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Research Article

GAMMA-GLUTAMYL TRANSPEPTIDASE (GGT) AS A DIAGNOSTIC MARKER IN OBSTRUCTIVE JAUNDICE

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ABSTRACT

Introduction - GGT is a membrane-bound enzyme that occurs in many parenchymatous organs. Activity of which is found in the kidneys, pancreas, liver, spleen, and small intestine. The serum level of this enzyme is raised only by liver and bile duct disorders. Aim of this study was to estimate the serum level of GGT in patients with cholelithiasis and those with CBD obstruction.

METHODS – 28 patients were included in the study, of which 18 were patients with cholelithiasis group 1 and remaining 10 with common bile duct (CBD) obstruction group 2. Patients with liver, renal diseases, chronic alcoholics and on drugs like phenytoin, phenobarbital and oral contraceptives, viral hepatitis, cholecystitis, chronic hepatitis, fatty liver, cholangitis, metastatic carcinoma to the liver, congestive heart failure, chronic alcoholism, post-myocardial infarction, were excluded from the study.

RESULTS – The mean serum GGT in group 1 was noted to be 116.67 U/L and that in the group 2 was noted to be 381.50 U/L, Alkaline phosphatase (ALP) levels were noted to be 94 in group 1 and 224.6 in group 2 and the difference of the mean value of serum GGT and serum ALP between the 2 groups was statistically significant that is p value <0.05.

CONCLUSION - Raised serum GGT along with raised ALP is an accurate diagnostic marker of patients with CBD obstruction.

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INTRODUCTION

Gamma-glutamyltransferase or gamma-glutamyl transpeptidase (also γ glutamyl transferase, GGT, GGTP, gamma-GT) is an enzyme that transfers gamma-glutamyl functional groups. It is found in many tissues, the most notable one being the liver, and is used as a diagnostic marker. GGT is present in the cell membranes of many tissues, including the kidneys, bile duct, pancreas, gallbladder, spleen, heart, brain, and seminal vesicles.^[1]

GGT is predominantly used as a diagnostic marker for liver disease in medicine, latent elevations in GGT are typically seen in patients with chronic viral hepatitis infections often taking 12 months or more to present.^[2]

Elevated serum GGT activity can be found in diseases of the liver, biliary system, and pancreas. In this respect, it is similar to alkaline phosphatase (ALP) in detecting disease of the biliary tract. Indeed, the two markers correlate well, though there is conflicting data about whether GGT has

better sensitivity.^[3,4] In general, ALP is still the first test for biliary disease. The normal level of GGT is 9 to 85 U/L.^[5]

Elevations of this enzyme occurs in a number of disparate clinical situations, including all manner of liver disease—fatty liver, viral hepatitis, bile duct obstruction, and most drug reactions involving the liver. The main value of GGT over ALP is in verifying that ALP elevations are, in fact, due to biliary disease; ALP can also be increased in certain bone diseases, but GGT is not.^[5]

Serum level of GGT in patients of c cholelithiasis and CBD obstruction were estimated in this study, and compared and analysed.

METHODS

This prospective study was carried out on 28 patients admitted in the Surgical Unit of Victoria Hospital, Bangalore Medical College and Research Institute, after taking informed written consent for the study. Serum GGT was measured in all the 28 patients, 18 patients with cholelithiasis and 10 of CBD obstruction. The cases were distributed into two groups

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comprising 18 patients each of with cholelithiasis (Group I) and 10 patients with common bile duct obstruction (Group II). All patients were evaluated pre operatively with blood investigations and ultrasonography of the abdomen. Patients with liver, renal diseases, chronic alcoholics and on drugs like phenytoin, phenobarbital and oral contraceptives, viral hepatitis, cholecystitis, chronic hepatitis, fatty liver, cholangitis, metastatic carcinoma to the liver, congestive heart failure, chronic alcoholism, post-myocardial infarction, were excluded from the study. The data was compared and statistically analysed

Statistical analysis

Diagnosis					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CBD	10	35.7	35.7	35.7
	cholelithiasis	18	64.3	64.3	100.0
	Total	28	100.0	100.0	
Sex					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	18	64.3	64.3	64.3
	M	10	35.7	35.7	100.0
	Total	28	100.0	100.0	

28 patients were included in the study of which, 64.3% of the patients had cholelithiasis alone and 35.7% had CBD obstruction along with gall stones. In the study it was noted that 64.3% of the patients were of the female sex and remaining 35.7% were males.

AGE	
N	28
Mean	45.36
Median	45.00
Std. Deviation	10.078
Minimum	21
Maximum	67

The median age of the study population was found to be 45 years, with the minimum age being 21 years and the maximum age of 67 years.

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
HB	1	18	12.767	1.1682	.2753
	2	10	13.180	1.7956	.5678
GGT(U/L)	1	18	116.67	129.341	30.486
	2	10	381.50	61.736	19.523
ALP	1	18	94.11	76.504	18.032
	2	10	224.60	37.104	11.733
AST	1	18	32.00	18.172	4.283
	2	10	49.80	22.880	7.235
ALT	1	18	29.17	16.961	3.998
	2	10	48.70	24.685	7.806
TB	1	18	.972222	.2321398	.0547159
	2	10	7.140000	1.2980327	.4104740
DB	1	18	.244444	.1247219	.0293972
	2	10	4.370000	.7986795	.2525646

The mean serum GGT in group 1 was noted to be 116.67 U/L and that in the group 2 was noted to be 381.50 U/L, ALP levels were noted to be 94 in group 1 and 224.6 in group 2. GGT levels were 5 times the normal value in patients with CBD obstruction.

On statistical analysis of the data obtained it was found that the difference of the mean value of serum GGT and serum ALP between the 2 groups was significant statistically that is *p value* < 0.05.

DISCUSSION

GGT is a biliary enzyme that is especially useful in the diagnosis of obstructive jaundice, intrahepatic cholestasis, and pancreatitis^[6]. GGT has a high sensitivity for biliary pathology. In patients with high GGT levels, pathology of the biliary system should be considered. Higher serum levels are present in biliary obstruction than in parenchymal events. The superiority of GGT over alkaline phosphatase is it is within the normal range in various bone pathologies. GGT is more responsive to biliary obstruction than are aspartate aminotransferase (AST) (SGOT) and alanine aminotransferase (ALT) (SGPT). It is normal in most instances of renal failure^[7]. GGT has no origin in bone or placenta, unlike alkaline phosphatase, and age beyond infancy does not influence GGT levels. GGT is increased in SLE and very high levels are common in primary biliary cirrhosis. High GGT is found in infants with biliary atresia and in chronic alcoholic patients. It is increased with hyperthyroidism and decreased in those with hypothyroidism^[8]. In the present study we have ruled out any liver pathology with USG abdomen, AST and ALT concentration. GGT and ALP levels were significantly high in patients, GGT is more sensitive for biliary disease than ALP, so it increases the specificity of the diagnostic test used for CBD obstruction. Because GGT is not increased in bone disorders, as ALP, a normal GGT with an elevated ALP would indicate bone disease. Conversely, because the GGT is more specifically related to the liver, an elevated GGT with an elevated ALP would strengthen the diagnosis of liver or bile-duct disease. In hepatobiliary disease due to other causes, some factor associated with biliary retention may stimulate production of hepatic GGT, which is normally present in small amounts only^[9], in the way that biliary obstruction is now believed to result in synthesis of hepatic alkaline phosphatase *de novo*.^[10]

Hepatobiliary disease is the predominant source of increased serum GGT activity. Increases are associated with all forms of primary and secondary hepatobiliary disorders. Elevations are moderate (2 to 5 times reference) with diffuse hepatic cell injury due to toxic or infectious hepatitis. Cholestasis due to intrahepatic or extrahepatic biliary obstruction causes higher serum levels (5 to 30 times reference). Increases occur earlier and persist longer than ALP in cholestatic disorders.

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
HB	Equal variances assumed	4.129	0.052	-0.740	26	0.466	-0.4133	0.5589	-1.5622	0.7356
	Equal variances not assumed			-0.655	13.340	0.524	-0.4133	0.631	-1.7731	0.9464
GGT(U/L)	Equal variances assumed	0.992	0.328	-6.065	26	.000	-264.833	43.666	-354.590	-175.076
	Equal variances not assumed			-7.316	25.653	.000	-264.833	36.201	-339.295	-190.372
ALP	Equal variances assumed	1.349	0.256	-5.043	26	.000	-130.489	25.873	-183.672	-77.306
	Equal variances not assumed			-6.065	25.730	.000	-130.489	21.514	-174.733	-86.245
AST	Equal variances assumed	1.989	0.170	-2.265	26	0.032	-17.800	7.860	-33.956	-1.644
	Equal variances not assumed			-2.117	15.411	0.051	-17.800	8.408	-35.680	0.080
ALT	Equal variances assumed	4.089	0.054	-2.479	26	0.020	-19.533	7.878	-35.728	-3.339
	Equal variances not assumed			-2.227	13.836	0.043	-19.533	8.770	-38.364	-0.702
TB	Equal variances assumed	34.962	.000	-19.885	26	.000	-6.1677778	0.3101706	-6.8053426	-5.5302130
	Equal variances not assumed			-14.894	9.321	.000	-6.1677778	0.4141047	-7.0996513	-5.2359043
DB	Equal variances assumed	20.715	.000	-21.765	26	.000	-4.1255556	0.1895521	-4.5151855	-3.7359256
	Equal variances not assumed			-16.225	9.245	.000	-4.1255556	0.2542697	-4.6984419	-3.5526692

Since skeletal disease is not associated with increased serum activity, measurement of GGT is of clinical value in identifying the source of obscure ALP elevations. Elevated serum levels of GGT are also found in alcoholics and patients receiving certain drugs, such as phenytoin or phenobarbital. This is probably the result of microsomal induction of enzyme activity.

Raised serum level of GGT with raised ALP is seen in patients with CBD obstruction and our conclusions is that serum GGT is a valuable diagnostic aid when used in conjunction with ALP assays for the investigation and diagnosis of Obstructive Jaundice.

CONCLUSION

Raised serum GGT along with raised ALP is an accurate diagnostic marker of obstructive jaundice.

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