Changes of Serum Bile Acids in Liver Diseases

Abstract

The present study was carried out to evaluate the clinical usefulness of measuring total serum bile acids concentrations as a diagnostic test for hepatobiliary diseases. It is measured by an enzymatic method under fasting conditions in 120 apparently healthy control subjects and 140 patients with various forms of hepatobiliary diseases. The study showed a highly significant increase in total serum bile acids levels in all types of liver disease patients groups (icteric and anicteric) ($P < 0.001$) , even when other liver tests are normal. The study has illustrated moderate correlations between the concentrations of total bile acids with those for any the other liver function tests.

Introduction

Fasting serum total bile acids determinations were used clinically in the diagnosis and prognosis of liver disease in conjunction with liver function tests. Because of the increased sensitivity of serum total bile acids determination as compared to liver function tests. Plasma total bile acids levels are a sensitive indicator of liver function in all species, reflecting hepatic synthesis, secretion, and re-absorptive functions [1, 2].

Materials and Methods

A case control study. The control group consisted of 120 (63 males and 57 females) healthy, asymptomatic, clinically, radiologically and biochemically normal subjects and none had a previous history of liver disease, while the patients group consisted of 140 (79 males and 61 females). The patient's diagnoses were based on clinical, biochemical, radiological, serological and histological grounds.

Results

The table 1 shows no significant differences (P > 0.05) in total serum bile acids in patients groups in relation to residence and gender.

Table 1 Comparison of serum levels biochemical parameters in relation to residence and gender patients.

Parameters	Gender		Residence	
	Male	**Female**	**Urban**	**Rural**
No.	79	61	73	67
S.T.Bile acids (μmol /L)	38.45±4.32	42.45±4.80	21.56±2.40	26.20± 3.68
S.T.billirubin (μmol /L)	83.96±10.64	90.21±11.38	51.58±6.17	53.53±7.53
S.AST (U/L)	53.36±5.26	59.18±6.82	39.02±3.11	35.76±4.45
S.ALT (U/L)	51.01±5.41	49.51±7.12	31.29±2.79	36.07±5.00
S.ALP (U/L)	165.34±17.32	153.86±12.79	114.89±9.21	108.47±10.2
S.GGT (U/L)	129.49±11.79	126.35±10.69	94.02±7.02	84.50±7.04
S.T. Protein (g/l)	68.60±0.44	67.22±0.52*	69.79±0.31	69.16±o.41
S. Albumin (g/l)	38.32±0.65	35.51±0.73**	39.63±0.45	39.31±0.50
S. Globulin (g/l)	31.05±0.83	31.80±0.60	30.68±0.45	29.75±0.34

The table 2 shows highly significant increases in total serum bile acids concentrations in all patients groups.

Table 2 Serum T. Bile acids and other parameters in patients with liver diseases.

Para.	Control	Hepatitis A	Hepatitis B	Hepatitis C	Obstruct. Jaundice	Secondary L. Cancer	Liver cirrhosis	Alcoholic Hepatitis	Uncon.Hyperbilirubinaemia
No.	120	27	15	21	19	17	18	4	19
S.T. BA (μmol/L)	3.8057 ±0.14	80.18 ±6.14***	8.18 ±2.41***	8.22 ±2.61***	84.08 ±5.26***	28.21 ±4.09***	48.2 ±5.64***	36.97 ±9.75***	4.19 ±0.3
T. Bil. (μmol/L)	12.31 ±0.23	131.89 ±11.21***	18.81 ±3.55***	15.19 ±0.68***	207.53 ±24.22***	38.11 ±11.27***	95.33 ±20.37***	168.99 ±98.24***	52.15 ±3.69***
S.AST (U/L)	16.51 ±0.57	88.04 ±11.38***	26.60 ±8.69**	19.93 ±3.17	92.87 ±10.66***	50.35 ±11.0***	78.27 ±9.39***	59.32 ±14.25***	19.14 ±1.87
S.ALT (U/L)	13.19 ±o.44	117.04 ±11.63***	25.59 ±10.86**	14.24 ±1.51	77.54 ±8.82***	27.33 ±5.61***	46.53 ±3.65***	39.55 ±6.7***	14.38 ±1.51
S.ALP (U/L)	56.05 ±1.23	123.57 ±8.39***	63.15 ±7.71	58.59 ±7.91	308.42 ±27.16***	292.86 ±24.47***	202.26 ±22.48***	326.07 ±170.19***	60.51 ±4.09
S.GGT (U/L)	45.98 ±1.12	104.44 ±5.41***	43.32 ±6.53	51.46 ±10.39	228.96 ±17.05***	211.26 ±19.98***	184.13 ±21.28***	281.24 ±54.11***	52.92 ±3.49
S.T. Prot. (g/l)	71.33 ±0.29	69.85 ±0.55*	70.96 ±1.02	66.8 ±0.82***	67.59 ±1.01***	66.97 ±1.13***	64.41 ±0.87***	67.54 ±1.86*	69.18 ±0.53**
S. Alb. (g/l)	42.31 ±0.26	41.08 ±0.36*	42.58 ±1.0	37.63 ±0.75***	36.77 ±0. 68***	31.05 ±0.61***	28.0 ±1.11***	38.07 ±4.45*	40.67 ±0.71*
S. Glob. (g/l)	29.06 ±0.16	30.81 ±2.06	28.38 ±0.95	29.62 ±0.81	30.81 ±0.70**	35.91 ±0.92***	36.48 ±1.18***	29.45 ±2.77	28.58 ±0.4

The results expressed as mean ± SD

(*, **, *** significantly differences as compared with healthy subjects ($P < 0.05$, $P < 0.01$, $P < 0.001$, respectively).

The table 3 shows the correlation analysis between serum T. Bile acids and the other biochemical parameters within the present groups and in all patients groups of liver diseases.

Table 3 Correlation coefficient (r) between Serum T. Bile acids and other liver function tests in liver diseases.

Patients Groups	No.	S.T. Bil.	S. AST	S. ALT	S. ALP	S.GGT	S.T. Prot	S. Alb.
Hepatitis A	27	0.251	-0.267	-0.212	0.15	0.452*	-0.366	-0.212
Hepatitis B	15	0.96**	0.97**	0.981**	0.836**	0.86**	0.213	-0.118
Hepatitis C	21	0.839**	0.972**	0.913**	0.894**	0.946**	0.185	-0.755**
Obstructive Jaundice	19	0.546*	-0.086	-0.018	-0.113	0.002	-0.085	-0.470*
Secondary Liver Cancer	17	0.659**	0.518*	0.517*	0.765**	0.658**	0.362	0.07
Liver cirrhosis	18	0.252	0.19	0.212	0.329	0.381	0.191	-0.197
Alcoholic Hepatitis	4	0.015	-0.231	0.106	0.087	0.484	0.844	0.634
Uncon. Hyperbilirubinaemia	19	-0.157	-0.004	-0.254	0.084	-0.116	0.161	0.342
All liver disease patients	140	0.659**	0.516**	0.593**	0.462**	0.501**	-0.011	-0.104

Discussion

This study has shown that fasting total serum bile acids concentrations in blood were a highly significant increase ($P < 0.001$) in all types of hepatobiliary disease patients who were icteric and anicteric), even when fasting serum concentrations levels of other liver function tests are normal. An increase in serum bile acid values will be expected in the presence of portosystemic shunting; any compromises of liver function or damaged hepatocytes which are unable to extract the bile acids from the portal blood. It is also apparent that bile acids leak directly from the liver to the systemic circulation, as very high serum bile acid concentrations are found in patients with extrahepatic obstruction [(3)]. There was a highly significant decrease (P

<0.001) in levels of serum albumin for all patients groups, table no. (3.9), which may reflect reduced capacity of liver for synthesis functions. Our study confirms and extends the conclusion of previous reports that the concentration of total bile acids in fasting patients is highly significant and not highly correlated with other liver tests. It was highly significant correlated to a certain extent with total serum bilirubin. As in previous studies, we found the estimation of fasting total bile acids to be a more sensitive liver test than is total bilirubin [4, 5, 6].

Our results, showed a highly significant increase of total serum bile acids and serum total bilirubin ($P < 0.001$) in all viral hepatitis patients (icteric and anicteric viral hepatitis A, B and C), table (3.9), [7]. This increases serum parameters levels due to the damage of liver cells. In addition to their value as a screening test for hepatobiliary disease, serum bile acid determinations are useful in following the progress of viral hepatitis. Toshihide Sima el al., recently reported that serum total bile acids levels is a sensitive indicator of hepatic histological improvement in chronic hepatitis C patients responding to interferon treatment [8]. Cholestasis, secondary liver cancer, liver cirrhosis and alcoholic liver groups showed highly significant increases ($P < 0.001$) in total serum bile acids, which was to be expected as they often had histological liver disease, table (3.9). In liver cirrhosis, the total serum bile acids may even be more sensitive than aminotransferases and other serum enzymes . With respect to liver metastases, our results agree with those in the study in showing substantial elevation of total serum bile acids and serum alkaline phosphatase. In addition, a highly significant correlation between total serum bile acids and serum alkaline phosphatase and gama- glutamyl transferase is demonstrable[8, 9, 10].

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