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Study of Serum Lipid Profile in Patients with Chronic Liver Disease and Its Correlation

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ABSTRACT

Liver plays a vital role in lipid metabolism hence chronic liver disease is often associated with impaired lipid metabolism. Cirrhosis of liver is a chronic condition of hepatocellular failure due to different etiology, leads to increases the morbidity and mortality. The aim of the study is to assess the degree of alteration of serum lipid profile in alcoholic cirrhotic patients and also detect its relationship with the chronic liver disease. This cross-sectional study was conducted in a tertiary care teaching hospital of central India. A total of 320 (160 liver cirrhosis (cases) and 160 healthy individuals (controls) were enrolled. Detailed history taking, clinical examination and relevant investigations was done Serum lipid profile (total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL) cholesterol and triglyceride) was recorded for each case and control. Most of the chronic liver disease patients were between 41-50 years of age, mean age of the patients was 45.73+8.23 years. Majority of them (80%) were male. Alcoholism was the most common cause of liver cirrhosis. Patients among the 'Class B' have high Child Pugh score. There was a significant decrease in total cholesterol, triglyceride, serum HDL and LDL cholesterol in liver cirrhosis group as compared with the control group ($p<0.05$). lipid profiles were found to be significantly decreased in patients with liver cirrhosis. Screening for dyslipidemia may be an important tool to initiate appropriate therapy in liver cirrhosis patients.

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Key Words
Alcoholic cirrhosis, serum lipid profile, chronic liver disease, child-pugh score

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INTRODUCTION

Liver cirrhosis is defined by three main morphologic characteristics bridging fibrous septa linking portal tracts with one another and portal tracts with terminal hepatic veins; parenchymal nodules containing hepatocytes encircled by fibrosis and disruption of the architecture of the entire liver[1-2]. "Chronic liver disease" refers to disease of the liver which lasts over a period of six months. It consists of a wide range of liver pathologies which include inflammation (chronic hepatitis), liver cirrhosis and hepatocellular carcinoma[3]. The liver plays a key role in the metabolism of plasma lipids and lipoproteins. As majority of endogenous cholesterol is synthesized in the hepatic microsomes, synthesis and metabolism of cholesterol are impaired in chronic liver disease resulting in a decrease in plasma levels[4]. There is prominent decline in plasma cholesterol and triglyceride (TG) levels in patients with severe hepatitis and hepatic failure because of reduction of lipoprotein biosynthesis. For reduced liver biosynthesis capacity, low levels of TG and cholesterol is usually observed in chronic liver diseases[5]. AS mentioned earlier, metabolism of TG, cholesterol and synthesis of lipoproteins predominantly occurs in liver and various parenchymal diseases may lead to alterations in lipoproteins structure and transfer through the blood[6]. Alcohol consumption cause fatty liver, alcoholic hepatitis and ultimately alcoholic cirrhosis in some patients. In Western countries, alcohol is the major cause of liver cirrhosis and it is gradually increasing in countries like Japan and India[7,8]. Globally, alcohol, nonalcoholic steatohepatitis and viral hepatitis currently are the most common causative factors. The prevalence of cirrhosis is likely to be underestimated as almost a third of the patients remain asymptomatic[9]. A complete lipoprotein profile as the initial test for evaluating cholesterol. You'll probably have to fast for 8 to 12 hours before it to make sure it's not affected by any food you recently ate. Serum lipid profile usually gives results for four different lipoproteins[10].

Aim and objectives: Due to the high prevalence of chronic liver disease in our country, we conducted this study to determine lipid profile in patients with cirrhosis and to assess if it relates to the severity of cirrhosis.

MATERIALS AND METHODS

This is a cross-sectional observational study conducted at tertiary care teaching hospital, central, India, All the patients suspected with chronic liver cirrhosis, attending OPD and those who getting admitted in medical wards during the study period were enrolled in this study.

Inclusion criteria:

- All patients aged 18 years or above
- Patients diagnosed to have cirrhosis of liver from clinical and investigative modalities
- Patients who provides written informed consent for the study

Exclusion criteria:

- All patients aged <18 years
- Conditions where lipid profiles are already abnormal
- Patients with diabetes mellitus, cancer, renal failure, acute pancreatitis and acute gastrointestinal bleeding
- Patients with history of hyperlipidemia, history of taking glucose or lipid lowering drugs
- Patients who provides written informed consent for the study

A case of clinical cirrhosis of liver was defined as a patient having at least one clinical sign of hepatocellular failure and one sign of portal hypertension along with at least three ultrasound (USG) findings suggestive of cirrhosis of liver[11].

Detailed history, clinical examination and investigations performed were studied regarding the diagnosis and etiology of cirrhosis of liver.

Biochemical tests including liver function tests were performed, which assisted in the diagnosis of alcoholic cirrhosis. These included serum levels of the enzyme aspartate aminotranferase (AST), alanine aminotransferase (ALT) and gamma glutamyl transferase (GGT). If the ratio of AST to ALT was greater than two in cirrhotic patients, the cause was most likely attributed to alcohol. Elevated GGT levels in blood also indicate heavy alcohol use and liver injury.

Lipid profile estimation was performed using a semi automated biochemistry analyzer. Five ml of venous blood was collected after overnight fasting of 12 h in all the subjects for estimation of serum TC, HDL, LDL, VLDL and TG by standard enzymatic method.

All cases were subjected to ultrasonographic examination. Typical imaging findings of alcoholic cirrhosis include hepatomegaly, bluntness of liver edges, irregular liver surface and coarse liver texture.

Statistical analysis: Data were analyzed by SPSS version 22. $\chi 2$, one-way analysis of variance (ANOVA) and Student's t test were used. A p value <0.05 was considered statistically significant.

RESULTS

In our study, a total of 320 participants were enrolled, among them 160 were chronic liver disease patients (cases) and remaining 160 was healthy

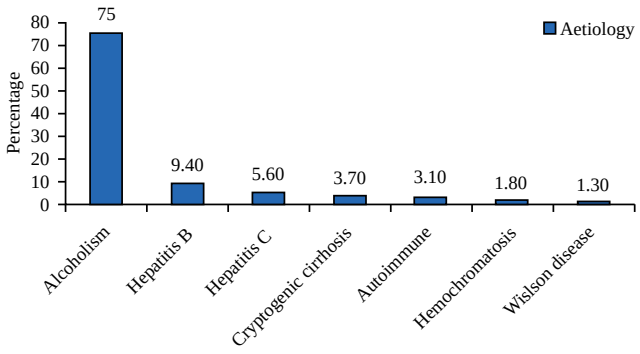

Fig. 1: Distribution of cases according to aetiology of chronic liver disease (n = 160)

Table 1: Socio-demographic characteristics of chronic liver disease participants

Socio-demographic profile	Frequency	Percentage
Age groups		
18-30 years	10	6.3
31-40 years	47	29.4
41-50 years	55	34.4
51-60 years	36	22.5
>60 years	12	7.5
Mean age of the patient in years (SD) 45.73 (8.23)		
Gender		
Male	128	80
Female	32	20
Socio-economic class		
Lower	69	43.2
Middle	56	35
Upper	35	21.8
Disease duration		
<3 years	87	54.3
>3 years	73	45.7

Table 2: Case distribution according to child pugh class scoring system

Child pugh class	No. Patients	Percentage
A	10	6.3
B	82	51.3
C	68	42.5

Table 3: Comparison of lipid profiles in chronic liver cirrhotic patients (cases) and healthy (control) group

Lipid profile	Cases (Mean±SD)	Control (Mean±SD)	p-value
Total cholesterol	159.35±32.72	179.42±22.33	<0.001
Triglycerides	128.21±30.43	152.40±28.55	<0.001
HDL cholesterol	34.71±4.60	46.02±3.74	<0.001
LDL cholesterol	107.14±31.05	129.17±23.52	<0.001
VLDL cholesterol	30.60±7.27	37.52±4.37	<0.001

participants (controls). Table 1 showing socio-demographic profile of the chronic liver disease patients, most of them (34.4%) were 41-50 years age group, followed by (29.4%) were 31-40 years age group, mean age±SD of the patient was 45.7±8.23 years. Majority of the patients (80%) was males, 43.2% patients belong to lower socio-economic class.

The most common cause includes alcoholic cirrhosis (75%), followed by hepatitis B (9.4%). Details of aetiology of liver disease shown in Fig. 1.

Child pugh scoring system found most of the patients under class B (51.3%) followed by class C (42.5%) (Table 2).

In our study all the parameters of lipid profile namely, serum total cholesterol, serum HDL, triglycerides (measured by direct method), serum VLDL, LDL (calculated by formula) have been significantly associated with the severity of the liver disease ($p<0.05$), found to be reduced with as the severity of cirrhosis increases (Table 3).

DISCUSSIONS

Chronic liver disease due to different reasons is commonly linked with dramatic decline in plasma TG and cholesterol levels which could be because of declined synthesis of lipoprotein. Hypercholesterolemia occurs as the main excretory pathways of cholesterol are blocked in CLD[12].

ALD is a major cause of morbidity and mortality throughout the world. ALD represents a spectrum of clinical illness and morphological changes that includes steatosis, alcoholic hepatitis and cirrhosis. There is a relationship between amount of alcohol consumption and extent of hepatic damage but no clear cut set amount is present. The severity of ALD not only depends on the amount of alcohol consumption but also on genetic and environmental factors[13-14].

In this study, most of the participants were in the age group of 41-50 years of age group with mean age were 45.73 years, Similarly, many studies like: Ghadir *et al*.[15] and Maskey *et al*.[16], have also revealed that have consistently shown a positive relationship between age and cirrhosis of liver. Muhammed and Jayaraj[17] have been observed in their study that the majority numbers of patients were belong to the age of 51-60 years.

Among the present study, majority of the patients with liver cirrhosis (80%) were males, our results comparable with the Rashid and Jasmin[18], Mandal *et al*.[19] and Nangliya *et al*.[20], reported male predominance 70, 66.7 and 66% respectively. The incidence of liver cirrhosis is more common in men probably because they are more prone to high risk activities, substance abuse and alcohol abuse.

The most common cause of cirrhosis of liver in our study was alcoholism (75%) related to cirrhosis, concordance to Jatav *et al*.[21] and Verma *et al*.[22],

whereas discordance ot our study, Boemeke *et al*.[23] reported hepatitis C virus infection were the most common etiology of liver cirrhosis in their study.

Majority of our patients had a history of regular alcohol consumption for a minimum of 5-10 years, accordance to Becker *et al*.[24] found that the relative risk of developing alcoholic cirrhosis were almost equal.

The persons with lower socioeconomic status exposed to viral hepatitis risk factors and found indirect association with the chronic liver diseases. Most of the female patients were married and housewife. The positive family history was significant risk factor associated with HBV-cirrhosis[25].

Viral hepatitis, alcohol and mixed etiology were more prevalent in the male group, whereas autoimmune diseases, cryptogenic cirrhosis and metabolic diseases were more prevalent in the female group[26].

In the present study chronic liver disease based on their Child Pugh score classified in three classes; majority of patients 51.3% belong to CTP class B, consistent finding reported by Janaki and Raju[27] and Habib *et al*.[28]. It was observed that there was a significant ($p<0.05$) negative correlation between liver damage according to Child Pugh criteria.

The significant decline in the serum total cholesterol and TG levels in cirrhotic patients compared with healthy people ($p<0.05$) has been confirmed earlier in many other studies of Sachdeva *et al*.[29], Pandey *et al*.[30], Raghupatruni *et al*.[31] and Sohail *et al*.[32], which is reasonably expected since liver biosynthesis has been reduced. The amount of decrement in the serum HDL, LDL, TG and total cholesterol had a negative correlation with the severity of liver damage.

These observations may be explained by the fact that in chronic liver disease unusually low levels TC, LDL, HDL and TG are found due to decreased biosynthetic capacity of liver increase severity of liver disease.

CONCLUSION

We found that all different lipid profiles level significantly decreasing in chronic liver disease cirrhosis as compare with non cirrhotic, it was found that there is strong negative correlation between them. We also found that all lipid profiles level decreasing as the severity of cirrhosis increasing. Evaluating patients of liver cirrhosis, dyslipidemia need to be considered for early recognition and analysis.

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