Occurrence and Assessment of Alcohol Induced Liver Diseases in Mohali Region

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ABSTRACT

Alcoholic Liver disease (ALD) - the fatal condition occurred in recent times. Previous studies, suggested direct relationship between alcohol consumption and alcoholic liver diseases. Other risk factor promoting to such conditions includes genetic predisposing, gender, obesity, and nutrition status, liver disease hepatitis C. Alcoholic liver disease range from steatoses to alcoholic hepatitis and with prolonging effects leading to establish cirrhosis. Several mechanism were involved in alcoholic liver disease' pathophysiology, including oxidative damage, leading to secondary alcoholic metabolism and endotoxemia results to tumor necrosis factor-α; mediated cell damage and death. Liver enzyme mainly transferases and phosphatases namely AST, ALT, GGT, and ALP levels in serum samples were measured. This study is conducted on various groups of patients suffering from chronic alcoholic diseases, with that of non-alcoholic diseases; along with the control samples were included. Analysis was done to find the significance of liver associated enzyme level in alcoholic and non- alcoholic liver conditions.

For this study, 85 alcoholic subjects were enrolled and blood samples were collected from IVY hospital, Mohali. In this study, comparison of the total 85 patients; out of which 37 were females and 48 were males, between 21–78 age-groups. These patients were admitted for treatment for alcoholic liver disease and liver cirhosis conditions. The test data has been collected from the Department of Pathology, IVY Hospital Mohali. Liver associated enzyme AST, ALT, GGT and ALP were assayed in the clinical biochemistry laboratory. The enzyme activities were measured by using kinetic method, recommended methodology provided by International Federation of Clinical Chemistry and Laboratory Medicine (IFCC), conducted by using Beckman Coulter AU480 Clinical chemistry Analyzer (Fully automated Analyzer).

In this study, there is a significance rise in AST/ALT ratio in the group suffering from alcoholic liver disease as compared to the another group with non-alcoholic liver disease, which suggests that men are more prone to alcoholic liver disease as compared with of the females. In this study, male patients of the age between 53-69 are more affected with alcoholic liver disease, which should be asked to get their liver profile investigated.

Key Words: Alcoholic liver Disease (ALD), aminotransferase, GGT (Gamma glutamyl transferase), Alkaline Phosphatase (ALP), alcohol metabolism.

Introduction

ALD is considered to be lethal cause of higher mortality rate. The direct relationship of alcohol and liver disease is very common [1, 2]. Since, liver is the main organ to metabolize the alcohol and its related components. ALD has been highly responsible for liver transplantation. One of most general cause of liver disease is due to high level of alcohol consumption. However consumption of high alcohol causes liver disability, leading to abnormal

liver test results [2, 3]. The patients suffering with liver disease is growing in hospital admission. Association between alcohol consumption and liver disease known since more than 200 year ago. Consumption of heavy amount of alcohol from long term is the most dominant cause of death rate in United State (National Centre of Health Statistics) [1]. As for alcohol metabolism, liver is organ, most susceptible to alcohol-related injuries. Various biomarkers used to assess the liver related condition were studied, which includes gamma glutaamyl transferase (GGT), ALT (alanine aminotransferase) and aspartate aminotransferase (AST). These biomarkers elevated at higher proportion during consumption of alcohol intake. In serum, elevated level of AST along with ALT proposed the degree of liver damage, hence, an indicator informs the alcohol leads to persuade liver damage [4, 5]. In most of the hepatocellular disorder, ALT levels gets higher and eventually become equals to the AST levels. The AST/ALT ratio >2:1 mainly suggested initial stage of liver damage and its values will varies in different liver conditions; while a ratio > 3:1 is high indicator for ALD. In serum, low level of ALT, mainly suggested in an alcohol induce condition, further leading to insufficiency of pyridoxal phosphate [Euro.J.Exp.bio, 2013].

Alcohol, a huge group of organic compound, derived from hydrocarbon and contain one or more number of hydroxyl groups attached with the main HC- chain. Ethanol, one of class of compound of alcohol and its main ingredient is alcoholic beverages. Alcohol/ethanol, one of the intoxicating ingredient, commonly originate in wine, liquor & beer and is produced by yeast fermentation, sugar and starches. It is formed from the yeast fermented sugar in food i.e. vodka from potatoes, wine from grapes, while cedar from apples. Alcoholism is also known for unknown long-lasting illness. Its cause is unknown, but the genetic, psychosocial and cultural issues are suspected and relations of alcoholic have higher incidence of the disease. Long-lasting alcoholism and its related disorder are one of the major problems in the world. Chronic alcohol abuse will cause drinker to loss their conscious.

LIVER ENZYMES:

Various biomarkers are suggested to assess the liver functional ability and its credibility to perform different metabolic, excretory functions. These enzymes mainly include classes of transferases and phosphatasases mainly; gamma glutaamyl transferases (GGT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and Alanine aminotransferase (ALT). Due to high consumption of alcohol intake leads to reduce the liver function and progressively, cell death. All these biomarkers leads to elevated in blood with continuous alcohol intake; finally being a resultant in raised level of transaminase enzyme occurs with ALD and fatty liver, condition results in an outcome from excessive alcohol ingestion. These all enzymes can be elevated in high consumption of alcoholic patients.

Aminotransferase

Aminotransferase are the most often used and specific indicator for hepatocellular necrosis. AST/SGOT and ALT/SGPT; catalyzed by transfer of the amino acids between alpha-amino acid and another keto-acid. It is mainly localized to the liver but the AST is present in wide tissue, like heart, skeletal muscle, kidney, brain, liver [2, 16]. AST is available mitochondria and cytosol both, of that of the hepatocytes, but highly localized in the cytosol. The cytosolic AST as well as mitochondrial AST are isoenzymes and of immunological distinct. In human liver, about 80% activity of the same enzyme is contributed by the mitochondrial isoenzyme, while circulating AST activity is derived from the cytosolic isoform. ALT, a cytoplasmic enzyme, found in liver and its elevated levels of transaminases are observed in hepatocellular injury, commonly in liver congestion and hepatocellular necrosis [10, 11].

Elevation of aminotransferase

Severe (> 20 times, 1000 U/L): The AST & ALT levels are elevated in almost all types of liver disease. High level of elevation occurs in sever viral hepatitis, cellular shock and drug toxin induced necrosis. While the moderate levels (3-20 times) raised in various forms of hepatitis including acute neonatal hepatitis, chronic, and autoimmune, while in acute biliary tract obstructions. ALT levels are more frequently increased in chronic liver disease on comparison with AST. In acute viral hepatitis, the maximum initial level approach normal level within 5 weeks of onset of illness and normal levels are easily obtained in 8 week in 85 % cases [22]. Mild (1-3 times): Elevation generally very high in sepsis induced neonatal hepatitis (SINH), non-alcoholic steato-hepatitis (NASH), fatty liver, cirrhosis, and drug toxicity. For complete assessing the degree of liver damage AST/ALT ratio is considered. ALT & AST indicates the hepatic intracellular enzymes leaked into circulation during various liver related injuries. Aminotransferase is sensitive indicator of liver cell injury. In most hepatocellular disorder, ALT founds higher than or equal to AST serum levels [21, 22, 23].

Gamma Glutamyl Transferase (GGT):

Gamma glutamyl transferase also known as gamma glutamyl Trans peptidase is microsomal enzyme with extensive tissue distribution. GGT is present on the cell wall of many tissues such as tissue such as kidney, pancreas, bile duct, gall bladder, spleen, brain, heart and seminal vesicles. It is involves in the transfer of amino acids across the cell membrane, leukotriene metabolism and glutathione metabolism. GGT use as a marker of liver disease. Elevation of most GGT in chronic viral hepatitis infection often taking twelve month or more to present. Also GGT increase in pancreas, liver and biliary tract disease [21].

Alkaline phosphatase (ALP):

Alkaline phosphatase which hydrolyze aliphatic aromatic or heterocyclic compounds. It is activated by magnesium and manganese. It is localized in cell membrane. Alkaline phosphatase is Zink metallohydrolase enzyme found in liver, bone, kidney, intestinal epithelium, placenta and germ cells.. The site of biliary obstruction can be either intrahepatic, or extrahepatic. Absence of intestinal ALP in extrahepatic obstruction may be helful to identify the site of obstruction [18]. An alkaline phosphatase level varies with age. Initially, high in childhood & puberty and lower in middle age & higher in old age. As compared to females, males usually have higher value [17].

MATERIAL AND METHODS

The observational present study conducted in IVY hospital, Mohali, over a period of four months. In this study, apparently 85 patients aged 21-78 years were randomly selected. The study is based on physical as well as serological investigations for liver profile. Out of this study sample, 38 were female and 47 were male, mostly, admitted for treatment of alcoholic liver disease and liver cirrhosis. The various biochemical parameters were measured in the laboratory using kinetic (clinical chemical) method for serum AST, ALT, ALP and GGT activity as per the recommendations of the test according to International Federation of Clinical chemistry and laboratory medicine (IFCC) method using Beckman Coulter AU480 Clinical chemistry Analyzer (Fully automated Analyzer). Values are express as mean. Chi-square test used to obtain the significance variance of the data for AST/ALT ratio in Alcoholic and Non-Alcoholic patients. P-value is <0.05 and degree of freedom is one. The differences between Alcoholic and Non-Alcoholic correlations analyzed by chi-square test.

Method:

1. Liver Function Test: The blood sample, under all asceptic conditions, was taken between 9 am and 11. At room temperature, samples were clotted for 30 minutes and centrifuged at 3000 rpm for about 20 minutes. Separated serum transferred to another tube for liver function estimation. Sampling, reagent delivery, mixing, processing and results were automatically performed by Beckman Coulter AU480 Clinical chemistry Analyzer. The liver biomarkers from serum was processed and evaluated as per the recommendations.

RESULTS:

Eighty five alcoholic subjects enrolled in this study. Blood samples are collected from IVY hospital, Mohali. In this study compares the total 85 patients (38 female, 47 male) and age between 21-78, admitted to treatment of alcoholic liver disease and liver cirrhosis. The test data has been collected in Department of Pathology IVY Hospital Mohali, Punjab. Majority of the study male subjects has more consumption of alcohol as compare to female subjects. Majority of the study population had no physical activity. Thirty two subjects have history of alcoholism.

Group Statistics				
	Group		**Number**	**Mean**
Gender	Male	Alcoholic	23	
		Non-Alcoholic	24	
	Female	Alcoholic	9	
		Non-Alcoholic	29	
AST	Alcoholic		32	726
	Non-Alcoholic		53	730
ALT	Alcoholic		32	268
	Non-Alcoholic		53	609
ALP	Alcoholic		32	217
	N0n-Alcoholic		53	176
GGT	Alcoholic		32	167
	Non-Alcoholic		53	159
AST/ALT Ratio	Alcoholic		32	2.90
	Non-Alcoholic		53	1.18

Table 5.1 Data has been reported as mean group.

Significance variation between Alcoholic and Non-Alcoholic

	Normal	Abnormal	Total
Alcoholic	22	10	32
Non-Alcoholic	42	11	53
Total	64	21	85

Result: - Chi square- 1.12, P value-0.2899.

Calculated P value of AST is more than the given value. Effect of Alcohol and Non-Alcohol on AST level was not significant.

ALT (SGPT) Level in Alcoholic and Non-Alcoholic

	Normal	Abnormal	Total
Alcoholic	22	10	32
Non-Alcoholic	41	12	53
Total	63	22	85

Result:- Chi square- 1.24, P value-0.2655.

Calculated P value of ALT is more than the given value. Effect of Alcohol and Non-Alcohol on ALT level was not significant.

GGT Level in Alcoholic and Non-Alcoholic

	Normal	Abnormal	Total
Alcoholic	17	15	32
Non-Alcoholic	34	19	53
Total	51	34	85

Result: - Chi square- 1.12, P value-0.2899.

Calculated P value of GGT is more than the given value. Effect of Alcohol and Non-Alcohol on GGT level was not significant.

ALP Level in Alcoholic and Non-Alcoholic

	Normal	Abnormal	Total
Alcoholic	22	10	32
Non-Alcoholic	33	20	53
Total	55	30	85

Result:- Chi square- 0.30, P value-0.5839.

Calculated P value of ALP is more than the given value. Effect of Alcohol and Non-Alcohol on ALP level was not significant.

AST/ALT Ratio in Alcoholic and Non-Alcoholic

	Normal	Abnormal	Total
Alcoholic	25	7	32
Non-Alcoholic	28	25	53
Total	53	32	85

Result:- Chi square- 5.46, P value-0.0195

Calculated P value of AST/ALT is less than the given value. Effect of Alcohol and Non-Alcohol on AST/ALT level was significant.

Alcoholic and Non-Alcoholic on the bases of Gender

	Male	Female	Total
Alcoholic	23	9	32
Non-Alcoholic	24	29	53
Total	47	38	85

Result:- Chi square- 5.79, P value-0.0161

Calculated P value on the bases of gender is less than the given value. Effect of Alcohol and Non-Alcohol on the bases of gender was significant.

Group	Chi-Square	P value
AST	1.12	0.2899
ALT	1.24	0.2655
ALP	0.3	0.5839
GGT	1.12	0.2899
AST/ALT Ratio	5.46	0.0195
Gender	5.79	0.0161

Table 5.2 Data has been reported as Chi-Square and P Value.

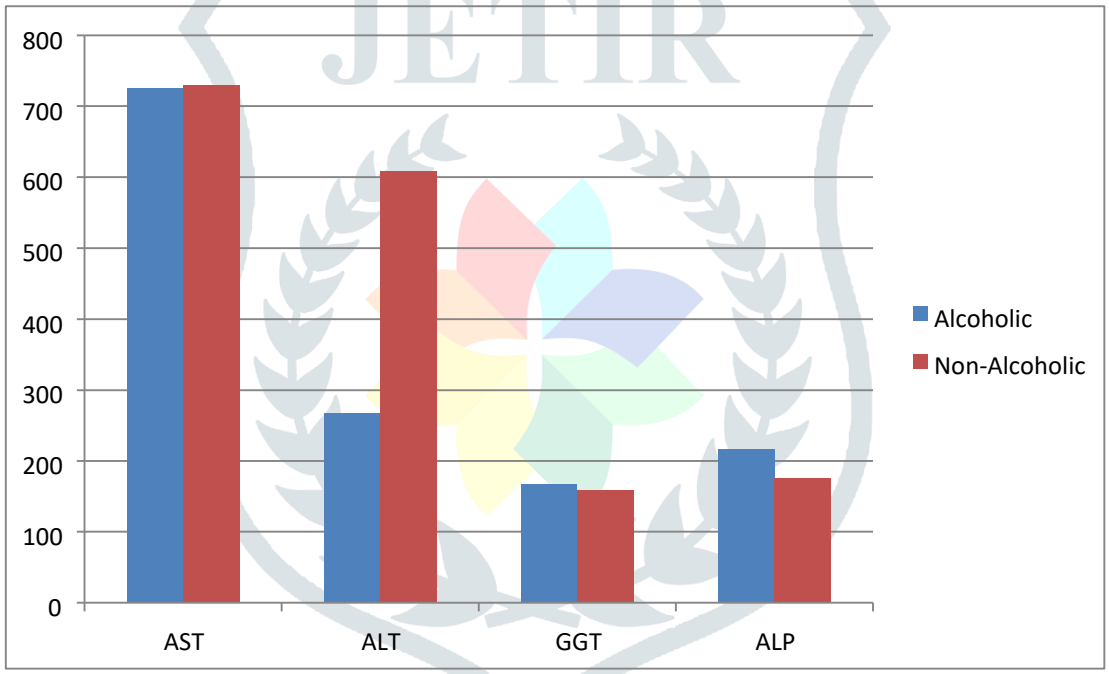

Figure 5.3 Graph Show theLiver enzyme activity inAlcoholic and Non-Alcoholic Patient (Mean of the Liver enzyme)

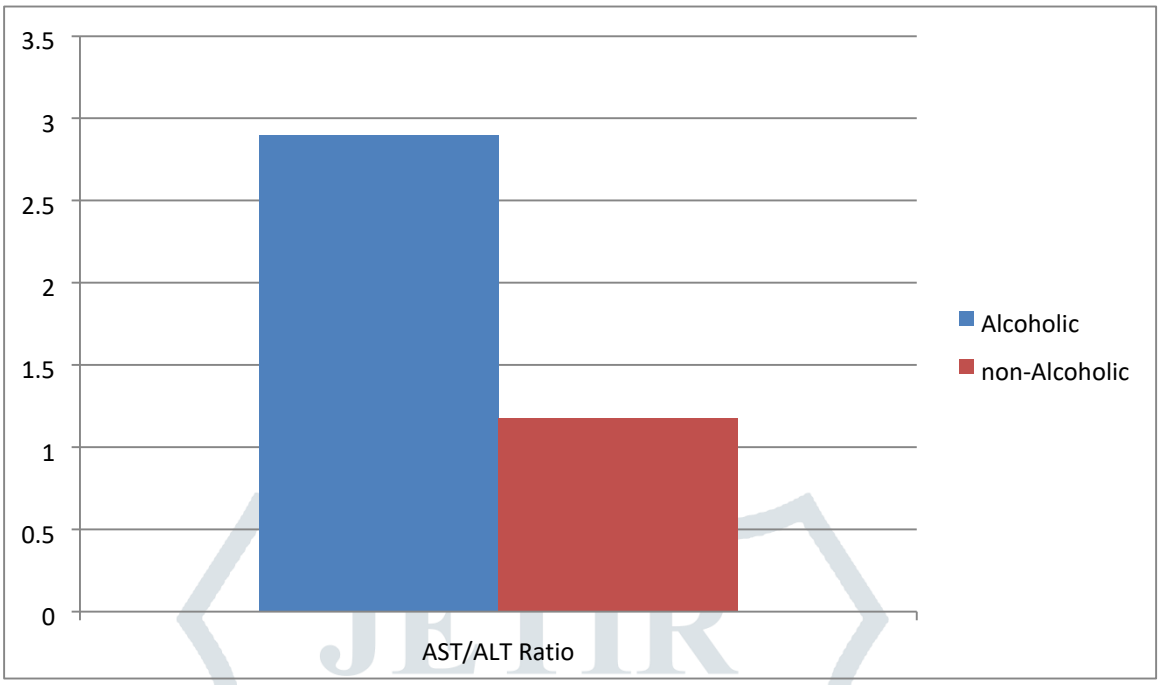

Figure 5.4 Graph show AST/ALT ratio in Alcoholic and Non-Alcoholic Patient.

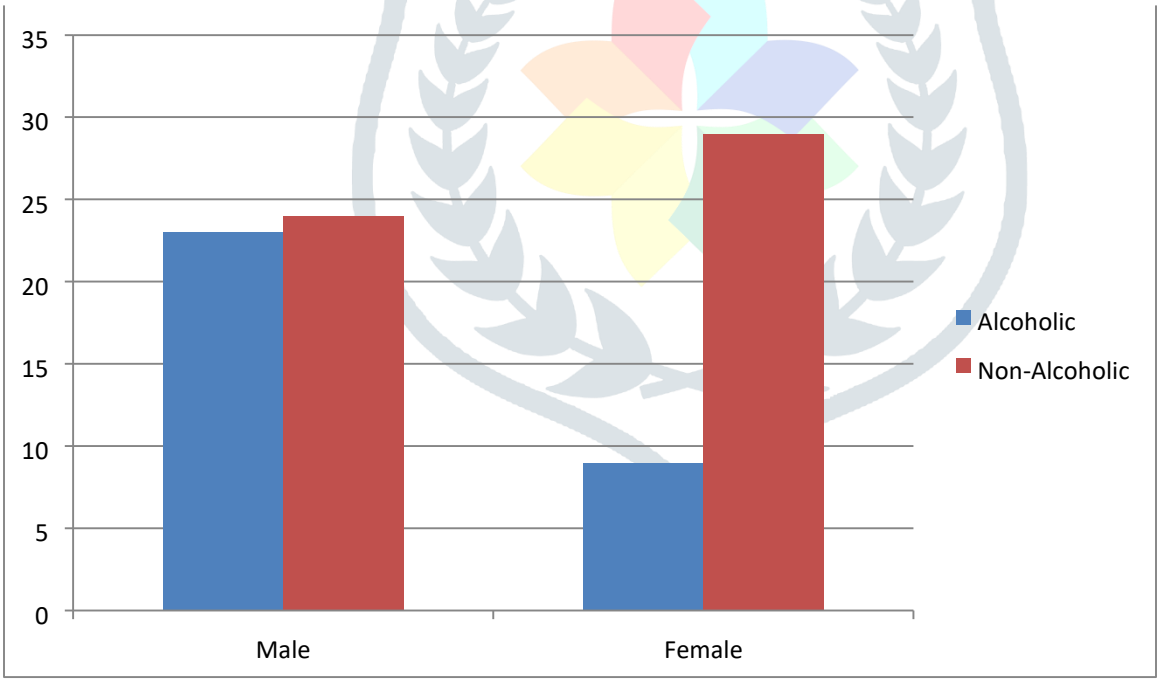

Figure 5.5 Graph show the Alcoholic liver disease on the bases of gender.

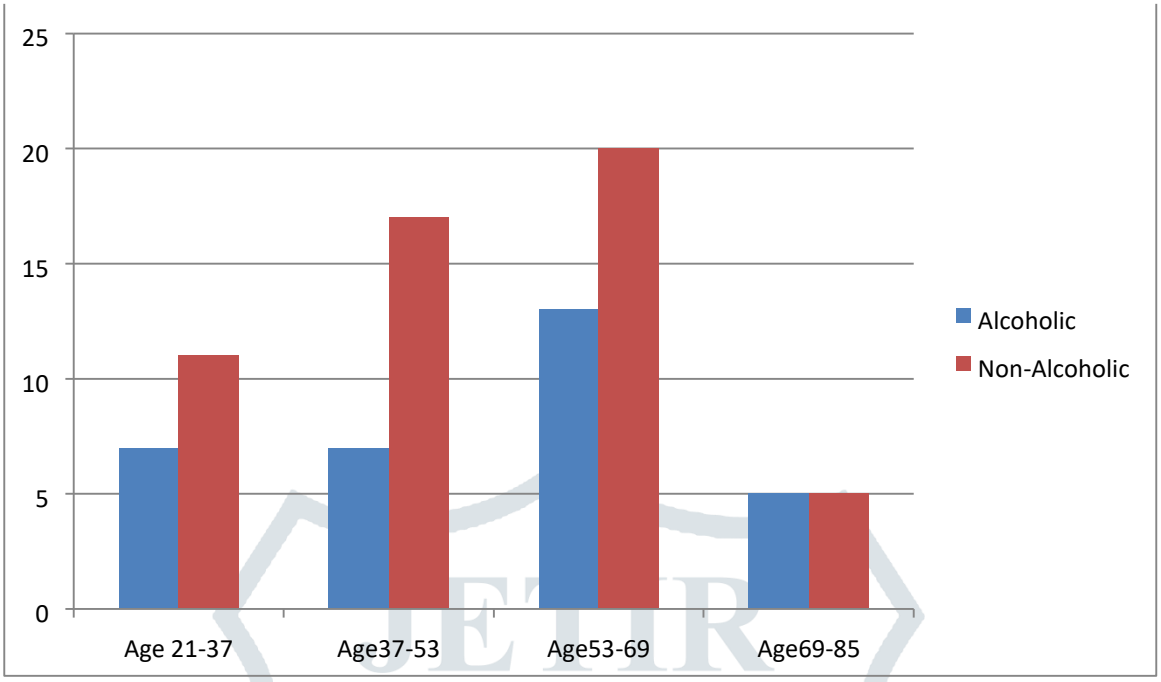

Figure 5.6 Graph show Alcoholic and Non-Alcoholic on the bases of age group.

The mean of the age of patient is 52.30 year. According to the data the age between 53-69 year old male is more affected to the alcoholic liver disease as compare to other group of age.

Independent sample Chi-square test used to analyze the result of liver enzyme (AST, ALT, GGT, and ALP) in alcoholic and Non-Alcoholic group. The mean serum AST of Alcoholic was 726 U/L, which show the rise from the normal range while that of the Non-Alcoholic group mean was 730 U/L, which is typically for a normal population AST level is (< 35 U/L). To test the hypothesis that use to study significance variation of AST/ALT ratio in Alcoholic and NonAlcoholic patient, value of the Chi-Square test is as can see in the table 5.2, p=<0.05 and degree of freedom is 1. The independent test was statistically not significant Chi-square= 1.12 and p=> 0.05 for AST. Among AST is not specific for Alcohol consumers.

The mean ALT of alcoholic was 268 U/L while that the Non-Alcoholic group was 609 U/ AST in normal population is <35 U/L. The Chi-square value of ALT is 0.2655 and p value of <0.05. This shows that there is no statistically significance ALT level between Alcoholic and Non-Alcoholic Patient. Among the ALT is not specific for Alcoholic liver disease. The mean of ALP value of Alcoholic was 217 U/L (higher than reference range) and NonAlcoholic mean was 176 U/L (Higher than reference range). Serum Alkaline phosphatase level in normal population is 30-120 U/L. The chi-square value value was 0.5839 at p=<0.05. This show there is No statistically significance of ALP level in Alcoholic and Non-Alcoholic patients. The mean of GGT value of Alcoholic patients was 167 IU/L while that Non-Alcoholic group mean is 159 IU/L (higher than normal range). Serum GGT level in normal population is 4-24 IU/L. The chi-square value of GGT is 0.2899, p=<0.05. This show there is no statistically significance of GGT level in Alcoholic and Non-Alcoholic patient. The mean of

the AST/ALT ratio in alcoholic patient is 2.90, while that Non-Alcoholic group mean of AST/ALT ratio is 1.18. Normal population has AST/ALT ratio is 2:1. The chi-square value of AST/ALT ratio is 0.0195, p=<0.05. This shows that there is statistically significance of AST/ALT ration in Alcoholic and Non-Alcoholic patient. Among alcohol consumers has increase the AST/ALT ratio.

On the bases of gender Alcoholic and Non-Alcoholic group. Total total eighty five patients participated in this study out of 38 female and 47 male, and out of 38 female, 9 is Alcoholic and 29 is Non-Alcoholic and out of 47 male 23 is Alcoholic and 24 is Non-Alcoholic. The chi-square value is, on the bases of gender is 0.0161, p=<0.05. This shows that there is statistically significance of Alcoholic and Non-Alcoholic on the basis of gender. This study shows that male is more affect to the Alcoholic liver disease as compare to the female.

Discussion

The study shows that Alcoholic have higher value of liver enzyme AST, ALT, ALP and GGT and Non-Alcoholic have also show higher level of liver enzyme in case of viral hepatitis and cirrhosis. AST/ALT ratio is higher in Alcoholic liver disease. AST/ALT ratio is more specific diagnosis for the Alcoholic liver disease. Male patient more affected to Alcoholic liver disease as compare to the female. Because male group consume more Alcohol as compare to the female. The data suggest that high AST/ALT ratio in alcoholic liver disease found in patient whose liver disease in advance. Diagnostically, high AST/ALT ratio was recently underscore guidelines for Alcoholic Liver disease published by American Collage of gastroenterology [25, 24]. The mean of the age of patient is 52.30 year. According to the data the age between 53-69 year old male is more affected to the alcoholic liver disease as compare to other group of age.

Conclusion

Result of this study; it can conclude that alcohol has detrimental effects on the liver. It observes that the liver enzyme AST, ALT, ALP, and GGT were raised more than normal range. Liver enzyme rise due to the deleterious effect of ethanol on liver cell (Hepatocytes), causes leakage of cytosolic into the blood stream. The AST/ALT ratio increase more in chronic alcoholic as compare to viral hepatitis. ALT is most significant in viral hepatitis in alcoholic liver disease AST is more than ALT. Most of patients with chronic alcoholic have an AST/ALT ratio is two or more than two. High AST/ALT ratio is sindicative of advance alcoholic liver diseases.

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