

Liver Profile Analysis in Patients of Alcoholic Liver Disease (ALD) and Non Alcoholic Fatty Liver Disease (NAFLD)

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Abstract: Alcoholic liver disease (ALD) may take the form of acute involvement or chronic liver disease. The severity and prognosis of alcohol-induced liver disease depends on the amount, pattern and duration of alcohol consumption, as well as on the presence of liver inflammation, diet, nutritional status and genetic predisposition of an individual. NAFLD is characterised by fatty infiltration of the liver, mostly in the form of triglycerides, which exceeds 5% of the liver weight. NAFLD is histologically similar to alcoholic liver disease, but by definition it occurs in the absence of excessive alcohol consumption. This study was conducted on a total of 90 individuals which included 30 patients of ALD, 30 patients of NAFLD and 30 age and sex matched healthy individuals. Detailed history, clinical examination and sample collection for AST, ALT, ALP, GGT and Bilirubin, was done. Further the samples were processed and the data was obtained which was subjected to statistical analysis. In ALD, AST/ALT ratio came out be >2 whereas, it was <1 in NAFLD patients. As far as bilirubin is concerned, it was significantly increased in case of ALD, however, in NAFLD, decreased levels of bilirubin were observed. The raised levels of GGT and ALP were pathognomonic for ALD but their levels were not significantly raised in case of NAFLD. It was concluded that above parameters of liver profile can be of diagnostic importance for the physicians to assess and manage various liver injuries.

Key words: Liver profile, ALD, NAFLD, AST/ALT ratio, GGT, ALP, Bilirubin

Date of Submission: 23-08-2019

Date of Acceptance: 07-09-2019

I. Introduction

Globally alcohol consumption accounts for an estimated 3.8% mortality. Although there are various causes of death among liver disease, alcoholism stands out as a significant cause of mortality.^[1] Alcoholic liver disease (ALD) encompasses a spectrum of injury, ranging from simple steatosis to cirrhosis. Possible factors that affect the development of liver injury include the dose, duration, and type of alcohol consumption; drinking patterns; sex; ethnicity; and associated risk factors including obesity, iron overload, concomitant infection with viral hepatitis, and genetic factors.^[2] The major clinical consequences of CLD can be evaluated by liver function tests like Bilirubin, AST, ALT, ALT and GGT. Biochemical changes indicate particularly liver dysfunctions in CLD patients. AST and ALT changes reveal leakage from damaged hepatocytes; GGT and bilirubin are related to cholestasis and decreased hepatocyte and renal excretory function.^[3] In CLD over 80% of patients presents AST levels at least twice the ALT levels. Another analytical indicator of excessive alcohol consumption is elevations of GGT levels. Of the 3 enzymes, GGT is the most accurate diagnostic provides, however, it can be increased in other diseases or drug intake. The analytical parameters in chronic alcoholic liver disease may be altered due to malnutrition presented by patients, which may also favor increased liver damage.^[4]

NAFLD represents a spectrum of clinico-pathological features ranging from simple steatosis, which is characterised by fatty infiltration only, to non-alcoholic steatohepatitis (NASH), which is characterised by inflammation and hepatocellular injury with or without fibrosis and cirrhosis.^[5,6] Most with NAFLD have an increase in liver fat content alone, which is apparently benign; others develop NASH that can progress to cirrhosis.^[7] Patients with NASH, most subjects (50%–90%) have abnormal aminotransferase activities.^[8] Serum transaminases (alanine transaminase: ALT and aspartate transaminase: AST) play a key role in amino acid metabolism. Elevated levels of these enzymes are quite sensitive for liver injury indicating a high hepatocyte cell membrane permeability that let enzymes leak out into the blood stream.^[9] ALT is most closely related to liver fat accumulation and has been reported to correlate with liver fat independent of obesity.^[10] Liver enzymes such as alkaline phosphatase and gamma-glutamyl transferase (GGT) may be abnormal.^[11] NAFLD is a type of chronic liver disorder which is gaining significance worldwide. The ratio of AST/ALT is usually less than 1 in patients who have either no or minimal fibrosis, although this ratio may be greater than 1 with the development of cirrhosis.^[12] The serum total bilirubin level was found to be inversely related to NAFLD.^[13] Most of the patients with NAFLD are asymptomatic, although some may experience fatigue, malaise or pain in the right hypochondriac region of abdomen.^[14]

ALD and NAFLD are both serious health and socioeconomic problems worldwide. Although these diseases have similar pathological spectra, ranging from simple hepatic steatosis to steatohepatitis and liver cirrhosis. ALD and NAFLD differ from each other in many characteristics, ranging from differences in clinical features to patient outcomes. A comparison of these diseases may result in a better understanding and management of both ALD and NAFLD.^[15] The AST:ALT ratio is in the differentiation of alcoholic liver disease (ALD) from the Non-alcoholic Fatty Liver Disease (NAFLD) spectrum. Both AST and ALT enzymes require pyridoxal-5'-phosphate (vitamin B6) to function properly. Its absence in nutritionally-deficient heavy-drinkers has a much larger effect on the production of ALT than that of AST, causing the AST:ALT ratio to rise. A normal AST:ALT ratio should be <1. AST:ALT scores >2 are, therefore, strongly suggestive of alcoholic liver disease and scores <1 more suggestive of NAFLD/NASH.^[16] Both liver diseases are generally related to unhealthy lifestyle habits, including excessive alcohol and food intake, and both are likely to be serious health problems in the future. In contrast to chronic viral liver diseases, ALD and NAFLD are frequently accompanied by extrahepatic diseases that can influence patient survival. A comprehensive understanding of these diseases is essential for their management.^[15]

II. Materials And Methods

This study was conducted on a total of 90 individuals which included 30 patients of ALD, 30 patients of NAFLD and 30 age and sex matched healthy individuals. Detailed history, clinical examination and sample collection for AST, ALT, ALP, GGT and Bilirubin, was done. Blood sample was collected in a plain vial under all aseptic conditions by venipuncture. The plain vial sample is allowed to clot and the serum was then separated by ultracentrifugation. The results obtained were subjected to statistical analysis.

III. Results

30 already diagnosed patients of ALD and 30 patients of NAFLD were taken which were compared to 30 controls and following observations were made from the study.

TABLE 1: Comparison of Liver Profile in patients of ALD and controls

S.NO.	PARAMETERS	ALD (n=30) (Mean±S.D)	CONTROLS (n=30) (Mean±S.D)	P VALUE
1	AST	130.63 ± 120.33	26.93 ± 9.80	0.00 (HS)
2	ALT	62 ± 37.38	24.23 ± 7.89	0.00 (HS)
3	ALP	131.06 ± 31.35	96.63 ± 27.57	0.00 (HS)
4	GGT	175.91 ± 183.63	34.50 ± 13.30	0.00 (HS)
5	BILIRUBIN	1.80 ± 2.58	0.80 ± 0.29	0.05 (S)
6	AST/ALT RATIO	2.22 ± 0.80	1.21 ± 0.56	0.00 (HS)

In the above table the analysis of liver profile in ALD patients was found to be significant when compared with controls.

TABLE 2: Comparison of Liver Profile in patients of NAFLD and controls

S.NO.	PARAMETERS	NAFLD (n=30) (Mean±S.D)	CONTROLS (n=30) (Mean±S.D)	P VALUE
1	AST	61.10 ± 24.30	26.93 ± 9.80	0.00 (HS)
2	ALT	73.53 ± 21.24	24.23 ± 7.89	0.00 (HS)
3	ALP	123 ± 62.10	96.63 ± 27.57	0.05 (S)
4	GGT	60.80 ± 25.46	34.50 ± 13.30	0.00 (HS)
5	BILIRUBIN	0.51 ± 0.14	0.80 ± 0.29	0.00 (HS)
6	AST/ALT RATIO	0.89 ± 0.42	1.21 ± 0.56	0.00 (HS)

In the above table the analysis of liver profile in NAFLD patients was found to be significant when compared with controls.

IV. Discussion

In the present study the liver profile was evaluated in the patients of ALD and serum transaminases enzymes was found to be with a mean ± SD of 130.63 ± 120.33 in AST and 62 ± 37.38 in ALT in ALD patients and 26.93 ± 9.80 and 24.23 ± 7.89 in controls respectively which was highly significant (p=0.00). it was also seen that AST/ALT ratio was 2.22 ± 0.80 in ALD patients and 1.21 ± 0.56 in controls and was found to be highly significant (p=0.00). As far as NAFLD is concerned, the levels of AST and ALT were found to be highly significant when compared with controls. The AST/ALT ratio was 0.89 ± 0.42 in patients and 1.21 ± 0.56 in controls. In this study, the AST /ALT ratio was found to be >2 in ALD and AST /ALT ratio <1 in case of NAFLD. These findings are supported by Sorbi D et al^[17] who found that AST/ALT ratio appears to be a useful

index for distinguishing nonalcoholic steatohepatitis from alcoholic liver disease. Although values < 1 suggest NASH, a ratio of > 2 is strongly suggestive of alcoholic liver disease. AST and ALT require pyridoxal-5'-phosphate (vitamin B₆) in order to carry out this reaction, although the effect of pyridoxal-5'-phosphate deficiency is greater on ALT activity than on that of AST. This has clinical relevance in patients with alcoholic liver disease, in whom pyridoxal-5'-phosphate deficiency may decrease ALT serum activity and contribute to the increase in the AST/ALT ratio that is observed in these patients.^[18]

Bilirubin levels in ALD patients when compared to controls were found to be significant ($p=0.05$). Bilirubin levels in NAFLD patients when compared to controls were found to be significant ($p=0.00$) in this study. The raised levels of bilirubin in ALD are supported by Adak et al which showed hyperbilirubinemia in ALD.^[19] Serum bilirubin levels were found to be inversely associated with the prevalence of NAFLD independent of known metabolic risk factors. Serum bilirubin might be a protective marker for NAFLD.^[20]

GGT and ALP are pathognomonic diagnostic markers of ALD. GGT (175.91 ± 183.63) and ALP (131.06 ± 31.35) were found to be raised in ALD patients when compared to controls and the comparison came out to be highly significant ($p=0.00$). However, in NAFLD, the levels of GGT (60.80 ± 25.46) and ALP (123 ± 62.10) were found to be less increased indicating less significance of these markers for NAFLD than ALD. Increased serum levels of GGT observed in alcoholic liver disease can be the result of enzyme induction and decreased clearance. In these patients, GGT serum levels can be markedly altered (> 10 times the upper reference value), whereas ALP levels may be normal or only slightly altered. The whole spectrum of liver diseases, regardless of cause, may be responsible for altered GGT serum levels. In particular, GGT levels may be 2–3 times greater than the upper reference value in more than 50% of the patients with nonalcoholic fatty liver disease and above the upper reference value in about 30% of patients with chronic hepatitis C infection. Furthermore, an increase in GGT levels in patients with chronic liver disease is associated with bile duct damage and fibrosis.^[18]

V. Conclusion

It was concluded that the above liver profile should be added in the investigation protocol of alcoholic patients. Moreover, other factors such as diet, lifestyle which can lead to NAFLD, should be taken care of, so that advanced liver injury can be prevented.

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Bharti Singla. "Liver Profile Analysis in Patients of Alcoholic Liver Disease (ALD) and Non Alcoholic Fatty Liver Disease (NAFLD)." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 9, 2019, pp 27-29.