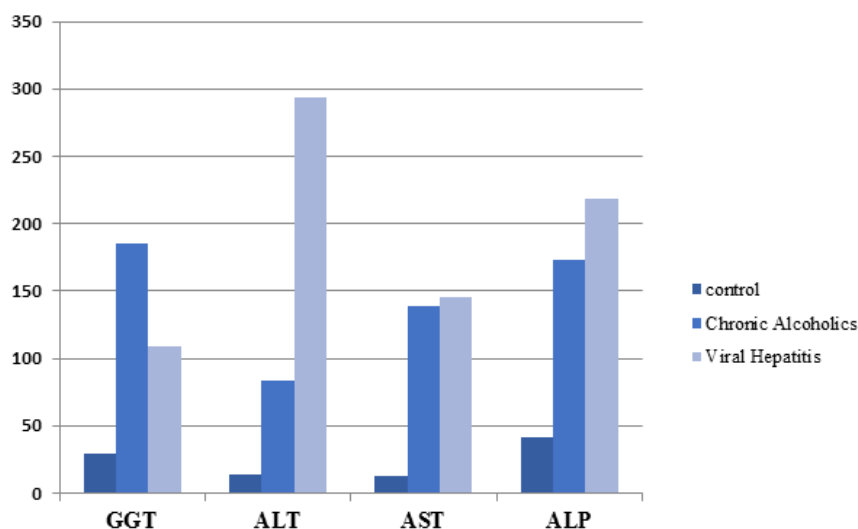


Fig. 1: Enzymes levels in controls, chronic alcoholics, viral hepatitis

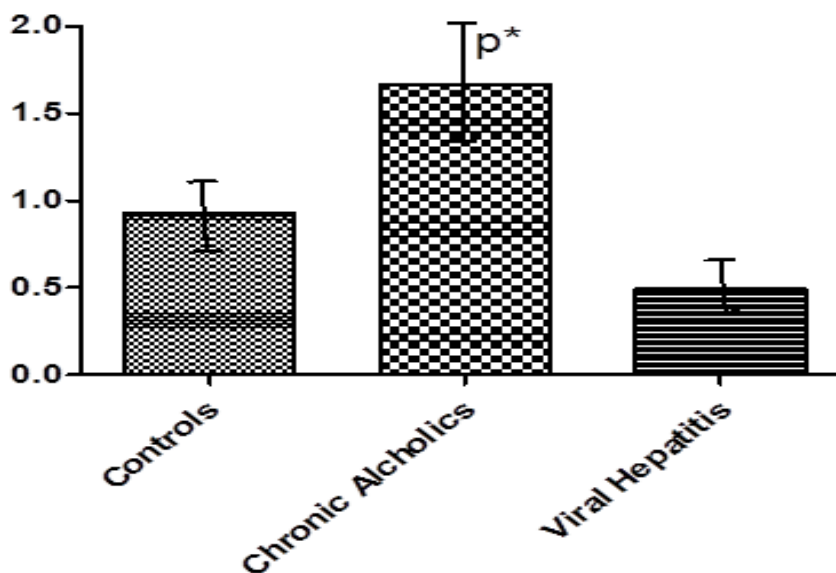


Fig. 2: Ratio of AST/AL

P*= significant change

Discussion

The enzymes, Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), Alkaline phosphatase (ALP) and gamma-glutamyl transferase (GGT) were increased in alcoholic liver diseases and viral hepatitis. In the present study all these enzymes were increased. These enzymes are measures of liver homeostasis^[23]. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) indicate the awareness of hepatic intracellular enzymes that have leaked into the circulation. These are the markers for hepatocellular damage^[24].

The aminotransferases are sensitive indicators of liver cell injury and are most necessary in recognizing hepatitis. The most of hepatocellular disorders have increased ALT than the AST.

In this study AST, ALT ALP and GGT levels were appreciably raised in viral hepatitis, chronic alcoholic liver disease patients in comparison to control. In viral hepatitis AST, ALT levels had been extra notably high ($p < 0.05$) as compared to chronic alcoholic liver disease. In viral hepatitis ALT was more than AST. The high levels of transaminases were reported to differ from 400-4000 IU/l or extra.^[25] In alcoholic liver disease, AST activity has been mentioned to be greater than ALT and usually does not exceed 300IU/L.

In subject with increased serum aminotransferase, the predominance of AST over ALT in alcohol-related liver disease changed into first mentioned by means of Hatinasuta et al. in 1967. This finding widely recognised with paper with the aid of Cohen and Kaplan in 1979. An AST: ALT ratio more than 2:1 is suggestive at the same time as ratio greater than 3:1 is highly suggestive of alcoholic liver disease and ALT frequently normal and rarely AST greater than 300U/L. A low level of

ALT in the serum is because of an alcohol induced deficiency of pyridoxal phosphate.^[26] In this study, table 1 shows the AST: ALT ratios 0.92 for normal, 0.49(< 1) for viral hepatitis. These findings were similar to De Ritis F et al^[27]. Ratio < 2 for chronic alcoholics, which similar to several other studies performed previously^[28] and others. This helps to distinguish ALD from different liver ailments. Increase of AST/ALT ratio is greater than 2 considering the fact that of present mitochondrial damage^[25,29].

Various workers have reported that the activity of ALP increased up to 200-300U/lit in acute viral hepatitis & alcoholic liver disease and ALP upto 300U/L. Increased levels of ALP was observed in hepatic bile duct obstruction patients. Impaired excretion of ALP by any mechanism, in bile will result in regurgitation of enzyme into circulation. The increased cholestasis stimulates the synthesis of ALP by the bile ductules providing more ALP which ultimately enter the blood.^[30]

Conclusion

Serum GGT and the ratio of AST/ALT increased much more in chronic alcoholics than viral hepatitis. In Viral hepatitis the GGT increased but not more than in chronic alcoholics, while level of ALT most significant in viral hepatitis. Most patients with chronic alcoholic have an AST/ALT ratio above one. A high AST/ALT ratio is suggestive of advanced alcoholic liver disease.

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