



STUDY OF LIPID PROFILE AMONG PATIENTS OF LIVER CIRRHOSIS

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ABSTRACT

Background: The lipids of biochemical importance for humans serve as structural components of biological membranes. Chronic liver diseases (CLD) cause significant morbidity and mortality worldwide. The liver plays a central role in lipid metabolism. Lipid profile is altered by chronic liver disease (CLD) severity. The pattern of dyslipidemia is not well characterized in cirrhosis, specially in this part of world. Thus, this study was planned to evaluate problem of dyslipidemia by studying patten of lipid profile among patients of liver cirrhosis. **Material and Method:** Present observation study was conducted on 50 patients of liver cirrhosis and 50 matched controls. After detailed history and clinical examination, patients were subjected to serological tests (hepatitis B surface antigen and antihepatitis C virus [HCV]) to support the diagnosis of viral infections. 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. Mean values of Lipid profile of the patients compared between cases and controls; and for severity class of the cirrhotic patients. **Results:** In this study, 50 cases and age and sex matched 50 controls were included. Out of 50 cases, Alcoholic cirrhosis was among 56%, HbsAg was present in 16% while 28% cases had other etiologies. On the basis of severity 6% cases were classified as CPT Class A, while 60% of CPT Class B and rest of CPT Class C. All the cases were having statistically significant and lower mean concentration of Lipid parameters among cases. Cirrhotic patients had a decreasing trend from CPT Class A to Class C. **Conclusion:** Dyslipidemia is common in chronic liver disease. Our study concluded that there is decrease in lipid profile parameters in cirrhotic patients, more severe the cirrhosis, there is greater fall in lipid profile parameters. We can use lipid profile parameters in all the cirrhotic patients to assess severity of disease.

KEYWORDS : Lipid profile, Liver cirrhosis

INTRODUCTION

Biological molecules that are insoluble in aqueous solutions and soluble in organic solvents are classified as lipids. The lipids of physiological importance for humans serve as structural components of biological membranes; provide energy reserves, predominantly in the form of triglycerides, serve as biologically active molecules exerting a wide range of regulatory functions, and the lipophilic bile acids aid in lipid emulsification during digestion of fats.(1)

Chronic liver diseases (CLD) cause significant morbidity and mortality worldwide. Multiple etiological factors lead to a similar clinico-pathological syndrome in CLDs, although the rates of progression and clinical course may be different.(2) As the liver plays a central role in lipid metabolism, lipid profiles are altered by chronic liver disease (CLD) severity. Although a vast body of literature exists on the effect of CLD on lipid profiles in several etiologies, state of the art assessment of CLD severity by, e.g. grading fibrosis severity is lacking in many studies and advanced CLD (ACLD)/cirrhosis is usually classified as a distinct etiology.(3)

Impairment of lipid metabolism is not uncommon in chronic liver disease. The abnormalities in serum lipoprotein profile may be due to decreased synthesis or reduced clearance of lipoprotein complexes by the liver or to regurgitation of biliary contents into the serum. A low concentration of serum cholesteryl esters in chronic liver disease suggests a decrease in lecithin cholesterol acyltransferase activity either secondary to impaired hepatic synthesis or reduced apoC-II levels or to a decreased release of cholesteryl ester hydrolase from the injured hepatocytes.(4)

Management of patients with Non-alcoholic fatty liver disease (NAFLD) and dyslipidemia is frequently challenging, as many factors need to be considered in terms of safety (i.e., patients frequently have elevated liver ALTs) and efficacy in preventing CVD.(5) The pattern of dyslipidemia is not well characterized in cirrhosis, specially in this part of world. Thus, this study was planned to evaluate problem of dyslipidemia by studying patten of lipid profile among patients of liver cirrhosis.

MATERIAL AND METHODS

Present study was registered as MD thesis project in the department of medicine, NSCB Medical College, Jabalpur (M.P) and data on 25 cases and 25 controls were collected between 2005-2006. Rest of the data for 25 cases and controls each was collected at Department of Biochemistry, NSCB Medical College, Jabalpur (M.P) from 2019 to 2020. A total of 50 patients of liver cirrhosis aged between 25-70 years diagnosed by history, clinical examination and imaging (Ultrasonography). Fifty normal healthy adults (those who have no clinical evidence of any disease) was included in the study as controls for comparison. Those patients who has age less than 25 years or more than 75 years of age, had diabetes mellitus, pregnant or lactating woman, congestive cardiac failure or renal failure were excluded from the study. After detailed history and clinical examination. Patients were subjected to liver function test along with lipid profile and ultrason ographic examination. The serological tests (hepatitis B surface antigen and antihepatitis C virus [HCV]) were also used to support the diagnosis of viral infections. If a diagnosis of liver cirrhosis is made, the patients were included in the study after filtering through inclusion and exclusion criterion. 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.(6)

For evaluating lipid profile of the patients. Patients were ask to fast for 8-12 hours. A fasting blood sample of 5ml was collected taking all aseptic and universal precaution from all cases and controls in plain and sterile vials. Blood was allowed to clot and the serum was separated by centrifugation and different parameters were estimated. Estimation of serum cholesterol was done by enzymatic method end point CHOD-POD method (cholesterol oxidase and per-oxidase method).

Serum triglyceride is estimated by enzymatic GPO-POD method (glycerol-3- PO4 oxidase and peroxidase). VLDL-C was calculated as one fifth of triglyceride. Estimation of low density lipoprotein cholesterol was calculated using freidwalds formula $[LDL-C = TC - (HDL + VLDL)]$.

Mean values of Total cholesterol, serum triglycerides, LDL, HDL and VLDL were compared between cases and controls; and for Child-Turcotte-Pugh [CTP] score or Child criteria of severity classification for cirrhotic patients using students t-test and ANOVA respectively.

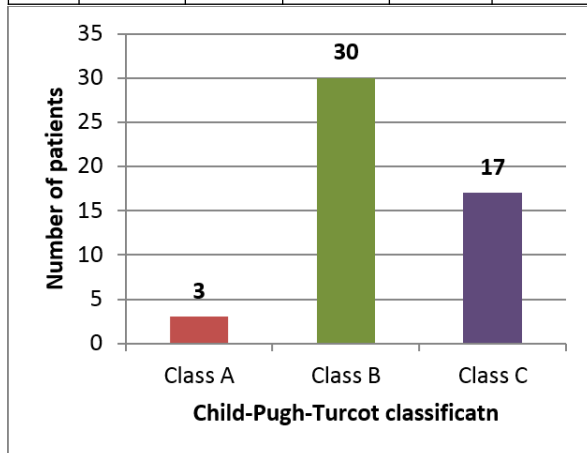
RESULTS

In this case control study equal number of cases and controls of 50 each included in the study. Both groups of the study groups had comparable sex ratio and mean age (Table 1). The most common age group was from 40-49 years of age and male to female sex ratio was 7:3.

Out of 50 cases, Alcohol was the cause of cirrhosis among 56%, HbsAg was present in 16% while 28% cases had other etiologies.

Table 1: Demographic profile of cases and controls

Age in years	Case (N=50)		Control (N=50)		TOTAL
	Male	Female	Male	Female	
<30	1 (2.86%)	1 (6.67%)	3 (8.33%)	1 (7.14%)	6 (6%)
30-39	2 (5.71%)	2 (13.33%)	7 (19.44%)	2 (14.29%)	13 (13%)
40-49	14 (40%)	8 (53.33%)	15 (41.67%)	5 (35.71%)	42 (42%)
50-59	11 (31.43%)	2 (13.33%)	8 (22.22%)	4 (28.57%)	25 (25%)
60-70	7 (20%)	2 (13.33%)	3 (8.33%)	2 (14.29%)	14 (14%)
TOTAL	35 (70%)	15 (30%)	36 (72%)	14 (28%)	100 (100%)
Mean	49.42±	43.63±	35.83±	44.43±	43.33±
±SD	11.11	10.88	9.33	11.06	8.53



Graph 1: Classification of cases according to Child-Pugh-Turcotte severity score

On the basis of severity (Child-Pugh-Turcotte classification) 6% cases were classified as CPT Class A, while 60% of all were CPT Class B and rest had severe cirrhotic illness classified as CPT Class C.

Table 2: Classification of cases according to Child-Pugh-Turcotte severity score

Lipid Parameters	Case (N=50)	Control (N=50)	Student's t test
Cholesterol	135.96±23.59	163.96±13.44	p<0.0001
Triglyceride	79.32±16.87	113.16±21.82	p<0.0001
HDL	28±3.41	54.01±10.23	p<0.0001
LDL	69.5±21.22	92.8±11.67	p<0.0001
VLDL	16.17±5.17	22.63±3.36	p<0.0001

All the cases were having statistically significant and lower mean concentration of lipid profile parameters. When means of lipid parameters were compared for CPT classification, cirrhotic patients had a decreasing trend from CPT Class A to Class C for Total cholesterol, Triglycerides, LDL and VLDL. CPT Class C had significantly lower mean values for lipid parameters compared to CPT class A (ANOVA, p<0.05).

Table 3: Lipid profile according to Child-Pugh-Turcotte severity score

Lipid Parameters	Child-Pugh-Turcotte classification			
	A (N=3)	B (N=30)	C (N=17)	ANOVA (p-value)
Cholesterol	170.03±10.17	135.46±23.23	133±23.88	p<0.0001
Triglyceride	103.73±18.9	76.3±16.09	74.72±17.52	p<0.0001
HDL	35.65±4.7	30.98±2.61	27.2±3.87	p<0.01
LDL	77.33±24.43	73.64±20.17	61.77±23.07	p<0.05
VLDL	20.6±6.54	16±4.99	14.98±5.74	p<0.0001

DISCUSSION

In the study conducted by Wang et al (2014) identified 6719 (83.16%) male patients and 1361 (16.84%) female patients. The average age of all of the patients was 50.5 years at the time of diagnosis. Infantile hepatitis syndrome patients were the youngest (2.5 years of age), followed by the metabolic group (27.2 years of age). 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.(7)

In our study comparison of mean total cholesterol in cirrhotic patients and control group was done. Mean total cholesterol in cirrhotic study group was 135.96±23.59 mg/dl and in control group was 163.96±13.44 mg/dl. The mean total cholesterol in study group was significantly lower as compared to control group (p<0.0001). In a study by Nangliya et al (2015) Total cholesterol in cirrhotic study group was 141.06±22.64 mg/dl and in control group was 175.69±16.41 mg/dl.(8) In similar previous Study by Suman et al (2016) Total cholesterol in cirrhotic study group was 147.54±35.46 mg/dl and in control group was 190.55±39.82 mg/dl.(9) It is evident from study by Mandal et al(11) that total cholesterol in cirrhotic study group was 141.5±46.69 mg/dl and in control group was 192±21.34 mg/dl.(10)

Mean LDL cholesterol in cirrhotic study group was 69.5±21.22 mg/dl and in control group was 92.8±11.67 mg/dl. The mean LDL cholesterol in study group was significantly lower as compared to control group (p<0.0001). In a study by Nangliya et al (2015) LDL cholesterol in cirrhotic study group was 82.81±13.17 mg/dl and in control group was 107.28±9.04 mg/dl.(8) Mean of LDL cholesterol was higher in control group than in study group that was statistically significant as p value <0.05. In another study by Suman et al (2016) LDL cholesterol in cirrhotic study group was 89.37±25.97 mg/dl and in control group was 120.28±27.01 mg/dl. Mean of LDL cholesterol was higher in control group than in study group that was statistically significant as p value <0.05.(9) In similar previous study by Mandal et al (2013) LDL cholesterol in cirrhotic study group was 86.58±35.63 mg/dl and in control group was 122.8±19.29 mg/dl.(10) Mean of LDL cholesterol was higher in control group than in study group that was statistically significant as p value <0.05.

In a study conducted by Janicko et al (2013) found significant difference in the level of total serum cholesterol between surviving and deceased patients. Cholesterol was confirmed as a significant predictor of mortality in univariate logistic regression analysis, and independent predictor beside bilirubin, creatinine and MELD (Model for End stage Liver Disease) score in multivariate logistic regression analysis. Addition of serum cholesterol level to a prognostic model based on total bilirubin, creatinine and INR increased its accuracy by 4%. Serum cholesterol is a routinely measured parameter, which has independent prognostic value in patients with liver cirrhosis.(11) A study conducted by Ghadir et al (2010) found that in patients with cirrhosis, there was a significant decrease in serum triglyceride, total, LDL 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). Serum total, LDL and HDL

cholesterol level in patients with cirrhosis is inversely correlate with severity of cirrhosis.(11),(12)

Kumar et al. (2015) observed 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. (13) **Nangliya et al. (2015)** in their 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.(8) Those results were comparable to our study.

CONCLUSION

Dyslipidemia is common in chronic liver disease. Our study concluded that there is decrease in lipid profile parameters in cirrhotic patients, more severe the cirrhosis, there is greater fall in lipid profile parameters. We can use lipid profile parameters in all the cirrhotic patients to assess severity of disease.

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