Biochemical analysis in patients of hepatitis and cirrhosis.

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Abstract:

Introduction : Hepatic injury is associated with distortion of the metabolic function. Hepatic disease can be evaluated by biochemical analysis of the serum tests, which includes levels of serum Alanine and Aspartate aminotransferases, alkaline phosphatase, Gama glutamyl transferases and others. **Objective :** The present study was conducted to assay liver associated enzymes on patients with hepatitis and Liver cirrhosis and to find out the comparative levels of enzymes between the groups. **Materials and Method :** The present Cross Sectional is conducted among 50 patients of Hepatitis and 50 patients of Cirrhosis. 50 normal healthy persons were selected from Civil Hospital Ahmedabad (CHA), Gujarat. Serum levels of Alanine and Aspartate aminotransferases, alkaline phosphatase and Gamma glutamyl transferase were analyzed on Abbott Architect fully automated analyser. **Results :** Acute Hepatitis shows highly elevated levels of ALT. The ratio of AST:ALT >3:1 is highly suggestive of progression of liver disease towards cirrhosis. The ALP activity has been reported up to 200 -300 U/L in hepatitis and in cirrhosis ALP is slightly elevated up to 200 U/L. Persistence elevation of GGT may be an indicator if Cirrhosis. **Conclusion :** The different enzyme alteration patterns and ratio is used as a guide to direct further evaluation of diseases that affect the liver.

Key Words: Cirrhosis, Hepatitis, Liver enzymes.

Introduction:

Liver diseases are diagnosed by means of varied laboratory investigations. The clinical spectrum of liver diseases represents a spectrum of clinical illness and morphological changes that range from fatty liver to hepatic inflammation (hepatitis) and necrosis to progressive fibrosis (cirrhosis). Blood tests used for initial assessment of liver disease include measured levels of serum Alanine and Aspartate aminotransferases (ALT and AST), Alkaline phosphatase (ALP), Gama glutamyl transferases (GGT) and others. The pattern of abnormalities generally points to hepatocellular versus cholestatic liver disease. Aminotransferases (AST and ALT) are enzymes that catalyze the transfer of α-amino groups from aspartate and alanine to the α-keto group of ketoglutaric acid to generate oxalacetic and pyruvic acids respectively, which are important contributors to the citric acid cycle. Both

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aminotransferases are highly concentrated in the liver. AST is also diffusely represented in the heart, skeletal, muscle, kidneys, brain and red blood cells, and ALT has low concentrations in skeletal muscle and kidney; so an increase in ALT serum levels is, therefore, more specific for liver damage. Hepatic ALP is present on the surface of bile duct epithelia. Cholestasis enhances the synthesis and release of ALP, and accumulating bile salts increase its release from the cell surface. GGT is a microsomal, membrane-bound glycoprotein enzyme, catalyzes the transfer of the gamma-glutamyl moiety of glutathione to various peptide acceptors. The whole spectrum of liver diseases, regardless of cause, may be responsible for altered GGT serum levels. [1,2,3,4,5]

Materials and Method:

Study Area :

The present Cross Sectional study is conducted among 50 patients of Hepatitis and 50 patients of Cirrhosis and 50 normal healthy persons were selected from Civil Hospital Ahmedabad (CHA), Gujarat. The study was conducted with necessary permission of ethical committee. The study period was September 2018- December 2019.

Inclusion Criteria :

Study includes male Individual within 25–55 years age groups and without any chronic condition other than Liver disorder are included in this study. Fifty normal healthy volunteer with no clinical evidence of any disease were selected as controls.

Exclusion Criteria:

We excluded patients with Cardiac disorders, pancreatic disorders, Thyroid Disorders, Diabetes Mellitus, Hypertension (HT), Bone and muscle disease, Blood coagulopathies, Cerebro-spinal abnormalities, Malignancy, Traumatic injuries, Drug abusers.

Biochemical analysis :

For analysis of serum enzymes AST, ALT, GGT & ALP, after taking informed consent of all participants and under all aseptic measures, 5 ml venous blood was collected in clot activator serum vacutte from all the patients and control group by venepuncture. Serum was separated by centrifugation and analysed on fully auto analyzer Abbott Architect at Hi-Tech Biochemistry Laboratory Civil, Hospital, Ahmedabad. Commercially available ready to use reagent kits were used for estimation of various parameters.

Data analysis :

The Master chart was prepared using Excel 2007 software. Data was statistically analyzed by Graphpad software; Version 6.0, which evaluated the differences of various parameters within groups on the basis of p value.

Results :

Table 1 : Serum ALT in Hepatitis, Cirrhosis and Control

Parameter & p-value	Biological Reference Interval	Group 1 (Hepatitis) Mean ± SD	Group 2 (Cirrhosis) Mean ± SD	Group 3 (Controls) Mean ± SD
Serum ALT (IU/L)	0 – 34	1729.72 ± 904.23 (p<0.001)	45.42 ± 36.63 (p<0.05)	20.80 ± 6.22

Table 2 : Serum AST in Hepatitis, Cirrhosis and Control

Parameter & p-value	Biological Reference Interval	Group 1 (Hepatitis) Mean ± SD	Group 2 (Cirrhosis) Mean ± SD	Group 3 (Controls) Mean ± SD
Serum AST (IU/L)	0 – 31	1335.97 ± 1090.50 (p<0.001)	157.59 ± 184.56 (p<0.001)	23.73 ± 5.27

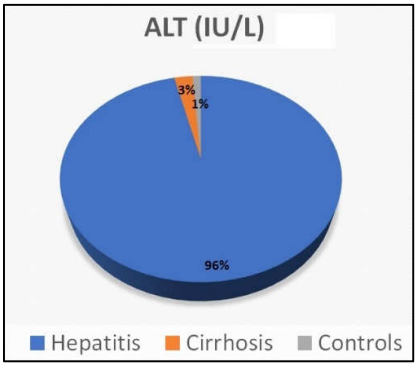
Table 3 : Serum ALP in Hepatitis, Cirrhosis and Control

Parameter & p-value	Biological Reference Interval	Group 1 (Hepatitis) Mean ± SD	Group 2 (Cirrhosis) Mean ± SD	Group 3 (Controls) Mean ± SD
Serum ALP (IU/L)	39 – 118	237.9 ± 205.14 (p<0.001)	188.28 ± 220.55 (p<0.05).	85.64 ± 21.10

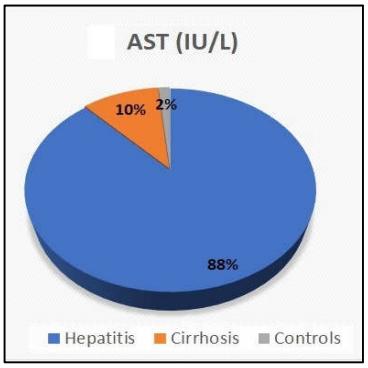
Table 4 : Serum GGT in Hepatitis, Cirrhosis and Control

Parameter & p-value	Biological Reference Interval	Group 1 (Hepatitis) Mean ± SD	Group 2 (Cirrhosis) Mean ± SD	Group 3 (Controls) Mean ± SD
Serum GGT (IU/L)	10 – 48	115.33±28.31 (p<0.05)	248.66±43.5 (p<0.05)	26.73±4.02611

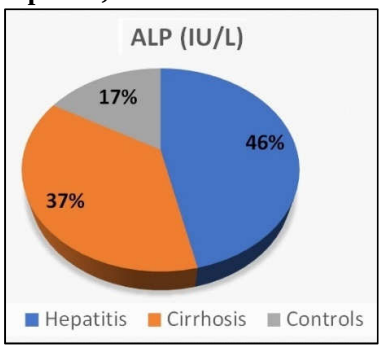
Graph 1 Serum ALT in Hepatitis, Cirrhosis and Control



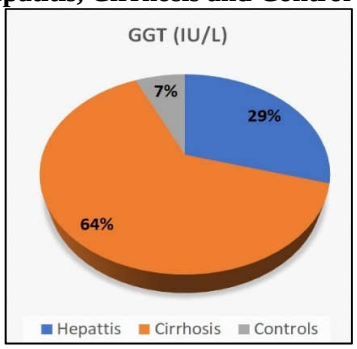
Graph 2: Serum AST in Hepatitis, Cirrhosis and Control



Graph 3 Serum ALP in Hepatitis, Cirrhosis and Control



Graph 4 Serum GGT in Hepatitis, Cirrhosis and Control



Graph I shows that serum ALT is increased in Hepatitis and Cirrhosis as compared to controls (1729.72 ± 904.23 IU/L, 45.42 ± 36.63 IU/L, 20.80 ± 6.22 IU/L respectively). So, there is highly significant difference observed in between group 1 & group 3 ($p<0.001$) and significant difference is observed in group 2 & group3 of serum ALT ($p<0.05$). (Table 1)

Graph II shows that serum AST is increased in Hepatitis and Cirrhosis as compared to controls (1335.97 ± 1090.50 IU/L, 157.59 ± 184.56 IU/L, 23.73 ± 5.27 IU/L respectively). So, there is highly significant difference observed in between group 1 & group 3 ($p<0.001$) and highly significant difference is observed in group 2 & group3 of serum AST ($p<0.001$) (Table 2)

Graph III shows that serum ALP is increased in Hepatitis and Cirrhosis as compared to controls (237.9 ± 205.14 IU/L, 188.28 ± 220.55 IU/L, 85.64 ± 21.10 IU/L respectively). So, there is highly significant difference observed in between group 1 & group 3 ($p<0.001$) and significant difference is observed in group 2 & group3 of serum ALP ($p<0.05$). (Table 3)

Graph IV shows that serum GGT is increased in Hepatitis and Cirrhosis as compared to controls (115.33±28.31 IU/L, 248.66±43.5 IU/L, 26.73±4.02611 IU/L respectively). So, there is highly significant difference observed in between group 1 & group 3 ($p<0.05$) and significant difference is observed in group 2 & group3 of serum GGT ($p<0.05$). (Table 4)

Discussion:

Measurement of enzyme activities in serum are useful for diagnostic assessment of Hepatobiliary disease. Both the concentration and pattern of enzyme activities gives valuable information regarding the type, extent and severity of liver disease. [6]

The pattern of the aminotransferase elevation can be helpful diagnostically. In most acute hepatocellular disorders, the ALT is higher than or equal to the AST. The pattern of the amino transferase elevation might be helpful diagnostically in differentiation of the type of hepatocellular injury like hepatitis and cirrhosis. In most acute hepatocellular disorders, the ALT is higher than or equal to the AST. An hepatitis show increase in level of both amino transferases while a ratio of AST:ALT >3:1 is highly suggestive of progression of liver disease towards cirrhosis. The AST:ALT ratios 1 for normal, 0.65 (<1) for viral hepatitis which is consistent with F .DE RITIS et al [7] and 1.24 in cirrhosis. But the ratio > 1 to < 2 is documented by Nyblom et all [8].

The ALP activity has been reported up to 200 -300 U/L in hepatitis and in cirrhosis ALP is slightly elevated up to 200 U/L, increased in serum ALP is associated with liver disease is caused by intra or extra hepatic cholestasis and some destruction of hepatic cell membrane. Elevation of ALP is observed in patients who have some form of extra hepatic and intra hepatic bile duct obstruction. Any mechanism that impaired excretion of ALP in bile will result in regurgitation of enzyme into circulation via the hepatic sinusoid [9,10].

In hepatitis GGT levels were significantly low as compared to cirrhosis. In hepatitis in absence of cholestasis, it increases upto 5 times and in the presence of cholestatsis it increases upto 10 times of upper limits. Persistence elevation of GGT may be an indicator if Cirrhosis.

Conclusion:

The study of different enzyme alteration patterns and ratio help us to guide further evaluation of diseases that affect the liver. Acute Hepatitis shows highly elevated levels of ALT as compare to cirrhosis. The ratio of AST:ALT >3:1 is highly suggestive of progression of liver disease towards cirrhosis. The ALP activity has been reported upto 200 -300 U/L in hepatitis and in cirrhosis ALP is slightly elevated upto 200 U/L. In hepatitis GGT levels were significantly low as compared to cirrhosis. Persistence elevation of GGT may be an indicator if Cirrhosis.

Disclosure: The authors report no conflicts of interest in this work.

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