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Study of Serum Gamma Glutamyl Transferase (GGT) Activity as a Biomarker in Alcoholic Liver Disease

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Abstract: Liver is known to be largest metabolic machinery in the body. Being the largest organ the liver shares with many other abilities to perform its functions with wide reserve capacity. Liver disease reduces the functioning of the liver. Alcohol induced liver diseases is common in this era. Our plan is to use the Serum Gamma Glutamyl Transferase (GGT or γ-GT) as the marker for the diagnosis of alcoholic liver diseases. Serum GGT is a microsomal enzyme, which produces the antioxidant Glutathione and catalyzes the transfer of the gamma-glutamyl moiety of glutathione to various acceptor peptides. In this study we have taken 100 subjects out of those 50 (50%) were healthy individual and 50 (50%) were alcoholic liver disease patients. GGT value of alcoholic liver diseases (140.15 ±79.05) is higher as compare to healthy individual (control) (26.86 ± 10.86) shows statistically highly significant (p=0.001).
Keywords: Gamma Glutamyl Transferase, Alcoholic Liver Disease, Biomarker, Enzyme.

INTRODUCTION

Alcoholism is one of the foremost current threats to the health and safety of people around the world and considered as the social disease. Primary metabolic site of the alcohol (ethanol) is liver [1]. Alcoholic liver disease (ALD) is one of the leading causes of morbidity and mortality worldwide [2]. Development of ALD due to consumption of alcohol is mediated by increased production of pro-oxidant and decrease in the antioxidant defense mechanism in the liver. Great imbalance between the pro-oxidants and the antioxidant leads to cell damage due to oxidative stress [3].

Therefore, more effective diagnosis and early intervention is important to reduce its prevalence. There is need of objective method for the early phase detection of alcoholic liver disease [4].

Gamma Glutamyl Transferase (GGT) is known to be a glycoprotein enzyme present on the cell membrane in several tissues. GGT is an enzyme which is derived from the plasma membrane of hepatocytes and its activity has been widely accepted as a biomarker of ALD. GGT shows the specific pharmacological effects of alcohol on the liver and have the different characteristics in the patient with liver diseases as compare with those without liver diseases [5].

It had been proved that GGT play an important role in the detoxification of xenobiotics and carcinogens [6]. The process implies detoxification of xenobiotics, include alcohol, free radicals are generated through the Microsomal Ethanol Oxidizing System (MEOS) as well as through leakage from the mitochondrial electron transport chain [7]. R educed Glutathione (GSH) is one of the frontline non-enzymatic intracellular antioxidants, which safeguards against the oxidative stress. It is highly involved in the re-absorption of glutathione from the glomerular filtrate and leads the protection against oxidative stress by maintaining the intracellular glutathione levels [8].

In clinical practice elevated serum GGT is used as one of the indicators of liver disease, such as biliary obstruction, alcohol consumption, and exposure to certain medical drugs [9]. In normal condition small amounts of GGT are released into the circulation from the cell membrane. Excessive alcohol consumption, leads to liver cell damage which increase the release of GGT from the cell membrane. Elevated serum GGT level remains the most widely used marker of alcohol abuse and the levels are typically rises after the heavy alcohol intake for several weeks [10].

There are various enzymes used in the diagnosis of alcoholic liver diseases including alanine aminotransferase (ALT) and aspartate aminotransferase (AST) but the most sensitive and widely employed marker is GGT and is the established biochemical tests for excessive alcohol consumption. GGT is an enzyme which is increased in serum in alcohol induced liver damaged [11].

MATERIALS AND METHODS

This study was conducted at Kaski Sewa Hospital and Research Center between 2nd December 2017 to 15th June 2018. A total of 100 subjects were included in this study out of which 50 were alcoholic liver disease patients and 50 were healthy control subjects. Gamma glutamyl transferase activity was measured in a DIA LAB DTN-405 chemistry analyzer, (Austria), (Kinetic method) for all the subjects.

Inclusion criteria

- Alcoholic liver diseases patients.
- History of Chronic alcoholic
- No history of any other diseases

Exclusion criteria

- Patients having history of other diseases like acute pancreatitis, cholelithiasis, biliary obstruction, viral hepatitis

Statistical Analysis

The results were expressed as mean ± SD. The comparison between the two groups were evaluated by Pearson correlation coefficient. Statistical analysis was performed by using Statistical package for social sciences (SPSS) version 17.0. A p value of < 0.05 were considered statistically significant.

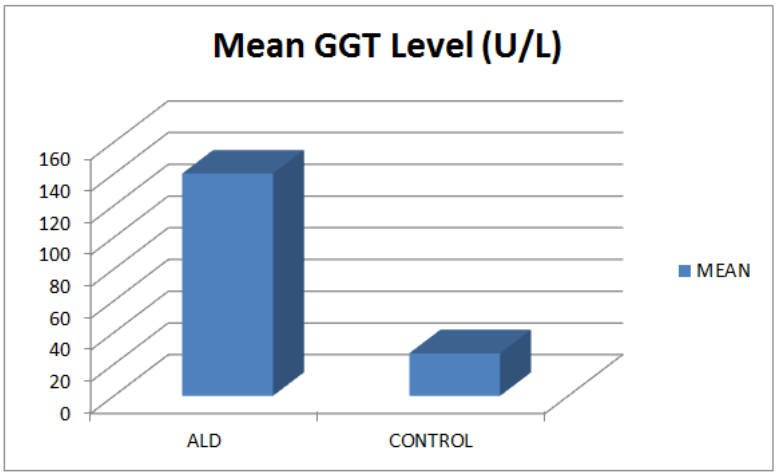
RESULTS

The mean age of the study subjects was 48.62 ± 16.3. Male and female percentage was 72 % and 28 % respectively. A significant correlation was found between the alcoholic liver disease patients and healthy control subjects. The mean values for GGT was markedly increased 140.15 ± 79.05 as compared to healthy subjects (26.86 ± 10.86) which was statistically significant (p= 0.001).

Table-1: Serum GGT activity in alcoholic liver disease (ALD) and healthy controls

Parameter	Study group Mean ± SD(n=50)	Control Group Mean ± SD (n=50)	P value
Gamma Glutamyl Transferase (GGT) U/L	140.15 ± 79.05	26.86 ± 10.86	0.001*

* P value < 0.05 is considered statistically significant.



Graph-1: Serum GGT activity in alcoholic liver disease (ALD) and healthy controls

DISCUSSION

Alcoholic liver diseases arise from the excessive ingestion of alcohol. It is the major cause of liver cirrhosis all over the world. It can be prevented by early diagnosis and management. Various biomarkers and enzymes are available for the diagnosis of alcoholic liver diseases. The aim of the present study is to find out the diagnostic accuracy of GGT in ALD patient.

Our study reveals that patient with ALD has higher Gamma-glutamyl transferase (GGT) level (140.15 ± 79.05) U/L than normal healthy individual (26.86 ± 10.86) U/L. This difference is considered to be statistically significant (p=0.001).

On comparison with other study Dr. JB Gogoi *et al*: 2012; studied serum gamma glutamyl transferase as a diagnostic marker in alcoholic hepatitis shows that the serum GGT level is significantly increased (107.73 ± 10.45 U/L) then normal healthy individual (20.43 ± 7.72) [12].

GGT activity in the serum is commonly used as a screening test for alcoholism; it seems to be highly elevated in patients with a high alcohol intake over a long period [13]. Elevated serum enzyme activities are also found in patients with various stages of alcoholic liver disease including alcoholic fatty liver, alcoholic hepatitis, alcoholic liver fibrosis and cirrhosis [14]. Variations in the serum are commonly observed even during the early stage of alcoholic liver disease. GGT activity in the serum is a useful test for diagnosis of alcoholic liver diseases.

CONCLUSION

This study suggested that serum level of gamma glutamyl transferase activity is helpful in the assessment, diagnosis, and superior Predictive Biomarker of alcoholic liver disease. Which should be routinely practice in medicine to diagnose it.

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