International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 06 | June - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

The Correlation between Liver Enzymes and Alcohol Consumption with Reference to High Density Lipoprotein Cholesterol

Iram Altaf [1] **Seema Rani**[2], **Rashed Ahmad Mir** [3]

1. Post graduate student of medical laboratory sciences at Desh Bhagat University Mandi Gobindgarh, Punjab, India.
2. Assistant Professor, Desh Bhagat University Mandi Gobindgarh, Punjab.
3. Post graduate student of medical laboratory sciences at Desh Bhagat University Mandi Gobindgarh, Punjab, India

Abstract

Health problems related to lifestyle and behavior are steadily more common in modernized societies. Recent studies have indicated that the common liver enzymes, gamma- gutamyltransferase (GGT),asparatate aminotransferase (AST), Alkaline phosphatase (ALP) and alinine aminotransferase (ALT) are elevated in alcoholics. In this study, we investigate blood sample of chronic alcoholics. Alcohol consumption, smoking, coffee drinking, income, education, food habits were analyzed using detailed questionnaires. The mean age of study group was 41.95 ± 8.45 years. Serum AST was 36.92 ± 26.35 U/L. Serum ALT was 53.59 ± 31.24 U/L, serum ALP was 102.47 ± 29.03 U/L, serum GGT was 66.63 ± 30.96 U/L and Serum HDL- Cholesterol was 44.68 ± 11.66 mg/dl. The result shows that alcoholics had increased serum liver enzymes and decreased serum HDL- Cholesterol

***Keywords*: - Liver enzymes, Alcohol, High density lipoprotein, Alcohol liver disease, High density lipoprotein**

INTRODUCTION

ALCOHOL

Alcohol are the organic molecules assembled from the carbon oxygen and hydrogen atoms. An active drug found in drinks that contain alcohol is a chemical called ethanol, Alcohol or ethanol is an intoxicating ingredient found in beer, wine and liquor. When yeast acts together with sugars in grains,fruits and vegetables. It causes them to ferment and breakdown This results in two by products – ethanol and carbon dioxide.

ALCOHOLISM

Alcohol is absorbed into a persons body primarily through the small intestines and also the stomach.Any drinking of alcohol results in significant mental or physical health problems, it's a serious disease where people where people gain control over the desire for physical and mental effects of drinking alcoholic beverages. Chronic alcohol abuse can lead the feeling of guilt and shame which leads to broken relationships due to family's lack of control over the alcohol intake. Alcoholism has injurious effects on one's overall health. Organs such as brain, liver, heart, kidneys and stomach are most affected.

LIVER ENZYMES

Prolonged alcohol consumption affects the liver enzymes. Four enzymes are measured in the laboratory to evaluate function of the liver. These enzymes include Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP), and Gamma Glutamyl- Transferase (GGT). The first two are known together as transminases and second two are known together as cholestatic liver enzymes. Elevation in any of these enzymes can indicate the presence of liver disease. Elevation of the transminases can occur with alcoholic liver disease and fatty liver, conditions that can result from excessive alcohol intake. Elevation of the cholestatic liver enzymes can also occur with alcoholic liver disease.

- **Aspartate amino Transferase (AST)**

AST catalyse transmination reaction. AST exists in two different isoenzyme forms, which are genetically distinct, the mitochondrial and cytoplasmic form. AST is found in highest concentration in heart compared with other tissues of the body such as liver, skeletal muscle and kidney. Normal level of serum AST is 0-40U/L. Elevated mitochondrial AST is seen in extensive tissue necrosis during myocardial infarction and also seen in chronic liver disease.

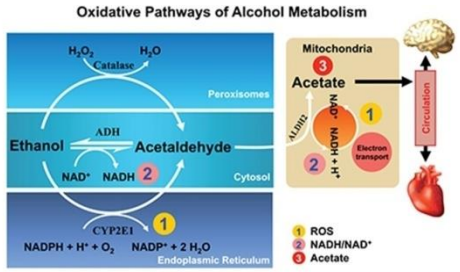
About 80% of AST activity of the liver disease is contributed by mitochondrial isoenzyme. However the ratio of mitochondrial AST to total AST activity has diagnostic importance in identifying the liver cell necrotic type condition and alcoholic hepatitis.

- **Alanine amino Transferase (ALT)**

ALT is found in kidney, heart, muscle and highest concentration in liver compared with other tissues of the body. ALT is purely cytoplasmic catalyzing the transminase reaction . Normal level of serum ALT is 0-40U/L. Any type of cell injury can increase ALT levels. Viral hepatitis like A, B, C, D, and E may be responsible for a marked increase in aminotransferase levels. The increase in ALT associated with hepatitis C infection tends to be more than associated with hepatitis A or B. In a recent study it was found that the hepatic fat accumulation in childhood obesity and nonalcoholic fatty liver disease causes serum ALT elevation.

- **Gamma-Glutamyl-Transferase (GGT)**

Gamma-glutamyl-transferase, catalyzes the transfer of the gamma-glutamyl group from peptides and compounds that contain it to the same accepters. The gamma-glutamyl accepter is the substrate itself, some

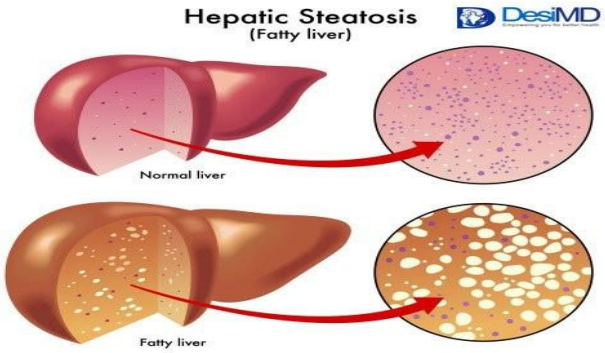


amino acid or peptides or even water in which case simple hydrolysis takes place. Even though renal tissue have the highest concentration of GGT, the enzyme present in serum appears to originate primarily from the hepatobiliarysystem.GGT is a sensitive indicator of the presence of hepatobiliary disease, being elevated in most subjects regardless of cause.

EFFECT OF ALCOHOL ON LIVER

Liver is one of the largest and most complex organs in the body. The liver regulates most chemical levels in the blood and excretes a product called bile. This helps carry away waste products from the liver. It protects the body from disease and helps remove harmful toxins like alcohol from the body hence is highly vulnerable to alcohol related injury.

Alcohol abuse and alcohol-induced liver diseases (ALD) are a major public health problems, both in the US and worldwide. ALD is probably the main cause of death among people with severe alcohol abuse and is responsible for about 3.8% of global mortality .Fatty liver (hepatic steatosis) is an early manifestation, can progress to alcoholic liver disease (ALD), on continued alcohol ingestion



(Figure Fatty liver)

MATERIAL AND METHODS

Blood samples were collected from chronic alcoholic subjects visiting the psychiatry department of Punjab Institute of Medical Sciences(PIMS), Jalandhar. Informed written consent was obtained from all participants. In this survey 132 alcoholic subjects and 108 non-alcoholic subjects were included.

Control: About 108 subjects aged between 20 to 60 years who had come for routine checkup and were non alcoholic, were selected as controls. Informed written consent was also obtained from these subjects.

Inclusion criteria

Subjects between 20 to 60 years taking at least 150 ml of alcohol daily for one year and above were included in the study.

Exclusion criteria

In this study, pregnant women, elderly (above 60 years) and children below 20 were excluded. A subject addicted to any other drug was also excluded from the study. Patients suffering from liver cancer and chronic heart disease were also not included in the study.

STUDY SITE: psychiatry department of Punjab Institute of Medical Sciences(PIMS), Jalandhar.

STUDY PERIOD: The present study was 6 months

AIM AND OBJECTIVES

RATIONALE

The prevalence of alcohol consumption in Punjab is very high especially among people of 20-60 years of age. This chronic alcohol consumption leads to several diseases amongst which alcoholic liver disease (ALD) is the commonest. In this study, the change in liver enzymes which is directly related to alcoholic liver damage will be evaluated. Also, HDL-Known's good cholesterol will be estimated and it will be studied to see if there is any correlation between it and the consumption of alcohol.

Aim and objectives

1.To investigate the change in liver enzymes (AST, ALT, ALP, GGT) in alcoholic subjects.

2. To correlate between alcohol consumption and change in HDL-C level in serum sample

RESULTS

One hundred and thirty two alcoholics were enrolled in this study. The mean age of the alcoholics was 41.95 ± 4.45 years .All the subjects were male. The longest duration of alcohol abuse was 15 years while the shortest duration of abuse was 2 years. Majority of the study population ingested at least 150 ml of alcohol daily. Majority of the study population had studied uptoclassXII. Few subjects of the study population were cigarette smokers. Average income of the study population was above 30,000 rupee per month. Majority of study population had no physical activity. Around 50% of the alcoholic subjects hadhypertension.More than 25% of the study population had either parent suffering from diabetics.Hundred and eight males of age group 20 to 60 years acted as controls. They had no history of alcoholism. The liver enzymes, (AST, ALT, GGT, ALP) and HDL-C concentration in the control subjects was within the normal reference rang

GROUP STATISTICS				
	GROUP	**N**	**Mean**	**Std. Deviation**
AGE	ALCOHOLIC	132	41.95	8.45
	CONTOL	108	41.03	9.44
AST	ALCOHOLIC	132	36.92	26.35
	CONTOL	108	24	4.62
ALT	ALCOHOLIC	132	53.59	31.24
	CONTOL	108	27.52	7.22
ALP	ALCOHOLIC	132	102.47	29.03
	CONTOL	108	71.95	9.93
GGT	ALCOHOLIC	132	66.63	30.96
	CONTOL	108	29.42	7.38
HDL	ALCOHOLIC	132	44.68	11.66
	CONTOL	108	50.9	7.26

STATISTICS

DISCUSSION

The study shows that alcoholics have higher value of liver enzymes such as AST, ALT, ALP and GGT, when compared with non-alcoholic, age matched subjects. A brief dietary history showed that alcoholics consumed more of dietary fats, had less physical activity leading to positive calorie balance and obesity.Batic- mujanovic et al shows that cigarette smoking adversely affects HDL-C by lowering its level,

further increasing the risk for coronary heart disease. According to the Heart UK: the cholesterol charity association, acrolein is a chemical, which is found in cigarettes. This substance decreases plasma HDL cholesterol and thus decreased transport of cholesterol to the liver. In our study 18.9% of subjects were alcoholics and smokers.

CONCLUSION

From the result of this study, it can be concluded that alcohol has detrimental effects on the liver. It was observed that the liver enzymes (AST, ALT, ALP and GGT), were raised above the reference range in the alcoholic subjects. This rise is due to the deleterious effect of ethanol on hepatocytes, causing leakage of cytosolic enzymes into the blood stream. Also a decrease in high density lipoprotein cholesterol (HDL-C), in sera of alcoholic subjects observed, can lead to higher risk of development of coronary heart disease. . Arising the consciousness about the adverse effects of alcohol in the general population will help in reducing the morbidity and mortality due to alcoholism.

References

[1] WHO lexicon of alcohol and drug terms published by world health organization.www.who.int/substance_abuse/terminology/who_lexicon/en.

[2] Alcohol. Org.nz, health promotion agency.alcohol.org.nz/alcohol-its-effects/about- alcohol/what-is-alcohol.

[3] Alcoholism: Definition of Alcoholism by Merriam-Webster. www.merriamwebster.com/dictionary/alcoholism.

[4] Chronic Alcohol Abuse Symptoms.www.alcoholabuse.com/info/effects-of-alcohol- abuse/chronic-alcohol-abuse-symptoms. Copyright AlcoholAbuse.com 2014.

[5] Horowitz M, Maddox A, Bochner M, et al. (August 1989)."Relationships between gastric emptying of solid and caloric liquid meals and alcohol absorption". Am. J.Physiol. 257(2): G291–8.

[6] Mauro P, Renze B, Wouter W. Enzymes. In: Tietz text book of clinical chemistry and molecular diagnostics. Carl AB, Edward R, David EB. 4th edition, Elsevier 2006, 604- 616.

[7] Thapa BR, Anuj W. Liver Function Tests and their Interpretation. Indian J Pediatric 2007; 74: 663-71.

[8] Panteghini M, Falsetti F, Chiari E et al. Determination of Aspartate aminotransferase isoenzymeinhepatic disease. Lab J Res Lab Med. 1983; 10: 515-19.

[9] Kallei L, Hahn A, Roder VZ. Correlation between histological findings and serum transaminasevalues in chronic diseases of the liver. ActaMedicalScandinavika. 1964; 175: 49-56.

[10] Marcellin P. Hepatitis C: the clinical spectrum of the disease. J Hepatol. 1999; 31: 9-16.

[11] James D, Tania SB, Sara ET, et al. Alanine Aminotransferase Levels and Fatty Liver in ChildhoodObesity: Associations with Insulin Resistance, Adiponectin, and Visceral Fat. J ClinEndocrinalMetab. 2006; 91: 4287-94.

[12] Jones-Webb, R. Drinking patterns and problems among African-Americans: Recent findings. Alcohol Health & Research World.1998;22(4):260–64.

[13] Tuyns, A.J., and Péquignot, G. Greater risk of ascitic cirrhosis in females in relation to alcohol consumption. International Journal of Epidemiology.1984;13:53–7.

[14] High density lipoprotein. From Wikipedia, the free encyclopedia.https://en.wikipedia.org/wiki/High-density_lipoprotein.

[15] U satyanarayana U. chakrapani. Textbook biochemistry with clinical concepts and case studies 4th edition 2013. Published by Elsevier A division of read Elsevier India private limited.

[16] Rehm J, Samokhvalov AV, Shield KD. Global burden of alcoholic liver diseases. J Hepatol. 2003; 59:160–68.

[17] Lieber, C.S. Medical disorders of alcoholism. N. Engl. J. Med. 1995; 333: 1058– 65.

[18] Corrao G[1], Bagnardi V, Zambon A, La Vecchia C.A meta-analysis of alcohol consumption and the risk of 15 diseases.Prev Med. 2004; 38(5):613-9.

[19] Krenz M[1], KorthuisRJ.Moderate ethanol ingestion and cardiovascular protection: from epidemiologic associations to cellular mechanisms.JMol Cell Cordial. 2012 Jan; 52 (1):93-104. Doi: 10.1016/j.yjmcc.2011.10.011. Epub 2011 Oct 23.