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Original Research Article

Study of Serum Lipid Profile in Patients of Alcoholic Cirrhosis

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Abstract

Introduction: Alcoholic cirrhosis is the end spectrum of alcoholic liver disease (ALD), which includes fatty liver or simple steatosis, alcoholic hepatitis, fibrosis, cirrhosis and super-imposed hepatocellular carcinoma. Although several studies have been conducted on dyslipidemia in cirrhotics in developed countries, there is a paucity of data in this regard in India. As there is a high prevalence of chronic liver disease in our country, we conducted this study to determine lipid levels in patients with cirrhosis and to assess if it relates to the severity of cirrhosis according to pughcriteria. ***Materials and methods:*** This is a cross sectional case-control study conducted on alcoholic cirrhotic patients and 50 healthy individuals (controls) without history of alcohol consumption. All the cases were investigated for fasting lipid profile and ultrasonographic evidence of cirrhosis. Biochemical tests including liver function tests were performed, which assisted in the diagnosis of alcoholic cirrhosis. These include serum bilirubin, total serum protein, serum albumin, serum globulin, aspartateaminotranferase (AST), alanineaminotransferase (ALT) and alkaline phosphatase (ALP). The data was collected systematically and analysed statistically according to the standard statistical methods. ***Results:*** Serum total, LDL, HDL, VLDL, cholesterol and trigylceride level in patients with cirrhosis is inversely correlate with severity of cirrhosis.
Keywords: Child pugh criteria, Cirrhosis; Lipid profile.

INTRODUCTION

Cirrhosis is an increasing cause of morbidity and mortality in more developed countries.[1]Being the 14th most common cause of death worldwide. In an effort to solve the major health problems of developing countries, the importance of liver has been well recognized since a long time. The liver plays an essential role in lipid metabolism, several stages of lipid synthesis and transportation [2-4].

Dyslipidemia seen in chronic liver disease differs from that found in most of the other causes of secondary dyslipidemias because circulating lipoproteins are not only present in abnormal amount but they also frequently have abnormal composition, electrophoretic mobility and appearance. Pre beta and alpha bands can be absent on electrophoreses in all types of liver disease. In acute hepatocellular disease such as alcoholic or viral hepatitis, there is a cholestatic phase and similar changes may be seen e.g. increased cholesterol and phospholipid levels [5].

Severe metabolic impairment in cirrhosis can produce a worsening of the serum lipoprotein pattern. High-density lipoprotein (HDL) cholesterol and its major apolipoproteins have been shown to be reduced in cirrhosis, as also the serum levels of low-density lipoprotein (LDL) cholesterol [6].

Prognostic evaluation of patients with liver cirrhosis is an important topic often challenging clinicians. Correct The Child-Pugh score is an important component of the prognostic evaluation of cirrhotic patients [7-10].

Prognostic scores also represent a quantitative estimation of the 'reserve' in terms of liver function and the capacity to stand up surgery or other aggressive therapeutic interventions [11].

Although several studies have been conducted on dyslipidemia in cirrhotics in developed countries, there is a paucity of data in this regard in India. As there is a high prevalence of chronic liver disease in our country, we conducted this study to determine lipid levels in patients with cirrhosis and to assess if it relates to the severity of cirrhosis according to pughcrieteria.

MATERIALS AND METHODS

The study was conducted on 50 alcoholic cirrhotic subjects (cases) and 50 healthy subjects (controls) without history of alcohol consumption attending outdoor and indoor patient department in

Guru Nanak Dev Hospital, Amritsar. The study was conducted after approval from institutional thesis and ethical committee. Patients were informed about the study procedure and written informed consent will be taken according to the performa attached. Patients with history of alcoholism with clinical,biochemical and ultrasonographic evidence of cirrhosis were included in the study.Random blood sugar and fasting blood sugar were checked for all study participants. All the cases were investigated for fasting lipid profile and ultrasonographic evidence of cirrhosis. Biochemical tests including liver function tests were performed, which assisted in the diagnosis of alcoholic cirrhosis. These include serum bilirubin, total serum protein, serum albumin, serum globulin, aspartateaminotranferase (AST), alanineaminotransferase (ALT) and alkaline phosphatase (ALP). The data was collected systematically and analysed statistically according to the standard statistical methods. Data were analyzed by SPSS. $\chi 2$, one-way analysis of variance (ANOVA) and Student's t test were used. A p value <0.05 was considered statistically significant.

RESULTS

Table-1: Mean Age

	Group I (N=50)	Group II (N=50)	P value
Mean Age (in years) ±SD	49.04 ± 10.81	51.24 ± 11.15	0.31

Table-2: Sex Distribution

Sex	Group I (N=50)	Group II (N=50)	P value
Males	47	46	0.69
Females	3	4	
Total	50	50	

Table-3: Level of FBS, RBS, S.BILLIRUBIN, AST, ALT, TSP, DSP, ALP in Both the Groups

Parameter	N=50	Mean	S.D	T Value	P Value
FBS	Group I	86.26	6.59	2.8	0.006
	Group II	91.36	11.02		
RBS	Group I	118.04	15.03	1.8	0.07
	Group II	112.38	16.24		
S. Bilirubin	Group I	3.77	3.92	4.8	0.0001
	Group II	0.79	0.11		
AST	Group I	130.15	167.47	4.4	0.0001
	Group II	24.22	8.23		
ALT	Group I	120.56	185.03	3.4	0.0008
	Group II	29.76	13.4		
TSP	Group I	5.98	0.69	7.14	0.0001
	Group II	7.01	0.75		
DSP	Group I	2.99	0.799	4.81	0.0001
	Group II	4.05	1.34		
ALP	Group I	187.07	143.53	4.2	0.0001
	Group II	101.34	20.13		

FBS – Fasting Blood Sugar, RBS – Random Blood Sugar Level, AST - Aspartate Aminotransferase, ALT- Alanine Aminotransferase, ALP - Alkaline Phosphatase Level, TSP – Total Serum Protein,

Table-4: Mean Total Cholestrol

Parameter	N=50	Mean	S.D	T Value	P Value
T.Chol	Group I	151.28	22.25	6.2	0.0001
	Group Ii	189.74	37.42		

Table-5: Mean Triglyceride

Parameter	N=50	Mean	S.D	T Value	P Value
TGL	Group I	122.73	18.81	1.83	0.06
	Group II	130.1	21.31		

Table-6: Mean LDL

Parameter	N=50	Mean	S.D	T Value	P Value
LDL	Group I	90.28	11.06	8.02	0.0001
	Group II	112.88	16.56		

Table-7: Mean HDL

Parameter	N=50	Mean	S.D	T Value	P Value
HDL	Group I	39.32	5.89	7.87	0.0001
	Group II	48.28	6.33		

Table-8: Mean VLDL

Parameter	N=50	Mean	S.D	T Value	P Value
VLDL	Group I	26.64	6.26	8.77	0.0001
	Group II	37.78	6.06		

Table-9: Child Pugh Score in Group I

	Child A	Child B	Child C	Total
No. Of Patients	2	27	21	50

Table-10: Comparison of Lipid profile according to Child Pugh Score (n = 50) or Severity Liver Disease

Parameter	Child A N = 2	Child B N = 27	Child C N = 21	ANNOVA	
	Mean+SD	Mean+SD	Mean+SD	F	P value
T.Chol	166.15±11.5	154.48±18.23	145.71±25.93	1.39	0.25
TGL	126.5±2.5	124.18±18.84	120.14±18.99	0.308	0.736
LDL	103±11	92.25±11.4	86.52±8.80	3.15	0.05
HDL	44.5±1.5	40.85±5.43	36.85±5.73	3.84	0.02
VLDL	32.5±2.5	28.03±5.93	24.28±6.03	3.23	0.04

DISCUSSION

The results of this study showed that the Mean age for study group that is cirrhotic patients is 49.04 years and for control group (healthy individuals) is 51.24 years. This result corroborates with previous studies done by Douds AC *et al*., [12] which showed that the mean age for alcoholic cirrhosis is 44 years.We found that among 50 patients of cirrhosis 47 were men. Bellentani S *et al*., [13] also reported male predominance in cirrhosis.

All the individuals included in the study also underwent biochemical tests for fasting blood sugar, random blood sugar, serum bilirubin, ALT, ALP, TSP and DSP.

There was a significant increase in fasting blood sugar in group II. No significant difference was found in random blood sugar levels in both the groups. S. Bilirubin, AST, ALT, TSP, DSP and ALP are significantly higher in group I as compared to group II. Kumar W *et al*., [14] in their study reported significantly increased serum bilirubin in cirrhotic group than control group. This is in accordance with our study. The mean serum bilirubin value in this study is 3.77 mg/dl and in their study was 4.44 mg/dl which is similar to some extent.

In the present study there is significant increase in mean values of AST and ALT in group I as compared to group II. Our results are in accordance with the studies done by Meikle PJ *et al*., [15] and Ramesh *et al*., [16]. In present study in group I mean AST is higher than mean ALT. In alcoholic liver injury, AST activity is characteristically elevated in comparison to ALT activity, although mild elevation of ALT level is common. The reasons for the higher AST activity in alcoholic hepatitis appear to be multiple: 1) Alcohol increases mitochondrial AST activity in plasma, while other forms of hepatitis do not [17]; 2) Pyridoxine deficiency common observed in alcoholics, which is a cofactor for the enzymatic activity of ALT, decreases hepatic ALT activity [18]. 3) Alcohol induces the release of mitochondrial AST, which has longer half-life, from cells without visible cell damage [19].

In present study total serum protein and differential serum protein are significantly lower in group I than group II. Das SK and Vasudevan DM [20] in their study also reported similar results. Common features of chronicalcoholic liver disease are progressive hypoalbuminemia [5, 28]. Acute exposure to alcohol depressed albumin. The decrease in serum albumin level is attributed to nutritional status of the subjects. Ethanol consumption slows down the rate of hepatic protein catabolism [20, 21].

Alkaline phosphatase levels in present study were significantly higher in group I than group II. Hyder MA *et al*., [22] and Nargis W *et al*., [23] in their studies also reported increased ALP levels in cirrhosis. Increased in serum ALP is associated with liver disease is caused by intra or extra hepatic cholestatis and some destruction of hepatic cell membrane. Any mechanism that impaired excretion of ALP in bile will result in regurgitation of enzyme into circulation via the hepatic sinusoid. The increased ALP present in the patients with disease closely resembles the ALP that can be extracted from liver. The increased cholestatis stimulates the synthesis of ALP by the bile ductules cell

providing more ALP which ultimately enters the bloods, the amphillic nature of bile salts facilitates the release of ALP from its membranes bound site and entry into blood [24].

Further in present study the cirrhotic patients in group I were divided into three subgroups according to child pugh score. Amongst 50 patients in GROUP 1 two patients had child pugh score A, 27 patients had child pugh score B and 21 patients had child pugh score C. Jaiswal P *et al*., [25] had divided the cirrhotic patients according to child pugh score. In their study Most of 25 (50%) cases were of class B, 20(40%) cases were of class C severity and 5(10.0%) were of class A. Kumar W *et al*., [14] also divided the cirrhotic patients according to child pugh score. In their study out of 100 patients 18 cases were of class A, 33 cases were of class B severity and 45 were of class C.

The value of serum total cholesterol was significantly lower in patients with cirrhosis when compared to controls in our study. This observation supports the earlier reports. The probable explanation for the reduced serum total cholesterol is due to the decline in synthetic function and altered metabolism. This was confirmed in the study conducted by Phillips *et al.,* [26]. Miller *et al.*, [27] found that in cirrhosis without cholestasis, cholesterol and apo B levels was reduced. LCAT activity and the proportion of plasma cholesterol esterified were also be markedly reduced. D'Arienzo A *et al*., [28] said in their study that a low serum cholesterol level is associated with a higher mortality rate in patients with liver cirrhosis. Studies done by Ghadir MR *et al*., [29], Subhan F *et al*., [30] have similar results according to our study.

Further comparison of the total cholesterol values in different Child Pugh Classes showed reduction in cholesterol level as the disease advances. But the difference in cholesterol level among three child pugh classes in our study was not significant. Andrzej P et al[31]also found insignificant difference between three child pugh classes. But studies done by Ghadir MR *et al.*, [29] and Subhan F *et al*., [30] found significant difference between three child pugh classes. This supported that Cholesterol falls as the disease advances.

In present study serum triglyceride levels were significantly lower in cases of cirrhosis than in control. The difference was statistically significant ($p< 0.001$). In studies done by Ghadir MR *et al*., [29] and Subhan F *et al.*, [30] it was found that serum triglycerides in cirrhotic patients was lower than healthy controls, this was in accordance to our study.

In our study, among cirrhotic patients, mean serum total cholesterol was lower in Child B patients than Child A patients and mean serum total cholesterol was lower in Child C patients than Child B patients but this difference was not statistically significant. In study done by Andrzej P *et al*., [31] mean serum total cholesterol decresed with the progression of liver disease according to child pugh score but the difference was insignificant. In study done by Ghadir MR *et al*., [29] and Subhan F *et al*., [30] similar reduction was seen but the difference was statistically significant. The mechanism responsible for reduction of triglyceride level in patient with cirrhosis could be that the metabolism of free fatty acids might be reduced in cirrhotics due to decreased reserve of liver parenchyma. The poor nutrition, altered metabolism and abstinence from alcohol of cirrhosis patients may explain the lower TGL in cirrhosis in them [14].

There was a significant decrease in levels of serum LDL in patients with cirrhosis, when compared to controls in present study. Observations by Ghadir MR *et al.*, [29] and Subhan F *et al*., [30] were in accordance to our study. LDL metabolism was greatly altered resulting in reduced level of LDL [32]. We found that the reduction in the LDL level was proportionate to the Severity of Liver damage in Cirrhotics as detected by the Child Pugh scoring system. This was supported by Subhan *et al*., [30]. The amount of decrement in the serum LDL was significant with increasing severity of liver damage.

The level of serum HDL in our study was significantly decreased in cases of Cirrhosis when compared to control are consistent with a large volume of publications on this subject. HDL estimation in patients with cirrhosis is an important marker of hepatic function. The decrease in HDL in patients with cirrhosis can be attributed to decreased hepatic synthesis of HDL. This could be due to LCAT deficiency. Liver is the only source of this enzyme (LCAT) and serum levels of this enzyme are decreased in liver disorders.[14] The decreased LCAT results inimpairmentof conversion of nascent HDL to matureHDL resulting in an increase in immatureHDL in blood which is more prone fordegradation, resulting in decreased levelsof HDL. We also found that thelevels of HDL reduction was proportionalto the severity of liver damage incirrhosis. These observations were in accordance with the studies done by Ghadir MR *et al.*, [29] and Subhan F *et al*., [30].

In our study, we found that mean serum VLDL cholesterol in cirrhotic patients was lower than healthy controls. This difference was statistically significant. This was in accordance with the study done by Sposito AC *et al*., [33]. Mean serum VLDL levels also decreased with the progression of liver disease. This is in accordance with study done by Bassani L *et al*., [34]. Presumably these low levels were due to failure of VLDL synthesis and release, either because of malnutrition or because of damage to the parenchymal cells responsible for the manufacture of VLDL [32].

Alcoholism is significantly associated with the Child-Pugh. These results suggested that the lipid profile could be used as an auxiliary tool in evaluating liver disease, given that there were statistically significant differences in these levels using instruments validated for this purpose.

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