ORIGINAL RESEARCH

Correlation between lipid profile and CTP scoring in patients of cirrhosis

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Abstract

Introduction– Liver cirrhosis is a condition characterised by widespread disruption of the liver's anatomical structure and function. Lipid metabolism mostly takes place in the hepatocytes. In cases of liver cirrhosis, it is common to observe aberrant lipid profiles and impaired hepatocyte activity. The aim of present study is to determine serum lipid profile in patients with cirrhosis and its correlation with Child Turcotte Pugh score

Material and methods- The present hospital based cross sectional study was conducted at department of medicine of a tertiary care centre among 100 patients diagnosed with cirrhosis during the study period of one year. Clinical history was taken and laboratory profile was done. Results were analyzed using SPSS version 25.0.

Results– The mean age of patients was 49.7 ± 12.4 years. The average values of lipid profile markers were calculated as follows Total cholesterol (mg/dl)   (96.7 ± 36.4), Triglycerides (mg/dl) (87.4 ± 41.8), High density lipoprotein (mg/dl)(54.4 ± 26.6) and Low density lipoprotein (mg/dl) (26.3 ± 12.7). The mean CTP score of all the patients was 9.7 ± 1.7. Out of all the patients 3 were in class A, 45 were in class B and 52 were in class C. Negative correlation was found between CTP and lipid profile ($p < 0.01$).

Conclusion– In the present study it was observed that there is a negative correlation present between lipid profile and cirrhotic patients.

Keywords– cirrhosis, correlation, CTP, lipid profile ,liver diseases

Introduction

Cirrhosis is characterised by three primary morphological features: the presence of fibrous septa that connect portal tracts to each other and to terminal hepatic veins, the existence of parenchymal nodules consisting of hepatocytes surrounded by fibrosis, and the disruption of the overall liver structure.[1]

The global incidence of cirrhosis, as determined by autopsy research, varies between 4.5% and 9.5% among the general population. Therefore, our estimation suggests that over 50 million individuals, specifically the adult population, would be impacted by chronic liver disease. Alcohol, nonalcoholic steatohepatitis, and viral hepatitis are currently the most prevalent causes of liver disease worldwide. The true extent of cirrhosis is likely to be underestimated, as about one-third of individuals do not show any symptoms.[2]

The liver has a crucial function in the process of metabolising plasma lipids and lipoproteins. The synthesis and metabolism of cholesterol are hindered in chronic liver illness, leading to a reduction in plasma levels, as the bulk of endogenous cholesterol is produced in the hepatic microsomes. Cirrhosis can cause a significant decline in metabolic function, leading to a deterioration in the pattern of lipoproteins in the blood. High-density lipoprotein (HDL) cholesterol and its primary apolipoproteins have been found to decrease in individuals with cirrhosis, as well as the serum levels of low-density lipoprotein (LDL) cholesterol.[3]

Several scoring systems have been developed to evaluate liver status as Child-Turcotte pugh score (CTP) to predict operative mortality and long-term survival. The CTP score has gained favour over the past decades as a simple method for determining the prognosis of patients with cirrhosis. [4,5].

The aim of present study is to determine serum lipid profile in patients with cirrhosis and its correlation with Child Turcotte Pugh score.

Material and methods

The present hospital based cross sectional study was conducted at department of medicine of a tertiary care centre among patients diagnosed with cirrhosis during the study period of one year. Ethical clearance was taken from the institutional ethics committee before commencement of study. Patients were asked to sign an informed consent form after explaining them the complete procedure.

Through consecutive sampling a total of 100 patients of cirrhosis were selected for study on the basis of inclusion and exclusion criteria.

Inclusion criteria- Patients with age group above 18 years , having chronic liver disease of different etiology, willing to participate in the study were included.

Exclusion criteria- Patient not giving consent to participate in the study, patients taking PCSK9 inhibitor, Statins, Fibrate were excluded from study.

The diagnosis of liver cirrhosis was established after a comprehensive evaluation that included the patient's medical history, ultrasound imaging, fibroscan testing, and upper gastro-intestinal endoscopy.

An extensive historical account was obtained. A thorough medical assessment was conducted. Extensive laboratory and radiographic assessments have been conducted, which include a complete blood count and a fasting lipid profile. The lipid profile specifically measures levels of cholesterol, triglycerides (TG), low-density lipoprotein (LDL), high-density lipoprotein (HDL), and very low-density lipoprotein (VLDL). The serum cholesterol and triglyceride levels were tested using an enzymatic colorimetric kit method in a laboratory setting. The determination of HDL was performed using the enzymatic kit method following the precipitation of serum with phosphotungstate and magnesium chloride. Tests were performed to assess liver and kidney function, as well as to conduct ultrasound on the abdomen and pelvis.

A Child-Pugh score ranging from 5 to 6 is categorised as Child-Pugh class A, indicating well-compensated disease. A score of 7 to 9 falls under class B, indicating severe functional compromise. A score of 10 to 15 is classified as class C, indicating decompensated disease.

Statistical analysis: The normality of the various variables was assessed using the Shapiro-Wilks test. The statistical software used for social science analysis is IBM SPSS Statistics for Windows, version 25, developed by IBM corporation in Armonk, New York, USA. The quantitative data were analysed using ANOVA for data that followed a normal distribution, and the Kruskal-Wallis test for data that did not follow a normal distribution. Post hoc tests, such as LSD or Tamhane, were used to further analyse the data. The Pearson and Spearman correlation coefficients were employed. A two-sided P value less than 0.05 was deemed to be statistically significant.

Results

The mean age of patients was 49.7 ± 12.4 years with maximum patients in the age group of 51-60 years (28) and least were in the group of 18-30 years (6). The number of male patients was 81 and number of female patients was 19 as shown in table 1.

Table 1 Demographic data of patients

Variable	Values

Age (years)	Mean age	49.7±12.4
	18-30	6
	31-40	21
	41-50	26
	51-60	28
	Above 60	19
Gender	Male	81
	Female	19

The most common etiology was alcohol (78) followed by hepatitis C (20) and hepatitis B (6) as shown in table 2.

Table 2 Etiology of liver disease among patients

Variable	Frequency
Alcohol	78
Hepatitis B	6
Hepatitis C	20

The average values of laboratory markers were calculated as follows bilirubin (5.6±6.8), SGOT (89.7±62.1), SGPT(50.7±54.7), GGT (157.5±271), Protein (6.4±0.88),Serum albumin (2.4±0.46), Total cholesterol (mg/dl) (96.7±36.4), Triglycerides (mg/dl) (87.4±41.8), High density lipoprotein (mg/dl)(54.4±26.6) and Low density lipoprotein (mg/dl) (26.3±12.7) as shown in table 3.

Table 3 Laboratory profile among patients

Biochemical marker	Mean±SD
Bilirubin	5.6±6.8
SGOT	89.7±62.1
SGPT	50.7±54.7
GGT	157.5±271
Protein	6.4±0.88
Serum albumin	2.4±0.46
Total cholesterol (mg/dl)	96.7±36.4
Triglycerides (mg/dl)	87.4±41.8
High density lipoprotein (mg/dl)	54.4±26.6
Low density lipoprotein (mg/dl)	26.3±12.7

The mean CTP score of all the patients was 9.7±1.7. Out of all the patients 3 were in class A, 45 were in class B and 52 were in class C as shown in table 4.

Table 4 Classification according to CTP score

Variable	Mean / frequency
Mean CTP score	9.7±1.7
Class A	3
Class B	45
Class C	52

Out of 100 patients 3 patients died during the hospital stay and 97 patients were discharged as shown in figure 1.
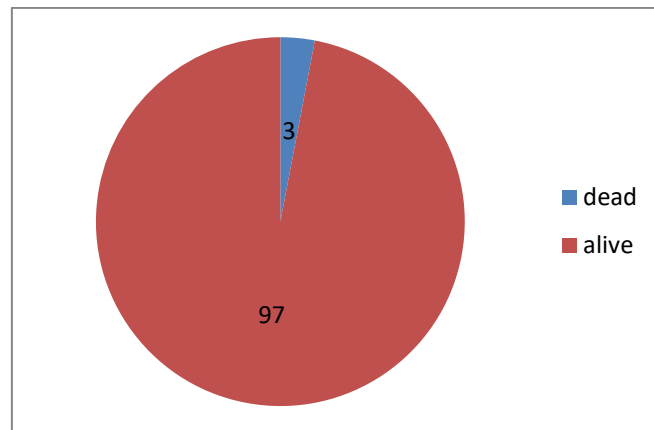
Figure 1 Division of patient on the basis of outcome

Patients of cirrhosis have negative correlation on lipid profile with Child Pugh score. In this study its was found that patients having higher CTP score having more derangement (low) in serum lipid profile (specially) serum cholesterol, serum HDL, than the patients having low CTP score as shown in table 5.

Table 5 Correlation of lipid profile and CTP score

Lipid profile markers	Correlation coefficient	P value
Total cholesterol (mg/dl)	-0.621	<0.001
Triglycerides (mg/dl)	-0.654	<0.001
High density lipoprotein (mg/dl)	-0.463	<0.001
Low density lipoprotein (mg/dl)	-0.405	<0.001

Discussion

Cirrhosis or chronic liver disease is characterised by the progressive degradation of liver tissue over a period of time. Chronic liver disease can be caused by any situation that leads to the slow deterioration and regeneration of the hepatocyte. Lipids have a crucial function in both the structure and metabolism of cells. Triglycerides serve as the primary reservoir for storing energy.

Cholesterol plays a vital role in the composition of cell membranes and serves as a precursor for the production of steroid hormones. Apolipoproteins are synthesised mostly in the liver. Apolipoproteins are essential for the formation and organisation of lipoproteins. Lipoproteins have a significant function in the process of absorbing dietary cholesterol, long chain fatty acids, and fat-soluble vitamins. Patients with chronic liver disorders generally exhibit poor lipid metabolism.[6] Regrettably, there is a scarcity of research on the blood lipid and lipoprotein levels in individuals with liver cirrhosis and chronic active hepatitis.[7] An abnormal lipid profile is frequently observed in individuals with chronic liver disease. It aids in the identification of the extent of liver illness and serves as a reliable indicator of prognosis. A lipid profile is necessary for all individuals with advanced liver disease.[8] Present study was conducted to determine serum lipid profile in patients with cirrhosis and its correlation with Child Turcotte Pugh score.

In our study the maximum patients were under of 41 to 60 years Furthermore, numerous studies have consistently demonstrated a strong correlation between age and liver cirrhosis, with the majority of participants falling between the age range of 40 to 59 years.[9-11]. The majority of patients were having habit of alcohol intake which was similar to study done by Pandey T et al.[12]

In our study, we observed that all of the lipid markers exhibited significantly higher levels in individuals with Child-Pugh A liver cirrhosis. However, as the liver cirrhosis progressed, these lipid markers started to decrease. Patients with Child-score A had a substantially higher total cholesterol level compared to those with Child-score B and C.

Child B had considerably higher levels of cholesterol, LDL cholesterol, compared to Child C. A strong negative correlation was seen between cholesterol levels and CTP. The decline in the synthesis function of the diseased liver [13] could account for this phenomenon. The results of this study were consistent with prior research. Muhammed and Jayaraj found that all components of the lipid profile, including triglycerides, were considerably reduced in patients with cirrhosis and were negatively associated with the severity of the condition [14].

Tauseef et al corroborated our findings and concluded that the reduction in serum total cholesterol, LDL, and HDL levels in cirrhosis patients is associated with the advancement of cirrhosis [15].

In 2013, Mandel et al. conducted a study comparing the lipid profile of 150 cirrhotic patients with that of healthy individuals. The study found that, except for serum TG and HDL levels, the lipid profile parameters decreased as the severity of liver cirrhosis increased. However, there was no significant correlation between the severity of liver disease and the lipid profile. This may be attributed to the fact that a large proportion of the patients suffered from cirrhosis as a result of non-alcoholic fatty liver disease [16]. In addition, Mohammad Reza Ghadir and colleagues discovered that blood lipid levels decreased in a linear manner as liver damage progressed, with the exception of serum triglyceride levels [10]. According to Sen et al., patients with grade III fatty liver had considerably higher levels of HDL and TG [17].

The current study has limitations in that it was conducted at a single centre and had a limited study sample. Additional multicentric research with a substantial sample size and prospective cohort studies are necessary to confirm its effectiveness.

Conclusion

In conclusion, alcohol was the most common cause of liver cirrhosis and disease is more prevalent in middle age persons as compared to younger ones. There was a significant negative correlation between the lipid profile and CTP score.

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