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Original Article

Study of Lipid Profile Changes in Cirrhosis of Liver

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Abstract

Introduction: Cirrhosis is defined anatomically as a diffuse process with fibrosis and nodule formation. It is the result of the fibrogenesis that occurs with chronic liver injury. For reduced liver biosynthesis capacity, low level of triglyceride and cholesterol is usually observed in the chronic liver disease. Due to the high prevalence of chronic liver disease in our country we have conducted this study to determine lipid profile in a patient with cirrhosis and to assess its relationship to the severity of cirrhosis.

Purpose of Study: The purpose of this study was to study the serum lipid profile changes in liver cirrhosis patients in comparison to age- and sex-matched apparently healthy control patients and to find the significance of lipid abnormalities in liver cirrhosis patients with the severity of cirrhosis of the liver.

Materials and Methods: The present study had been carried out in the Department of Medicine, Medical College and associated Hospital, Jabalpur (Madhya Pradesh) India, from March 2016 to August 2017. This was a case–control observational study. The targeted populations were 75 of cases with liver cirrhosis and age- and sex-matched 75 apparently healthy control patients.

Results: There was a significant decrease in serum high-density lipoprotein (HDL), low-density lipoprotein (LDL), triglyceride, very low-density lipoprotein (VLDL), and total cholesterol in cases as compared to controls. Of 75 cases, one (1.30%) was belonging to Child-Turcotte-Pugh (CTP) Class A, 34 (45.30%) to Class B, and 40 (53.30%) to Class C. All lipid profile parameters were decreased more in CTP-C compared to CTP-B.

Conclusion: We have concluded that there was a significant decrease in serum total cholesterol, LDL cholesterol, VLDL cholesterol, HDL cholesterol, and serum triglyceride level in liver cirrhosis patients which belongs to the Child-Pugh Class C.

Key words: Cholesterol, Cirrhosis, Fibrosis, Lipid, Nodule

INTRODUCTION

Cirrhosis is defined anatomically as a diffuse process with fibrosis and nodule formation. It is the result of the fibrogenesis that occurs with chronic liver injury.[1]

Previous studies have been observed that in Western countries, the prevalence of alcoholic cirrhosis, nonalcoholic steatohepatitis (NASH) cirrhosis, and viral cirrhosis in particular hepatitis C, are all increasing. In developing countries, such as India the predominant causes for liver cirrhosis were found due to infection from hepatitis virus B and C; however, alcohol and autoimmune condition may be in increasing trends.[1]

Lipoproteins are complexes of lipid and proteins that are essential for transport of cholesterol, triglycerides, and fat-soluble vitamins. As we know, that the liver is the principal site of formation and clearance of lipoproteins; hence, liver disorders can affect plasma lipid level in a variety of ways. Hepatitis due to infection, drugs, or alcohol is often associated with increased very low-density lipoprotein (VLDL) synthesis and mild-to-moderate hypertriglyceridemia. Severe hepatitis and liver failure

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such as cirrhosis are associated with dramatic reductions in plasma cholesterol and triglycerides due to reduced lipoprotein biosynthetic capacity.[2]

As there is increasing prevalence of chronic liver diseases in the form of cirrhosis in our country, we have been conducted this study in our tertiary care hospital to determine the lipid profile changes in cirrhotic patients in comparison to age- and sex-matched apparently healthy control patients and also assess it correlation with severity of liver cirrhosis irrespective to its etiologies.

MATERIALS AND METHODS

Place of Study

The present study had been carried out in the Department of Medicine, Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur, in the state of Madhya Pradesh, India, between the periods of March 2016 and August 2017.

Type of Study

The present study was a case–control observational study.

Aims and Objectives of Study

The primary objective of the present study was to assess the serum lipid profile changes in liver cirrhosis patients (cases) and its comparison to age- and sex-matched apparently healthy control population.

The secondary objective was to find the significance of lipid abnormalities in cirrhotic patients (cases) with the severity of cirrhosis of liver.

Inclusion Criteria

Irrespective of the etiologies, 75 liver cirrhosis patients were taken as cases and 75 apparently healthy age- and sex-matched patients as controls. The case and control patients were selected from the indoor of Medical Wards, Medical Out Patients Department, relatives of the cases, and volunteers from the institution, respectively. Both case and control patients were belong to ≥18–≤80 years of age groups of both sexes.

Laboratory Tests

All the relevant investigations have been done in the Department of Pathology, Radiology, and Cardiology of Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur, Madhya Pradesh. Some test results were obtained from the National Institute for Research in Tribal Health (I.C.M.R.), Jabalpur. The fasting blood samples have been collected from all study patients for lipid profile study.

Lipid profile test was performed using the Randox RX Imola fully automated biochemistry analyzer machine.

The diagnosis of liver cirrhosis was performed on the basis of typical signs and symptoms of the disease which have been further confirmed by detailed physical and clinical examinations along with the abdominal ultrasound imaging study and biochemical liver panel known as liver function tests which included mainly alanine aminotransferase and aspartate aminotransferase (ALT and AST), prothrombin time, serum bilirubin, albumin, and total serum proteins. The serological tests (hepatitis B surface antigen and antihepatitis C virus [HCV]) were also used to support the diagnosis of viral infections. Whenever needed cardiac 2D echocardiography, color Doppler portal vein study, upper gastrointestinal endoscopy, and ascitic fluid examination has also been done accordingly.

The classification of plasma lipid level was done by the criteria adopted from the third report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel-III).[3]

Child-Pugh score (or the Child-Turcotte-Pugh [CTP] score or Child criteria) was used to assess the prognosis and severity of chronic liver disease, mainly cirrhosis.[4]

Grading of hepatic encephalopathy was done according to practice guideline by the European Association for the study of the liver and the American Association for the study of liver diseases.[5]

Exclusion Criteria

The patients were using insulin or other hypoglycemic drugs and/or cholesterol-lowering medicines within the previous 30 days. Patients with a history of other medical illnesses which may influence the serum lipid level such as diabetes mellitus, hypertension, chronic smoker, nephrotic syndrome, and/or thyroid dysfunctions were excluded from the study.

Statistical Analyses

The present study was a case–control observation study. The study data have been recorded by using structured schedule (Case Report Form) and entered for tabulation in Microsoft Excel Sheet. Statistical data were analyzed using STATA 12.1 (Stata Corp LP) TX, USA software. Chi-square test was used for the comparison of frequency and percentage distribution in cases and controls. Student t-test was applied to compare mean and standard deviation (SD) of difference between cases and controls. Level of statistical significance was calculated with *P* value (<0.05 significance) consideration.

RESULTS

In the present study, it is summarized that total *n* = 75 patients with liver cirrhosis of both sexes have been taken as cases irrespective of the etiology of liver cirrhosis and *n*' = 75 of age- and sex-matched apparently healthy patients were taken as controls after fulfillments of their inclusions and exclusions criteria.

In the present study, the age of the liver cirrhosis patients (cases) ranged from ≥18 years to ≤80 years of age with the mean age of 43.47 and SD 14.12 years. The age distributions in control group were also ranged from ≥18 years to ≤80 years of age with the mean age of 43.21 and SD 14.47. The observed *P* value was 0.914, which found statistically nonsignificant; hence, both study groups were comparable in terms of age [Table 1].

Of total *n* = 75 cases of liver cirrhosis, the present study groups were comprised *n* = 56/75, (74.66%) of male and *n* = 19/75, (25.33%) of female patients (cases) and from total *n*' = 75 control patients *n*' = 17/75, (22.70%) were found female and *n*' = 58/75, (77.30%) male.

The maximum numbers of cases were observed with alcoholic etiology, i.e., *n* = 42/75, (56.2%) followed by hepatitis B, *n* = 11/75, (14.6%) and hepatitis C, *n* = 2/75, (2.6%). The remaining liver cirrhosis cases were diagnosed with etiology as others, which comprised *n* = 20/75, (26.6%) of cases [Table 2].

Serum level of total cholesterol, high-density lipoprotein (HDL), serum triglycerides, and VLDL cholesterol were observed significantly low in cases compared to apparently healthy control patients (*P* = −0.0001, statistically highly significant) [Table 3].

Of total number of *n* = 75 patients in case group, *n* = 1/75, (1.30%) belong to CTP Classification Class A, *n* = 34/75, (45.53%) of cases belong to CTP Class B, and *n* = 40/75, (53.30%) belong to CTP Class C [Table 4].

Serum total cholesterol and HDL level decreased more in CTP Class C as compared to CTP Class B (*P* = 0.03 found statistical significance); which can be further correlated with the severity of cirrhosis. In the present study, the level of low-density lipoprotein (LDL), serum triglycerides, and VLDL were observed low in cases belongs to the CTP Class C in comparison to CTP Class B patients (*P* value found statistically nonsignificant) [Table 5 and Graph 1].

Of *n* = 75 patients (cases) with liver cirrhosis, the maximum number of cases was belongs to the model for end-stage liver disease (MELD) score 10–19, i.e., *n* = 46/75, (61.31%) and minimum number of cases *n* = 05/75, (6.7%) have MELD score <10.

In the present study, we have observed that the cases have total serum proteins level relatively very low from controls serum proteins value (*P* value found statistically significant).

DISCUSSION

After observation of data and results, following discussion was made:

In the present study, we have been observed that the mean value of age distribution in cases was 43.47 ± 14.12 years and 43.21 ± 14.47 years in control patients, respectively. The *P* value was 0.914 which found statistically nonsignificant in both groups; hence, both groups were comparable in terms of age. The maximum numbers of cases, i.e., 23

Table 1: Age-wise distribution of cases and controls

Age group (in years)	Number (%)	
	Cases (*n*=75)	Controls (*n*'=75)
>18–28	10 (13.33)	13 (17.33)
29–39	23 (30.67)	19 (25.33)
40–50	22 (29.33)	24 (32.00)
51–60	12 (16.00)	10 (13.33)
61–70	5 (6.67)	6 (8.00)
71<80	3 (4.00)	3 (4.00)
Total	75 (100)	75 (100)

n=Number of patients (cases), *n'*=Number of patients (controls)

Table 2: Distribution of cases according to primary etiology of liver cirrhosis

Primary etiology of liver cirrhosis	Frequency of cases *n*=75 (%)
Alcoholic	42 (56.2)
HBV	11 (14.6)
HCV	2 (2.6)
Others	20 (26.6)
Total	75 (100)

n=Number of patients (cases). HBV: Hepatitis B virus, HCV: Hepatitis C virus

Table 3: Comparison of lipid profile with cases and controls

Parameters (mg/dl)	Mean±SD		Statistical analysis	
	Case (*n*=75)	Control (*n'*=75)	*t* test	*P* value
S. total cholesterol	135.33±37.04	172.79±26	7.17	0.0001
HDL	31.99±7.85	43.11±7.85	8.68	0.0001
LDL	79.58±23.13	112.27±22.8	8.72	0.0001
Serum triglyceride	88.1±37.92	151±40.84	10.18	0.0001
VLDL	20.11±10.74	27.28±9.06	4.92	0.0001

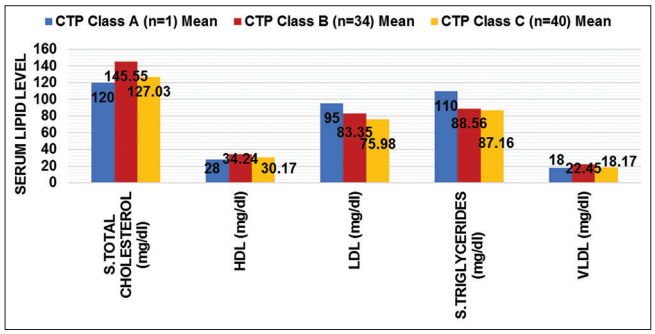
n=Number of patients (cases), *n'*=Number of patients (controls). SD: Standard deviation, HDL: High-density lipoprotein, LDL: Low-density lipoprotein, VLDL: Very low-density lipoprotein

(30.67%) were belong to 29–39 years of age group and the maximum numbers of control patients, i.e., 24 (32%) were belong to 40–50 years of age group.

Muhammed *et al.*[6] have been observed in their study that the majority numbers of patients were belong to the age of 51–60 years (39.8%). If consider the age-wise distributions of cases and controls, the results of the above study were found not relevant to the present study.

Phukan *et al.*[7] have been included the total number of $n = 100$ patients as cases and $n = 50$ noncirrhostic, nonalcoholic individuals as control patients in their study. They have also been found in their study that the most common affected age group was 41–50 years (41%). The above study data for the age group were found relevant to the present study.

In the present study, of total number of cases (n = 75), males were belong to n = 56/75, (74.66%) and female n = 19/75, (25.33%). The total number of control patients in our study was (n' = 75) from which n' = 58/75, (77.3%) were found male and n' = 17/75, (22.7%) female.



Graph 1: Comparison of Child-Turcotte Pugh-Class with serum lipid profile status of cases

Table 4: Case distribution according to CTP classification and scoring system

Child-Pugh Class (CTP)	No. of cases belongs to CTP *n*=75 (%)
A	1 (1.30)
B	34 (45.30)
C	40 (53.30)

n=Number of cases. CTP: Child-Turcotte-Pugh

The present study was done by Nangliya *et al.*[8] have been observed in their study that of 150 clinically diagnosed patients of cirrhosis (cases); 66% males and 34% females were included in the study, and results were compared to the age- and sex-matched 50 normal healthy control patients.

Mandal *et al.*[9] have been studies of total 120 cirrhotic patients as cases from which 80 were male and 40 female patients.

In the present study, we have taken n = 75 cases and n' = 75 control patients, which was a low sample size. Hence, the present study results may vary for sex distribution (in percentage) from the above-described study results; however, the overall male patients were found more in all above-mentioned studies as described in our study results also.

In the present study, it was observed that the maximum number of cases have alcoholic etiology n = 42/75, (56.2%) which followed by hepatitis B; n = 11/75, (14.61%) and least have hepatitis C n = 2/75, (2.6%).

In the present study, the etiology of liver cirrhosis that belongs to the category of others causes was comprised n = 20/75, (26.6%) of cases.

Verma *et al.*[10] have been observed that the maximum number of patients with liver cirrhosis have hepatitis B virus-(HBV) related cirrhosis n = 55/139, (39.57%) which followed by other etiologies n = 39/139, (28.05%); alcohol n = 34/139, (24.46%); and HCV-related cirrhosis n = 11/139, (7.9%), respectively.

Nangliya *et al.*[8] have been observed in their study that the main etiologic cause for liver cirrhosis from 150 cirrhotic patients was the alcohol (42.6%) followed by HBV (20.7%), NASH (20%), other (10%), and HCV (6.7%), respectively.

The explanation of this difference was that the demographic variation may vary the study result for cirrhosis etiology.

In this study, we have observed that the value of serum total cholesterol, HDL, LDL, serum triglyceride, and VLDL

Table 5: Comparison of CTP class with serum lipid profile status of cases

CTP class	Mean±SD			Significance	
	A (*n*= 1)	B (*n*= 34)	C (*n*= 40)	*t*-test	*P* value
Serum total cholesterol (mg/dl)	120±*	145.55±44.48	127.03±27.6	2.19	0.03
HDL (mg/dl)	28±*	34.24±8.21	30.17±7.19	2.27	0.03
LDL (mg/dl)	95±*	83.35±21.81	75.98±24.11	1.37	0.17
S. triglycerides (mg/dl)	110±*	88.56±44.91	87.16±24.36	0.17	0.86
VLDL (mg/dl)	18±*	22.45±14.54	18.17±5.58	1.72	0.09

*Only single patient was belongs to CTP Class A so that it could not be analyzed statistically. *n* = Number of cases (patients) out of total 75 cases. HDL: High-density lipoprotein, LDL: Low-density lipoprotein, VLDL: Very low-density lipoprotein, CTP: Child-Turcotte-Pugh

was significantly low in cases compared to healthy control patients ($P = 0.001$ found statistically highly significant).

Mandal *et al.*[9] have been observed in their study that in patients with chronic liver diseases, with the exception of triglyceride level, there was a significant decrease in total cholesterol, LDL cholesterol, VLDL, and HDL cholesterol levels compared to the control group ($P < 0.05$ found statistically highly significant).

Kumar *et al.*[11] have been observed in their study that the level of serum cholesterol, LDL, HDL, and VLDL cholesterol in cases was significantly reduced when compared to control group ($P < 0.000$). They have also been observed that the levels of triglyceride were marginally reduced in cases ($P < 0.05$).

Nangliya *et al.*[8] study result has showed that all the serum lipid profile parameters (total cholesterol, LDL, and HDL) were significantly ($P < 0.05$) decreased in cirrhosis as compared to control group and the concentration of these study variables decreased with the severity of liver disease. They were also observed in their study that the triglyceride levels rather showed a decline in cirrhotic patients; however, it was not statistically significance.

Phukan *et al.*[7] have found in their study result that in patients with cirrhosis, the total serum cholesterol level was decreased. There was a significant decrease in serum HDL and LDL cholesterol compared to the control group ($P < 0.001$). However, serum triglyceride level was significantly increased in alcoholic cirrhosis patients compared to the control group ($P < 0.001$).

Ghadir *et al.*[12] have found in their study results that in patients with liver cirrhosis, there was a significant decrease in serum triglyceride, total cholesterol, LDL cholesterol, and HDL cholesterol levels compared to the comparison group (mean of 82 vs. 187, 138 vs. 184, 80 vs. 137, and 40 vs. 44 mg/dl, respectively); all $P < 0.05$ found statistically significant. They have also concluded that the comparison of lipid profile with the pathologic progression of liver cirrhosis revealed that except for serum triglyceride level, other serum lipids diminish linearly with the progression of liver damage. The probable explanation for the reduced serum total cholesterol in liver cirrhosis patients was due to the decline in synthetic function and altered metabolism.

The overall emphasis of above-mentioned studies results were comparable with present study results in terms of serum lipid profile status in patients of liver cirrhosis (cases), and age- and sex-matched apparently healthy controls except the few variable results for serum triglycerides value that might be due to more or less severity and/or progression of liver disease status.

In the present study, the serum level of total bilirubin was observed (mean 4.61, SD 4.47), serum glutamate-pyruvate transaminase (SGPT)/ALT (mean 57.47, SD 61.08), and serum glutamic-oxaloacetic transaminase (SGOT)/AST (mean 100.91, SD 102.91) in cases which were found significantly higher in comparison to controls, i.e.,, total serum bilirubin (mean 0.85, SD 0.32), SGPT/ALT (mean 31.44, SD 12.83), and SGOT/AST (mean 33.69, SD 13.76), respectively ($P = 0.0001$, found statistically highly significant).

Kumar *et al.*[11] have been described that the routine liver function tests, i.e., serum bilirubin, SGPT used in the assessment of liver function may give abnormal results in various kind of liver disorders, and furthermore, these tests reflect the extent of hepatic cell damage, rather than hepatic function assessment which is more important to evaluate the patient's condition and progression. They were observed in their study that serum total bilirubin, (mean 4.44, SD 2.86 in cases and mean 0.59, SD 0.33 in controls), and SGPT (mean 74.58, SD 28.21 in cases and mean 26.85, SD 8.38 in controls). The statistical analysis has showed that the unpaired *t*-test was 13.36, $P < 0.000$ and 16.21, $P < 0.000$ for total serum bilirubin and SGPT, respectively, which is comparable with present study results.

In the present study, the maximum numbers of cases were belong to CTP Class C group, i.e., 40 (53.30%) and minimum numbers of cases were belong to CTP Class A group, i.e., 1 (1.30%).

In the present study, it was observed that the only single patient (case) was belongs to CTP Class A; hence, it was not included in statistical analysis.

Kumar *et al.*[11] have been observed that the reduction in the LDL cholesterol level was proportionate to the severity of liver damage in cirrhosis as detected by the Child-Pugh scoring system. In their study, they have included 100 cases of liver cirrhosis from which according to CTP classification belong to Class A - 18, Class B - 33, and Class C - 49 of cases, respectively. Their study results have showed that patients with liver diseases had lower lipid level, i.e., lower LDL in cirrhotic patients than in the comparison group. Besides, the amount of decrement in the serum LDL was significant with increasing severity of liver damage.

Nangliya *et al.*[8] study result has showed that all the serum lipid profile parameters (Total cholesterol, LDL, and HDL) were significantly ($P < 0.05$) decreased in cirrhosis

as compared to control group and the concentration of these study variables decreased with the severity of liver disease. They were also observed in their study that the triglyceride levels rather showed a decline in cirrhotic patients; however, it was not statistically significance. They have concluded in their study that the serum lipid level decreases progressively with the severity of liver disease and assessment of plasma lipid and lipoprotein levels will be helpful to evaluate the extent of the hepatic damage. They have further concluded that the hypolipidemia is a common finding in chronic liver disease and has got the significant association with the Child-Pugh class so that it may increase the reliability of Child-Pugh classification in assessment of severity and prognosis in chronic liver disease patients.

Ghadir *et al.*[12] have observed in their study that according to Child-Pugh classification criteria, 11 (22%) of patients had score "A," 14 (28%) score "B," and 25 (50%) had score "C" from total 50 patients. They have also observed that there was a significant ($P < 0.05$) negative correlation between liver damage according to child criteria and serum total, HDL, and LDL cholesterol level ($P < 0.05$) so that more severe the liver damage is, the more decline in lipid level is detected, especially in LDL and total cholesterol levels. However, they were found no correlation between the serum triglyceride level and the extent of liver damage.

In the present study, the maximum number of patients (cases) belongs to 10–19 MELD score, i.e., 46 (61.3%).

Ghadir *et al.*[12] have observed in their study that according to MELD criteria of 50 patients, 10 patients had MELD scores <10, 15 had MELD scores between 11 and 18, 17 had MELD scores between 19 and 24, and 8 had MELD scores >25. Further, they have observed that there was a significant ($P < 0.05$) negative correlation between liver damage according to MELD score and serum total, HDL, and LDL cholesterol level ($P < 0.05$).

In the present study, it was observed that the serum total cholesterol and HDL levels were low in patients belong to CTP Class C in comparison to patients belong to CTP Class B; ($P = 0.03$, found statistically significant).

In the present study, the level of LDL, serum triglycerides, and VLDL was observed low in cases which belong to CTP Class C in comparison to cases belongs to CTP Class B (*P* value statistically not significant).

In the present study, the Child-Pugh Class A was recorded in a single patient so that there it was not included in statistical analysis.

Mohammed *et al.*[6] in their cross-sectional study of total 170 consecutive chronic liver disease patients which were analyzed over 1 year, it was observed that among the total 170 patients, 24 patients belong to CTP score Class A, 47 patients were in Class B, and 52 patients were in Class C. Hence, they have observed a significant ($P < 0.001$) negative correlation of all the lipid profile parameters with the severity of liver disease.

Kumar *et al.*[11] have observed that the levels of serum lipid included triglyceride, LDL, HDL, and total cholesterol in cases were significantly reduced in child score C compared to B and compared to A, i.e., decrease in lipids was proportional to the child class. They have also observed in their study that there was no significant variation in the VLDL levels in all the child classes.

Nangliya *et al.*[8] in their analytical cross-sectional study of 150 cirrhotic patients of their sex ranging in the age from 25 to 65 years were included in the study, and the results were compared to 50 age- and sex-matched healthy control patients. They had observed that when all cirrhotic patients were assessed for severity of disease as mild (Child A), moderate (child B), and severe (child C) as per Child-Pugh classification along with the serum total cholesterol, HDL, LDL, and triglyceride measurement, the results of the study showed that all the serum lipid profile parameters (which included total cholesterol, LDL, and HDL) were significantly ($P < 0.05$) decreased in cirrhotic patients as compared to control group and the concentration of these study variables decreased with the severity of liver disease and the mean level difference was statistically significant ($P < 0.01$) with the exception of serum triglyceride levels. Triglyceride levels rather showed a decline in cirrhotic patients; however, it was not statistically significant. So that, they have concluded that dyslipidemia exists in patients with liver cirrhosis and serum lipid profile is routinely measured parameter which may have independent prognostic value in patients with liver cirrhosis. Thus, the assessment of the serum lipid profile is important for effective treatment and prognostic evaluation of patients with the chronic liver disease.

Mandal *et al.*[9] have resulted that in patients with chronic liver diseases with the exception of triglyceride level, there was a significant decrease in total cholesterol, LDL cholesterol, VLDL, and HDL cholesterol levels compared to the control group ($P < 0.05$). However, they have observed no significant correlation between severity of cirrhosis and change in serum lipid levels.

In the present study, we were observed that the cases have total serum protein (mean 6.27, SD 0.86), serum albumin (mean 2.66, SD 0.72), and serum globulin (mean 3.60,

SD 0.80) mg/dl, respectively, which were compatibly very low from controls serum proteins value, i.e., total serum proteins (mean 6.87, SD 0.57), serum albumin (mean 4.05, SD 0.49), and serum globulin (mean 2.81, SD 0.55) mg/dl, respectively ($P = 0.0001$, found statistically significant).

CONCLUSION

After analyzing the data and results finally we are concluded that as follows:

1. In the present study, there was a significant decrease in serum total cholesterol, LDL cholesterol, VLDL cholesterol, HDL cholesterol, and serum triglyceride levels in liver cirrhosis patients (cases) compared to control patients.
2. The majority of patients (cases) belongs to the CTP Class C, i.e., 40, (53.30%) cases, and least belong to the Class A, i.e., 1 (1.30%) of total 75.
3. In this study, all lipid profile parameters were found decreased in liver cirrhosis patients, which mean dyslipidemia exists in patients with liver cirrhosis and it also further correlated with the severity of liver cirrhosis because we have studied that the CTP Class C group's patients have lowest serum lipid level as compared to CTP Class B patients.

However, further studies are needed to assess the predictive value of dyslipidemia as a tool to forecast the progression of cirrhosis.

LIMITATION OF STUDY

Due to the limitation of resources liver biopsy could not be performed in the patients. On account of financial constraints, several laboratory investigations could not be done as a result of which etiology of cirrhosis in several patients could not find. Gender-wise correlation with outcome could not be done as the numbers of female cirrhotic were very low for comparison. Any result data if found statistical insignificance in the present study was probably attributable to small cohort under study. This was a single-center study with our limited resources.

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