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Original Research Article

A research study on the utility of GGT level and AST/ALT ratio in alcoholic liver diseases

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ABSTRACT

Alcoholic liver disease covers a spectrum of disorders, beginning from the fatty liver, progressing at times to alcoholic hepatitis and culminating in alcoholic cirrhosis, which is the most advanced and irreversible form of liver injury related to the consumption of alcohol. There are three histologic stages of alcoholic liver disease: 1. Alcoholic Fatty Liver or Steatosis: At this stage, fat accumulates in the liver parenchyma. 2. Alcoholic Hepatitis: Inflammation of liver cells takes place at this stage, and the outcome depends on the severity of the damage. Alcohol abstinence, nutritional support, treatment of infection, and prednisolone therapy in severe cases can help in the treatment of alcoholic hepatitis, but more severe cases lead to liver failure. 3. Alcoholic Cirrhosis: Liver damage at this stage is irreversible and leads to complications of cirrhosis and portal hypertension.

Objectives: 1. Summarize the conditions and factors that aggravate alcoholic liver disease. 2. Outline strategies for decreasing alcohol dependency and/or abuse in patients with alcoholic liver disease. 3. Review the treatment options available for alcoholic liver disease. 4. Describe interprofessional team strategies for improving care coordination and communication to ameliorate outcomes in patients with alcoholic liver disease.

Aims: To assess the value of enzymes Gamma-glutamyl transferase (GGT), Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) as diagnostic indicators of alcoholic liver diseases.

Material and Methods: Our study group comprised of 25 normal healthy controls, 50 patients with advanced alcoholic liver disease (ALD), 15 patients with acute viral hepatitis (AVH) and 10 patients with nonalcoholic cirrhosis (NALD). We analyzed GGT, AST, ALT, Total bilirubin, Total protein, Albumin, and Prothrombin time. AST/ALT ratio and discriminant function were calculated.

Results: GGT values were significantly high (6-8 times upper limit of the mean of normal controls) among ALD patients in comparison with all other groups. The mean AST/ALT ratio among ALD patients was >2. 88% of patients with ALD had an AST/ALT ratio of ≥1.5. The ratio was<2 among all the other diseased groups, with a value of 1.15 among normal healthy controls. A discriminant function score of ≥32 was found in 9 among 50 ALD patients.

Conclusion: GGT and AST/ALT ratio of ≥1.5 together are good indicators of alcohol as the cause of liver disease. AST/ALT ratio >2 indicates advanced liver disease in alcoholics. Bilirubin and prothrombin time can be used to know the severity of liver disease as a part of discriminant function. A discriminant function of ≥32 has a poor prognosis. Our study shows that 6-8 times elevations in GGT and AST/ALT ratio of ≥1.5 together can be used as diagnostic indicators for alcohol-induced liver damage. Bilirubin and MDF score have their utility as prognostic indicators as well as in selecting patients.

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1. Introduction

The liver is vulnerable to a wide variety of toxic, metabolic, microbial and circulatory insults. Liver diseases and cirrhosis contribute to 23.59% of mortality in the world and rank 27th as a major cause of death in the world. In India, it is 2.74% of all the causes of death.[1] In southern India, the prevalence of current alcohol use varies between 33% and 50%, with a higher prevalence among the lesser educated and the poor.[2]

The World Health Organization estimates that there are 140 million people with alcoholism worldwide. Alcoholism is called a "dual disease" since it includes both mental and physical components. The biological mechanisms that cause alcoholism are not well understood. Social environment, stress, age, mental health, family history, ethnic group and male all influence the risk for the condition.[3]

Morphologically, there are three variants of cirrhosis: Micronodular cirrhosis < 0.3 mm, Macronodular cirrhosis >3 mm and mixed nodular cirrhosis, which has both micro- and macronodular features. If Alcoholic liver cirrhosis is undetected, undiagnosed and untreated, it leads to complications like ascites, gastrointestinal haemorrhage, encephalopathy, renal failure, bacterial infection, hepatocellular carcinoma and finally, death. Worldwide, 3 million deaths every year result from the harmful use of alcohol; this represents 5.3% of all deaths. The harmful use of alcohol is a causal factor in more than 200 disease and injury conditions. Overall, 5.1% of the global burden of disease and injury is attributable to alcohol, as measured in disability-adjusted life years (DALYs). Alcohol consumption causes death and disability relatively early in life. In the age group 20–39 years, approximately 13.5% of the total deaths are alcohol-attributable. There is a causal relationship between harmful use of alcohol and a range of mental and behavioural disorders, other noncommunicable conditions as well as injuries. The latest causal relationships have been established between the harmful drinking and the incidence of infectious diseases such as tuberculosis as well as the course of HIV/AIDS. Beyond health consequences, the harmful use of alcohol brings significant social and economic losses to individuals and society at large.

Alcoholism and, hence, alcohol-related diseases are a major problem in the Western world and are of growing concern in developing countries. The prevalence of alcohol intake is reported as 10.4% (5-20%) in men in India.[4] Alcoholic liver disease (ALD) is the predominant form of chronic liver disease. Liver involvement appears earlier with lower consumption of illicit liquor in Indians than in West.[5] An alarming trend is the increase in alcohol abuse, even among women and children. Women have been found to be twice as sensitive to alcohol-mediated hepatotoxicity and may develop more severe ALD at lower doses and with shorter duration of alcohol consumption than men.[6] The amount of alcohol ingested is an important risk factor for the development of ALD. The risk of developing cirrhosis increases with ingestion of >60-80 g/day for >10 years in men and >20 g/day in women.[7] ALD is increasingly seen in countries such as Japan and India, which traditionally had a low prevalence of the disease.[8]

The presence and extent of protein-calorie malnutrition have an important role in determining the outcome of patients with ALD. Mortality increases in direct proportion to the extent of malnutrition, approaching 80% in patients with severe malnutrition.[9] In addition, genetic factors predispose to both alcoholism and ALD. Polymorphisms of genes involved in the metabolism of alcohol and in those that regulate endotoxin-mediated release of cytokines have been associated with ALD.[10] Genetic polymorphisms of gamma-glutamyl transferase (GGT) may link with the induction of GGT by alcohol and consequently to the development of alcoholic liver and pancreatic diseases.[11]

The liver is the largest gland in the human vital organ. It weighs about 1500 g and accounts for 5% of a newborn's body weight. The most common liver diseases are Alcoholic liver disease, Infectious hepatitis, Obstructive Jaundice, Liver abscess, and Liver metastasis. Before we examine the liver's pathology, understanding its basic function and histology is essential.

1.1. Functions of liver

1. Carbohydrate, fat and protein metabolism 2. Bile production and secretion 3. Storage of glycogen 4. Protein synthesis 5. Production of bile pigments and Heparin 6. Erythropoiesis.

The liver is a major organ only found in vertebrates, which performs many essential biological functions such as detoxification of the organism and the synthesis of proteins and biochemical necessary for digestion and growth.[5–7] In humans, it is located in the right upper quadrant of the abdomen, below the diaphragm. Its other roles in metabolism include the regulation of glycogen storage, decomposition of red blood cells, and the production of hormones.[7] The liver is an accessory digestive organ that produces bile, an alkaline fluid containing cholesterol and bile acids, which helps the breakdown of fat. The gallbladder, a small pouch that sits just under the liver, stores bile produced by the liver, which is then moved to the small intestine to complete digestion.[8] The liver's highly specialized tissue, consisting mostly of hepatocytes, regulates a wide variety of high-volume biochemical reactions, including the synthesis and breakdown of small and complex molecules, many of which are necessary for normal vital functions.[9] Estimates regarding the organ's total number of functions vary, but textbooks generally cite it as being around 500.[10] It is not

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known how to compensate for the absence of liver function in the long term, although liver dialysis techniques can be used in the short term. Artificial livers have not been developed to promote long-term replacement in the absence of the liver.[11] Liver transplantation is the only option for complete liver failure.

A public health strategy for ALD would identify patients at high risk of developing cis and its complications and would refer such patients for abstinence–promoting therapy. Laboratory tests need to be a part of the diagnostic process for confirming the diagnosis of alcohol abuse, follow-up of patients undergoing treatment and monitoring abstinence. The conventional marker gamma-glutamyl transferase (GGT) continues to remain the test, combining the greatest convenience and sensitivity. Its diagnostic accuracy can be enhanced by combination with other traditional markers such as aminotransferases (AST, ALT) and certain parameters that indicate the severity and prognosis like total proteins, albumin, bilirubin and prothrombin time.[12]

According to a report from the National Survey on Drug Use and Health (NSDUH) published in 2014, 139.7 million current alcohol users are 12 years of age or older, with 23% being binge drinkers and 6.2% being heavy daily drinkers. Excessive use of alcohol increases the risk of developing serious health problems, including brain and liver damage, heart disease, hypertension, and fetal damage in pregnant women (NSDUH 2014). Alcohol abuse is the third largest factor, resulting in disability, diseases, and death. An estimated 12.5 million deaths can be directly attributed to alcohol consumption each year, which is the equivalent of 4% of the total deaths worldwide.[13]

Alcoholic liver disease (ALD) is one of the main consequences of alcohol abuse. Data on the epidemiology of alcoholic liver disease in Finland is scarce. Both liver cirrhosis and alcohol consumption are risk factors for malignancies, but cancer incidence among patients with all forms of advanced alcoholic liver disease has not been thoroughly studied. All persons with excessive alcohol consumption do not develop advanced liver disease, and other risk factors besides alcohol are poorly understood. Severe alcoholic hepatitis (AH) is treated with corticosteroids. Patients lacking response to corticosteroids have a very poor prognosis. Prognostic markers predicting response to corticosteroids at baseline are needed. The purpose of the study was to examine the incidence, risk factors, prognosis and malignant comorbidities of ALD and to search for prognostic factors in AH.[14]

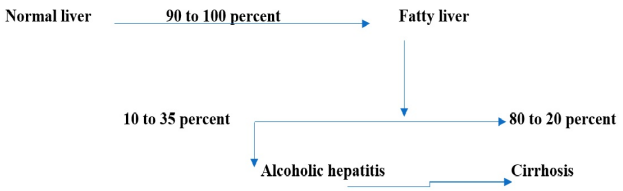
1.2. Alcoholic liver disease: Incidence

Worldwide mortality from alcoholic liver disease is estimated to be 1,50,000/year. 90-100% of heavy drinkers will develop hepatic steatosis in 10 years. Only 10-30% develop steato hepatitis, and 8-20% will develop cirrhosis in the same period.

Liver cirrhosis develops in 6–14% of those persons who consume greater than 60-80 g of alcohol daily for men and greater than 20 g daily for women.

Despite the cessation of alcohol use, only 10% will have normalization of liver histology and liver function tests.

1.3. Progression in alcoholic liver disease



The most prevalent types of alcoholic liver disease are fatty liver, alcoholic hepatitis, and cirrhosis. Often, as people continue to drink heavily, they progress from fatty liver to hepatitis to cirrhosis. The disorders can also occur together; however, liver biopsies can show signs of all three in some people.[15]

2. Aims and Objectives

This study aims to detect the presence of alcohol-induced liver damage by using simple, economical, and reliable tests. The estimation of serum AST and ALT activity doesn't require specialized technology. Therefore, they can be estimated in clinical laboratories that do not have an automated system. This is in favor of the patients who get their diseases diagnosed at a low cost. The present study was planned to assess the effectiveness of serum AST, ALT activity, and their ratio (AST/ALT ratio), which could be employed for the welfare of mankind. Previous studies have shown that the AST/ALT ratio is greater than two in several cases of alcoholic liver diseases in patients with clinical conditions other than liver dysfunction.

The proposed study was planned with the following objectives:

1. To assess the value of enzymes GGT and Aspartate aminotransferase, Alanine aminotransferase (ALT) as diagnostic indicators of alcoholic liver diseases.
2. AST/ALT ratio and discriminant function were calculated.
3. To evaluate the patients of ALD and non-ALD by biochemical parameters compared to controls.
4. To determine potential risk factors besides alcohol for advanced liver disease separately in men and women and to assess the interaction of alcohol intake and various other risk factors for advanced liver disease.

3. Materials and Methods

3.1. Source of data

The present study was carried out at the Department of Biochemistry, Graphic Era Institute of Medical Sciences, Dehradun. Our study group comprised a total of 50 participants. Patients who were admitted to the GEIMS Hospital, Dehradun.

3.2. Study groups and sample size

Sample size: 50

Group 1: 10 normal healthy persons as control group

Group 2: 20 patients having advanced alcoholic liver disease

Group 3: 20 patients of nonalcoholic liver disease

3.3. Study design and duration

Hospital-based cross-sectional study and 12 months (Aug 2023–June 2024).

3.4. Data collection and methods

After selection, patients were subjected to thorough history taking and clinical examination. The following Investigations were performed:

1. Alanine aminotransferase (ALT): UV, IFCC method
2. Aspartate aminotransferase (AST): UV, IFCC method
3. Gamma-glutamyl transferase (GGT)

3.5. Inclusion criteria

Patients with any liver disease like Infective hepatitis, Liver cirrhosis, Obstructive jaundice liver abscess, and alcoholic liver and malignancy are normal controls.

3.6. Exclusion criteria

A. Patients with age 25 to 70 years, B. Acute abdominal disease, C. Chronic infection, D. Protein energy malnutrition, E. Postoperative subject, F. Alcoholic liver disease

4. Observations and Results

Table 2: Comparison of AST/ALT ratio among different patient groups

AST/ALT ratio	ALD (*n*=20)	NALD (*n*=20)	Control (*n*=10)
≥2	10 (50%)	1 (5%)	2 (20%)
2-1	6 (30%)	10(50%)	1 (10%)
<1	4 (20%)	9 (45%)	7 (70%)

In Table 2, a comparison of the AST and ALT ratios was given. In the ALD, 50% of patients have the value of AST and ALT ratio ≥2. Another notable finding was AST levels, which were much higher than ALT elevations among ALD patients, due to which the AST/ALT ratio was >2 in this group. However, only 5% of NALD patients have values more or equal to value 2, which is much less than the ALD. The 30% of patients have values between 1 and 2 in the ALD. In the NALD, 50% have a ratio between 1 and 2. Most of the healthy controls lie within the range of less than 1.

In Table 3, we show the number of ALD and NALD in different intervals of AST, ALT, and GGT. This table shows that in the ALD, 20% of values of AST are greater than 300. While only 10% of ALT values were greater than 300. Another notable finding was AST levels, which were much higher than ALT elevations among ALD patients. In the NALD, all the values of AST and Alt were lower than 300. In the GGT 40% values were higher than 300 for ALD and all the values were lower than 300 for NALD.

In Table 4, minimum and maximum values for all the parameters in their respective group were given. The maximum difference between minimum and maximum values in GGT was shown in the ALD. The controls have a minimum range for GGT. In the ALT and AST parameters, the range was also high for ALD. While the controls have a minimum range for both parameters.

In Table 5, the values for mean±sd are presented for different age groups. This table shows the average parameters for the different age groups in different taken groups. In the table, all the parameters of ALD have a higher average for the less than equal to 40 age as compared to greater than 40 age except the AST and ALT ratio. In the NALD, ALT, and AST parameters have average values high for less than equal to 40 age group as compared to the greater than 40 age group, but the GGT parameter was low in the less than 40 age group. In the controls, all the parameters were low in the less than equal to 40 age group as compared to the greater than 40 age.

Table 6 shows the minimum and maximum values according to their age group. In the table, we divide the whole patient into their two age group. The maximum value for GGT was from ALD, and the minimum value was from NALD for both age groups. Similarly, for ALT, the maximum value was from ALD, and the minimum was from NALD. The maximum value for the AST parameter was also from ALD, but the minimum is from Controls for both groups. We can see the high values for all the parameters for age groups less than equal to 40 as compared to greater than 40 groups except for the ratio of AST and ALT. This shows that in the age less than equal to 40, AST was not as much higher than ALT as compared to greater than 40 age.

5. Results and Discussion

Liver disease due to excessive alcohol intake is a common medical problem associated with tremendous mortality and morbidity. Several studies have been conducted to

Table 1: Comparison of all the parameters between groups 1, 2 and 3 (All values expressed as Mean±Standard deviation)

Parameters	Controls (*n*=10)	ALD (*n*=20)	NALD (*n*=20)	*p*-value
GGT	30.14±7.17	388.76±401.03	33.834±18.91	<0.001
ALT	21.2±4.92	124.15±101.01	45.12±39.00	<0.05
AST	24.1±6.90	177.35±175.31	42.73±26.56	<0.05
AST/ALT	1.14±0.19	1.58±0.84	1.09±0.40	<0.05

Table 3: Showing the number of ALD and NALD in different intervals of AST, ALT, and GGT activity

Groups	Intervals of AST and ALT activity	ALD		NALD	
		Number of cases	Percentage	Number of cases	Percentage
AST	0-300	16	80	20	100
	>300	4	20	0	0
ALT	0-300	18	90	20	100
	>300	2	10	0	0
GGT	0-300	12	60	20	100
	>300	8	40	0	0

Table 4: Minimum and maximum values of all the parameters for groups 1, 2, and 3

Parameters	Controls (*n*=10)		ALD (*n*=20)		NALD (*n*=20)	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
GGT	43.6	18.2	1000	8.28	75.6	13.9
ALT	30	15	378	22	190	13
AST	38	17	589	40	134	15
AST/ALT	1.36	0.84	3.12	0.28	2.04	0.64

Table 5: Comparison of all the parameters according to their age for different groups (All values expressed as Mean±Standard deviation)

Parameters	Age Groups	Controls	ALD	NALD
GGT	≤40	27.78±7.04	609.94±431.93	31.57±18.30
	>40	33.67±6.62	207.80±276.16	40.63±21.20
ALT	≤40	20.33±5.13	186.89±115.64	45.49±44.34
	>40	22.5±5	72.82±47.40	44±18.51
AST	≤40	22.5±6.02	243.33±205.02	43.84±30.38
	>40	26.5±8.34	123.36±132.83	39.4±10.16
AST/ALT	≤40	1.12±0.21	1.48±0.87	1.11±0.39
	>40	1.17±0.18	1.67±0.83	1.04±0.49

Table 6: Minimum and maximum values of all the parameters according to their age for groups 1, 2, and 3

Parameters	Age Groups	Controls		ALD		NALD	
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
GGT	≤40	34.6	18.2	1000	8.28	75.6	13.9
	>40	43.6	30.3	890	29.02	70.5	23.9
ALT	≤40	27	15	378	47	190	13
	>40	30	20	200	22	60	15
AST	≤40	30	17	589	54	134	15
	>40	38	18	500	40	50	28
AST/ALT	≤40	1.36	0.84	2.51	0.28	2.04	0.64
	>40	1.27	0.9	3.12	0.47	1.87	0.64

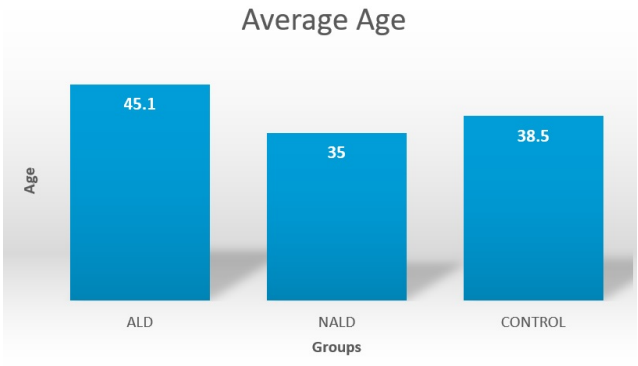


Figure 1: Age and disorder interpretation

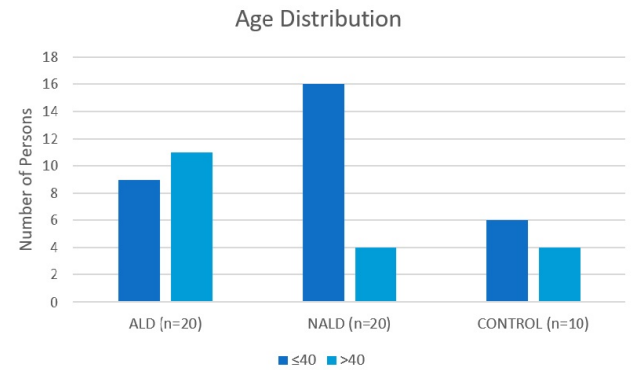


Figure 2: Age and disorder comparison

assess the usefulness of various laboratory tests in the diagnosis and prognosis of ALD. Our study estimated conventional marker GGT and traditional markers such as aminotransferases (AST and ALT).

Serum GGT activity is increased in hepatobiliary disorders and with fairly heavy consumption of alcohol. In our study, GGT was significantly elevated in patients with ALD when compared to normal controls, patients with AVH, and also nonalcoholic cirrhosis. GGT exists to a large extent in smooth endoplasmic reticulum and is, therefore, subject to hepatic microsomal induction by drugs and alcohol. Because of the effects of alcohol on GGT activity, GGT assays are considered sensitive indicators of alcoholism.

The present study was carried out at the Department of Biochemistry, GEIMS, Dehradun. Our study group comprised a total of 50 participants. Patients who were admitted to the GEIMS Hospital, Dehradun. Patients were taken from out-patient and in-patient in the Department of Medicine and Psychiatry, GEIMS Hospital, Dehradun. The Patient was selected based on the pre-defined inclusion and exclusion criteria and after obtaining informed consent. Blood samples are collected and analyzed for estimation of AST, ALT, and GGT.

Vidya S. Patil et al. 2011 observed in their study that we also made a comparison between ALD and NALD patients. We observed that GGT significantly increased among ALD patients when compared with NALD patients (p<0.02, p<0.001).

In the present study, the value of the AST and ALT ratios in ALD was significantly higher than in NALD. The GGT parameter for ALD increased significantly compared to NALD. Also, the value for ALT and AST parameters was significantly increasing for ALD as compared to NALD.

Naveen Kumar Shreevastva et al. 2017 observed in their study that AST/ALT ratio in alcoholic liver disease (ALD) is 1.9061±0.44236 and in nonalcoholic liver disease (NALD) is 0.9222±0.26529 which shows significant rise in ratio in ALD in comparison to NALD. This is in agreement with Pujar et al. who found high AST/ALT ratio in ALD in comparison to control. Gurung et al.(2013) studied upon the correlation of AST/ALT ratio and severity of ALD and suggested that AST/ALT ratio is also an indicator of severity of alcohol induced liver damage

In the present study the mean± sd for GGT parameter in ALD, NALD and control was 388.76±401.03, 33.834±18.91 and 30.14±7.17, respectively. The mean±SD for ALT activity in ALD, NALD and control was 124.15±101.01,45.12±39.00 and 21.2±4.92, respectively and for AST activity in ALD, NALD, and control was 177.35±175.31,42.73±26.56 and 24.1±6.90 respectively. The value of AST and ALT ratio in ALD was significantly high as compare to NALD. The GGT parameter for ALD was highly significant increasing as compared to NALD. Also, the value for ALT and AST parameters was significantly increasing for ALD as compared to NALD.

Dr. Shanmkam et al. 2019 similar findings were observed by the most commonly observed etiology for chronic liver diseases is alcohol. In our study, serum cholinesterase were decreased in liver disease patients (mean value of chronic liver disease: 3492.64±1440.82 U/L, Infective hepatitis: 4488.5±1092.14 U/L, Obstructive jaundice: 4595.4 ± 1241.04 U/L, Liver metastasis: 4153.8 ± 1178.73 U/L, Non-liver disease patients: 6494.21 ± 1269.16 U/L).

Jerold A.Cohen, MD and Marshall M. Kaplan, MD (1979) The SGOT/SGPT ratio is significantly elevated in patients with alcoholic hepatitis and cirrhosis (2.85±0.2) compared with patients with post necrotic cirrhosis (1.74±0.2), chronic hepatitis (1.3±0.17), obstructive jaundice (0.81±0.06) and viral hepatitis (0.74 ±0.07). An SGOT/SGPT ratio greater than 2 is highly suggestive of alcoholic hepatitis and cirrhosis. It occurs in 70% of these patients compared with 26% of patients with post necrotic cirrhosis, 8% with chronic hepatitis, 4% with viral hepatitis and none with obstructive jaundice.

Baral N and Pokhrel S et al. 2015 AST to ALT ratio was significantly higher (p <0.01) in the patient group (1.586) compared to the control (1.16). Eighty patients (92%) with

alcoholic liver disease had an AST/ALT ratio > 1, but no one in the group had an AST or ALT level ≥ 300 IU/l (Table 4). The degree of elevation in the AST in the patients was higher (3.7 times) than the ALT (3.2 times).

The specificity of measuring γ-GT levels was higher (62.5%) than MCV (41.7%), but the sen-sitivity of the γ-GT was lower (81.0%) than the MCV (85.3%).

In the study we take total 50 patients. In the 50 patients, 20 patients have alcoholic liver disease, 20 patients have non alcoholic liver disease and 10 patients from control group. The alcoholic group have mean age as 45.1, 35 is mean age for NALD patients and 38.5 for the control group. The mean±SD for GGT parameter in ALD, NALD and control was 388.76±401.03, 33.834±18.91 and 30.14±7.17, respectively. The mean±SD for ALT activity in ALD, NALD and control was 124.15±101.01,45.12±39.00and 21.2±4.92 respectively and for AST activity in ALD, NALD and control was 177.35±175.31,42.73±26.56and 24.1±6.90 respectively. The value of AST and ALT ratio in ALD was significantly high as compare to NALD. The GGT parameter for ALD was highly significant increasing as compared to NALD. Also, the value for ALT and AST parameters was significantly increasing for ALD as compared to NALD.

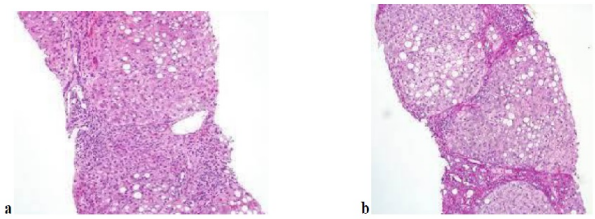


Figure 3: Microscopic picture of a liver biopsy in alcoholic liver cirrhosis showing parenchymal steatosis, fibrous septae and regenerative cirrhotic nodules, hematoxylin-eosin (a) and Herovici (b) stain.

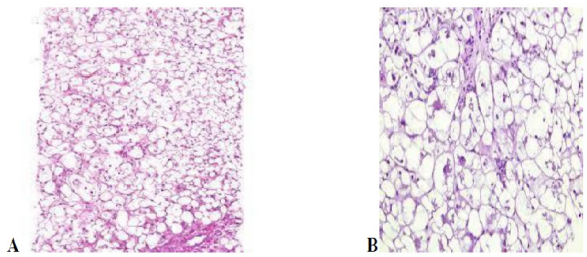


Figure 4: Microscopic picture of a liver biopsy in alcoholic steatohepatitis showing notable steatosis, hepatocyte necrosis and neutrophil infiltration, hematoxylin-eosin (A) and Herovici (B) stain.

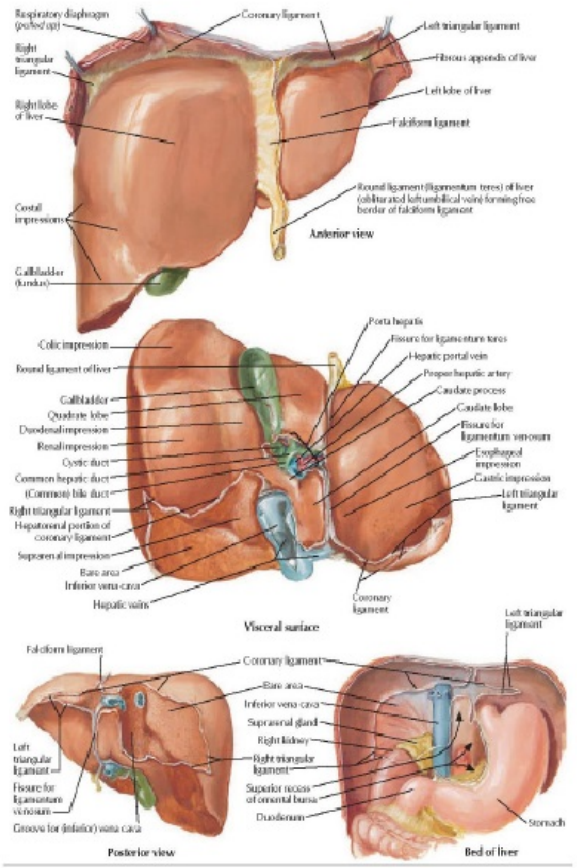


Figure 5: Liver functional structures

6. Conclusion

From our study, the following results were concluded:

In the study, we take a total of 50 patients. Of the 50 patients, 20 patients have alcoholic liver disease, 20 patients have nonalcoholic liver disease, and 10 patients from the control group. The alcoholic group has a mean age of 45.1, 35 is the mean age for NALD patients, and 38.5 for the control group. The mean±SD for the GGT parameter in ALD, NALD, and control was 388.76±401.03, 33.834±18.91, and 30.14±7.17, respectively. The mean±SD for ALT activity in ALD, NALD, and control was 124.15±101.01, 45.12±39.00, and 21.2±4.92 respectively and for AST activity in ALD, NALD, and control was 177.35±175.31, 42.73±26.56, and 24.1±6.90, respectively. The value of the AST and ALT ratios in ALD was significantly higher than that of NALD. The GGT parameter for ALD increased significantly compared to NALD. Also, the value for ALT and AST parameters significantly increased for ALD compared to NALD. The most commonly observed etiology for chronic liver diseases is alcohol.

The mean±SD for the GGT parameter in ALD, NALD, and control was 388.76±401.03, 33.834±18.91, and 30.14±7.17, respectively. The mean±SD for ALT activity in ALD, NALD, and control was 124.15±101.01, 45.12±39.00, and 21.2±4.92, respectively and for AST activity in ALD, NALD, and control was 177.35±175.31, 42.73±26.56, and 24.1±6.90, respectively.

Our study shows that 6-8 times elevations in GGT and AST/ALT ratio of ≥2 together can be used as diagnostic indicators for alcohol-induced liver damage. Bilirubin and MDF score have their utility as prognostic indicators as well as to select patients for appropriate modes of therapy.

The value of the AST and ALT ratios in ALD was significantly higher than that of NALD. The GGT parameter for ALD increased significantly compared to NALD. The value for ALT and AST parameters was significantly increasing for ALD as compared to normal.

7. Source of Funding

None.

8. Conflict of Interest

None.

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