Research Article

Evaluation of lipid profile in patients with liver cirrhosis and their association with severity of the disease

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Abstract

The study was conducted to determine the Lipid profiles in Patients with Liver Cirrhosis and to assess their association with severity of the disease. In an analytical cross sectional study, 150 Cirrhotic subjects of either sex ranging in age from 25-65 years were included in the study and the results were compared with 50, age and sex matched healthy control subjects. All Cirrhotic subjects were assessed for severity of disease as Mild (Child A), Moderate (Child B) and Severe (Child C) as per Child Pugh classification. Total Cholesterol, HDL, LDL and triglycerides were measured. The results of this study showed that all the serum lipid profile parameters (Total Cholesterol, LDL and HDL) were significantly ($p < 0.05$)decreased in cirrhotics as compared to control group and the concentration of these study variables decreased with Severity of liver disease and the mean level difference was statistically significantly ($p < 0.01$) with the exception of serum triglyceride levels. Triglyceride levels rather showed a decline in Cirrhotic patients but it was not statistically significant. Dyslipidemia exists in patients with liver cirrhosis. Serum Lipid profile is routinely measured parameters, which may have independent prognostic value in patients with liver cirrhosis thus assessment of the serum lipid profile is important for an effective treatment and prognostic evaluation of patients with chronic liver disease.

Keywords: Liver Cirrhosis, Child Pugh Classification, Lipid Profile

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INTRODUCTION

Lipids are essential component of biological membranes, free molecules and metabolic regulators that control cellular function and homeostasis.[1] Liver plays a vital role in lipid metabolism. It contributes both in exogenous and endogenous cycles of lipid metabolism and transport of lipids through plasma. Synthesis of many apolipoproteins takes place in liver. The apolipoproteins are required for the assembly and structure of lipoproteins. Lipoproteins play an important role in the absorption of dietary cholesterol, long chain fatty acids and fat soluble vitamins. The transport of triglycerides, cholesterol and fat soluble vitamins from the liver to peripheral tissue and transport of cholesterol from peripheral tissue to liver is by lipoproteins. Apolipoproteins activate enzymes important in lipoprotein metabolism and to mediate the binding of lipoproteins to cell surface receptors. Liver is the principal site of formation and clearance of lipoproteins. This shows liver is involved in many steps of lipid metabolism and lipid transport. Thus in severe liver disease, lipid metabolism is profoundly disturbed. It is affected in a variety of ways. 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.[2] Hence, the present study was conducted to study evaluation of lipid profile in patients with Liver cirrhosis and their association with severity of the disease.

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MATERIAL AND METHOD

The present Cross Sectional Hospital Based study was conducted in the Department of Biochemistry, in association with Department of Gastroenterology SMS Medical College and attached Hospitals, Jaipur, Rajasthan, India.

Subject Selection: 150 Cirrhotic subjects of either sex attending Out Patient Department (OPD) or admitted in wards of the Department of Gastroenterology SMS Medical College and attached Hospitals, Jaipur, Rajasthan, ranging in age from 25 -65 years (mean± SD 43.04±8.51years) were included in the study. after excluding those with diabetes mellitus, cancer, renal failure, acute pancreatitis, and acute gastrointestinal bleeding, and patients with history of hyperlipidemia, recent parenteral nutrition, history of taking glucose or lipid lowering drugs. The results were compared with 50 age (mean ± SD 43.14 ± 9.3 years) and sex matched healthy Control subjects. Local institutional ethics committee approval was sought before commencement of the study. Informed written consent was obtained from all recruited subjects prior to participation.

Clinical Criteria for Diagnosis: Thorough clinical and symptomatic examination of all the patient was done under the guidance of the treating Gastroenterologist. Cirrhosis was diagnosed on the basis of combination of clinical features, blood profile and radiological imaging. Clinical features were those of portal hypertension, i.e. ascites and/or gastrointestinal varices. Blood profile included evidence of thrombocytopenia and/or coagulopathy. Radiological features, either with trans-abdominal ultrasound or computerized tomography, had to demonstrate a small shrunken liver with or without splenomegaly and intra-abdominal varices.[3-4] To assess severity of disease Cirrhotic subjects (n=150) were further segregated according to Child Pugh Classification: as Child A: mild, Child B: moderate and Child C: severe, indicating degree of hepatic reserve and function.

Child Pugh Turcotte (CPT) classification[5-6]

Points	1	2	3
Encephalopathy	Absent	medically controlled	poorly controlled
Ascites	Absent	controlled medically	poorly controlled
Bilirubin (mg/dL)	< 2	2-3	> 3
Albumin (g/dL)	< 3.5	2.8-3.5	< 2.8
PT/INR	< 1.7	1.7-2.2	>2.2

Interpretation: Class-A: 5-6 points Class-B: 7-9 points Class- C: 10-15 points

Fasting Blood sample was drawn of each subject in Plain and PT vials and following investigations were done: Serum Bilirubin, Total Protein, Albumin, Serum cholesterol, Triglyceride, HDL and LDL cholesterol on Fully Automated analyzer (Olympus AU 400) and PT/ INR was assessed on Semi Autoanalyzer (Coagulation Analyzer SPR 123).

STATISTICAL ANALYSIS

All data were recorded in a database system on a personal computer, and statistical analysis were performed using SPSS (STATA 12.0 statistical software). All data were expressed as Mean ±SD. Unpaired student t Test was used for comparison of Cirrhotic patients with healthy Controls. Comparison of parameters among the three groups (patients with Child's class A, B, or C liver disease) was performed using one-way analysis of variance (ANOVA). Tukey's test was used to correct for multiple comparisons.

RESULTS

150 clinically diagnosed patients of cirrhosis (male 66% and female 34 %) were included in the study and results were compared with age and sex matched 50 normal healthy control subjects. On the basis of etiology of Cirrhosis, 42.6% percent of the patients had Cirrhosis of alcoholic etiology, 20% had NASH, 20.7% had HBV, 6.7% had HCV and 10 % with other etiologies (Autoimmune, PBC, PSC).. In patients with Liver cirrhosis, with the exception of triglyceride plevel, there was a significant decrease in total cholesterol, LDL and HDL cholesterol levels compared to the control ($p<0.05$) (Table 1).

Cirrhotic patients (n= 150) were further segregated into three groups according to the severity of liver disease as assessed by the Child-Pugh classification as Child A (Mild), B (Moderate) and C (Severe). According to Child Pugh Score out of 150 Cirrhotic patients 51 (34%) belonged to Child A, 50 (33.3%) to Child B and 49 (32.7%) in Child C, category. Lipid Profile (Total cholesterol, LDL, HDL and Triglyceride) were assessed for severity of liver cirrhosis (Table 2). Serum Total, LDL and HDL cholesterol level were significantly decreased with advancement of liver disease (Child A to C) and tukey's test showed a statistically significant mean difference within the groups (Child A-B, A-C and B-C groups).Serum triglyceride level decrease with advancement of liver disease but it was not statistically significant.

Table 1: Comparison of Lipid profile in Controls and Cirrhotic subjects (n=200)

Parameters	Controls (n=50)	Cirrhotics (n=150)	Statistical analysis P value
	Mean±SD	Mean±SD	
Total Cholesterol(mg/dl)	175.69±16.41	141.06±22.64	0.001***
Triglyceride (mg/dl)	125.46±16.41	118.52±24.88	0.06
HDL (mg/dl)	43.32±4.08	34.54±4.50	< 0.001***
LDL (mg/dl)	107.28±9.04	82.81±13.17	<0.001***

Comparison was done using unpaired student t test) *(p < 0.05) significant, ** (P < 0.01) very significant, *** (P<0.001) indicates that groups are responsible for variance in the measured variable and is highly significant and Rest are not significant (p>0.05)

Table 2: Comparison of Lipid profile according to Child Pugh Score (n=150) or Severity Liver Disease

Parameters	Child-A (n=51)	Child – B (n=50)	Child-C (n=49)	ANOVA test	
	Mean±SD	Mean±SD	Mean±SD	F	P value
Total Cholesterol (mg/dl)	147.13±19.54	142.43±22.48	134.32±24.39	4.24	<0.01**
Triglyceride (mg/dl)	120.14±19.64	118.23±21.46	116.27±23.49	0.403	0.66
HDL (mg/dl)	36.25±4.69	34.27±4.54	32.29±4.49	9.87	0.001***
LDL (mg/dl)	86.85±10.93	84.52±13.65	78.78±15.21	4.81	0.009**

Comparison was done using ANOVA (Analysis of variance test) *(p < 0.05) significant, ** (P < 0.01) very significant, *** (P<0.001) indicates that groups are responsible for variance in the measured variable and is highly significant and Rest are not significant (p>0.05).

DISCUSSION

Cirrhosis of the liver is a growing health problem in India and death from this condition is increasing rapidly among both men and women. Cirrhosis is a chronic disease of the liver in which diffuse destruction and regeneration of hepatic parenchymal cells, and diffuse increase in connective tissue result in disorganization of the lobular architecture.[7] This study was conducted to evaluate any derangement in lipid profile in cirrhotic patients and whether this derangement has any correlation to severity of liver damage. The results of this study showed that all the serum lipid profile parameters (Total Cholesterol, LDL and HDL) were significantly (p <0.05)decrease in cirrhotics as compared to controls groups and the concentration of these study variables decreased with Severity of liver disease and the mean level difference was statistically significantly (p <0.01 with the exception of serum triglyceride levels. Triglyceride levels also showed a decline in Cirrhotic patients but it was not statistically significant . Chronic liver diseases due to various causes are often associated with dramatic reductions in plasma triglyceride and cholesterol level due to reduced lipoprotein biosynthetic capacity been reduced.[8] Liver is one of the most important organs for the metabolism of plasma apolipoproteins, endogenous lipids and lipoproteins. Most plasma apolipoproteins, endogenous lipids and lipoproteins are synthesized by the liver, which depends on the integrity of cellular functions of liver.[9] As. Under normal physiological conditions, liver plays an important role to regulate lipid and lipoprotein metabolisms. Liver not only synthesizes and secretes endogenous lipoprotein, synthesis of key enzyme for the LDL metabolism, i.e., lecithin cholesterol acyltransferase (LCAT), hepatic lipase and apolipoproteins, but also regulates catabolism of various plasma lipoproteins via hepatic cellular surface lipoprotein receptors, which may maintain relative equilibrium of plasma lipids and lipoproteins in vivo. These processes could be interfered or impaired when hepatic cellular damage, which leads to an alteration of plasma lipid and lipoprotein patterns. And syntheses of cholesterol, triglycerides, apoAI, apoB and Lp(a) could be changed and their plasma concentrations will be altered correspondingly. Therefore, serum lipid level decrease progressively with severity of liver disease and assasment of plasma lipid and lipoprotein levels will be helpful to evaluate the extent of the hepatic damage.[10] Insignificant decrease of TG level in Cirrhosis as compare to control possibly because of majority of our patients which might have resulted from Alcohol and Nash related liver cirrhosis. It is well known that NASH and Alcoholic cirrhosis is associated with increase in serum TG concentrations.[11] An increase in TG secretion form the liver in the form of LDL is likely responsible for the increase in serum TG concentrations commonly noted in patients with NAFLD.[12]

CONCLUSION

Hypolipidemia is a common finding in chronic liver disease and has got significant association with Child-Pugh class. It may increase the reliability of Child-Pugh classification in assessment of severity and prognosis in chronic liver disease patients.

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