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Research Article

Relationship between Lipid Profile Changes and Severity of Liver Cirrhosis in Patients With Hepatitis C

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Abstract

Objective: To compare the lipid profile in Hepatitis C patients having cirrhosis with healthy comparison group and determine the relationship of lipid profile change with the severity of liver disease.

Methods: A comparative cross sectional-study was carried out at gastroenterology OPD Unit 1 LGH, Lahore from Jan 2020 to September 2020 after approval from ethical review board of PGMI/ LGH, using non-probability purposive sampling technique. Total 113 patients diagnosed with liver cirrhosis due to hepatitis C on abdominal ultrasound and 113 healthy individuals (comparison group) of either gender with age more than 18 year were enrolled. Severity of the liver disease was assessed using Child Pugh classification. After informed consent and physical examination, data was recorded and blood sample was taken for analysis of fasting lipid profile which include total cholesterol, serum high density lipid (HDL), serum low density lipid (LDL) and serum triglycerides (TG). SPSS 23 was utilized for data analysis. Mean ± Standard deviation was used to present quantitative data and frequency (percentage) was used for qualitative data. Independent t test and ANOVA was applied for statistical analysis.

Results: Mean total cholesterol in cirrhotic group and control group was 145.57+17.21 mg/dl and 161.52+16.43 mg/dl respectively and the difference was statistically significant (p value <0.001). Mean LDL and HDL in cirrhotic group was 80.49+15.37 mg/dl and 39.74+3.54 mg/dl respectively. Levels of serum HDL, VLDL, LDL, and total cholesterol were reduced significantly with liver disease progression (Child A–C).

Conclusion: The reduced lipid profiles in patients with cirrhosis due to HCV infection as compared to healthy participants were significantly associated with the Child Pugh scoring. The value of lipid profile parameters decrease as the severity of liver cirrhosis increases from Child class A to Child class C.

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Introduction:

Cronic liver disease has shown its fatality in the current era. About 1.5 billion people have been diagnosed so far with the chronic liver disease, worldwide.[1] Cirrhosis is currently the 11th most common cause of death globally.[2] In Pakistan, the prevalence of cirrhosis is 13.5 %.[3] Lipid profile such as HDL, LDL, TC and TG play important roles in cellular metabolism, energy transformation and in the regulation of cellular membrane potentials. Liver has a role in production, shifting of lipids and accumulation of Apo proteins and lipoproteins along with the catabolism of various lipids and removal of the excessive cholesterol and lipoproteins. All these functions run smoothly until the liver is not damaged due to any disease.[4]

Lipids are vital constituent of biological membrane. They act as metabolic regulators and control cellular function and maintain homeostasis. Lipids get cholesterol and fatty acids from diet and peripheral tissues and then pack them into complexes of lipoprotein and then releases back into circulation.[5] Plasma triglycerides level reduces in chronic liver disease due to reduced capacity of lipoprotein synthesis. VLDL is formed by long chain fatty acids esterification, and with chylomicrons the triglycerides of VLDL are hydrolyzed by Lipoprotein lipase especially in muscle, heart, and adipose tissue.[6] About 70% LDL circulating in the body is cleaned by receptor mediated endocytosis in the liver. As majority of cholesterol is synthesized in the microsomes of liver so impairment of liver function due to cirrhosis causes decrease formation of cholesterol endogenously.[7] If the condition of liver disease progresses to severity then serum lipoprotein level also reduces. Various biochemical and clinical parameters have been proposed to envisage more precisely the prognosis of patients with liver cirrhosis and appropriately evaluate their survival rate.[8] As there is increased burden of chronic liver disease in our country, we conducted this study to assess lipid profile in patients with cirrhosis and determine its relationship to the severity of disease.

Methods:

A comparative cross-sectional study was carried out at gastroenterology OPD Unit 1 LGH, Lahore from Jan 2020 to September 2020 after approval from ethical review board of PGMI/ LGH, using non-probability purposive sampling technique. Total 113 patients diagnosed with liver cirrhosis due to hepatitis C on abdominal ultrasound and 113 healthy individuals of either gender with age more than 18 year were enrolled. Patients with diabetes, renal failure, malignancy and those on treatment with hepatic disease and lipid lowering drugs were excluded from the study. Confirmation of cirrhosis was made on basis of clinical signs, symptoms and ultrasonography. Abnormal liver surface, echogenicity, liver size and portal vein diameter were marked for confirmation. Severity of the liver disease was assessed using Child Pugh classification. Child Pugh class A at (5-6 point) was considered as mild disease condition, Child Pugh class B (7-9 point) as moderate and child Pugh class C (10-15 point) as severe disease.[9] After informed consent and physical examination, data was recorded and blood sample was taken for analysis of fasting lipid profile which include total cholesterol, serum high density lipid (HDL), serum low density lipid (LDL) and serum triglycerides (TG). Lipid profile parameters were measured by ELIZA method using fully automated biochemistry analyzer (HITACHI).

SPSS 23 was utilized for data analysis. Mean ± Standard deviation were used to present quantitative data and frequency (percentage) was used for qualitative data. t independent test and ANOVA was applied for statistical analysis. Chi-square was used to evaluate association between categorical variables. p value ≤ 0.05 was measured significant.

Results:

Data was analyzed SPSS version 23.0 was used analysis; Chi square was applied for comparison of categorical data. P value ≤ 0.05 was taken as statistically significant. Average age of the cirrhotic patients was 46.08 + 12.65 years. Cirrhotic patients comprised of 65.48% males (n = 74) and 34.51% females (n = 39). Total cholesterol was 145.57 + 17.21mg/dl in cirrhotic group and 161.52 + 16.43mg/dl in comparison group. Serum LDL was 80.49 + 15.37 mg/dl, VLDL level was 26.24 + 3.16 mg/dl and HDL level were 39.74 + 3.54mg/dl showing statistically significant results (p value = 0.001) as shown in **Table I**

Table I: *Comparison of lipid profile in cirrhotic patients and healthy participants (comparison group)*

Variables		Cirrhotic group n = 113	Comparison group n = 113	p value
Age (years)		46.08 ± 12.65	42.32 ± 15.06	0.043
Gender	Male	74 (65.48%)	80 (70.79%)	0.733
	Female	39 (34.51%)	33 (29.20%)	
Total cholesterol (mg/dl)		145.57 ± 17.21	161.52 ± 16.43	< 0.001
LDL (mg/dl)		80.49 ± 15.37	92.86 ± 18.54	< 0.001
VLDL (mg/dl)		26.24 ± 3.16	25.5 ± 3.46	< 0.001
HDL (mg/dl)		39.74 ± 3.54	43.65 ± 3.65	< 0.001
Triglycerides (mg/dl)		121.46 ± 18.78	135.63 ± 17.83	< 0.001

p value is calculated using t independent test and chi-square. p value ≤ 0.05 is statistically significant Serum HDL, VLDL, LDL and total cholesterol levels were decreased significantly with progression of liver cirrhosis (Child A–C). Among 113 total cirrhotic patients, 49.55% patients had Child C score, 30.08% patients had Child B score and 20.35% had Child A score as shown in **Table II.**

Table II: *Comparison of lipid profile according to severity of chronic liver disease using Child Pugh score*

Lipid Profile	Child A n = 23 (20.35%)	Child B n = 34 (30.08%)	Child C n = 56 (49.55%)	p value
Total cholesterol (mg/dl)	205.18 + 35.12	153.21 + 40.32	148.56 + 27.65	< 0.001
LDL (mg/dl)	120.81 + 22.34	93.54 + 21.45	70.34 + 14.57	< 0.001
VLDL (mg/dl)	32.64 + 18.65	28.35 + 17.66	21.43 + 10.06	0.005
HDL (mg/dl)	37.16 + 12.86	34.23 + 12.03	41.34 + 14.54	0.052
Triglycerides (mg/dl)	165.76 + 84.54	135.32 + 54.34	103.57 + 56.38	0.000

p value is calculated using one-way ANOVA. p value ≤ 0.05 is statistically significant

LDL: low-density lipoprotein, HDL: high-density lipoprotein, VLDL: very-low-density lipoprotein, TG: triglycerides

Discussion:

Liver plays an important role in metabolism. Transverse movements of the particles necessary for the metabolic activates are also performed by the liver.[10] The average age in our study was 46.08 + 12.65 years which was similar to another study carried out in Pakistan done by Latif A, et al.[11] When the serum lipid profile was evaluated, it was observed that there was decrease in all the four parameters of lipid profile studied in this study i.e. TC, HDL, LDL, TG level. It was also observed that this decline in the serum lipid profile level was directly related to the progression of the severity of the cirrhosis.[12] In this study the average TC level was 145.57 + 17.21 mg/dL which was lower the normal value. These results are supported by the various other studies which showed that there was decreases serum TC level. A reduction in total cholesterol values was may be due to decrease in esterification, most probably due to a decrease formation of cholesterol acyltransferase enzyme.[13]

Serum LDL level was also noted lower in the cirrhotic cases. In current study the mean LDL level was 80.49 + 15.37 mg/dl. The same results were noted by the previous study conducted by Nazneen A. et al and Suman et al.[14,15] All these showed the same results for the changes in the serum lipid profile level as they have selected the same age, gender and etiology of the cirrhosis. So, all these studies support our findings. Only one study is present so far that quoted that LDL level increases with the severity of the disease.[16] The average level of serum HDL was 39.74 + 3.54mg/dl in our study. The low HDL values suggested a solid association between prognosis and reduced synthesis of HDL lipoprotein i.e. apoprotein AI.[17]

A cross-sectional study done by Bassani et al. showed decrease in the lipid profile in 314 cirrhotic patients due to HCV infection and it was signify-cantly correlated Child–Pugh scores.[18] These findings are consistent with our results. A study by Ghadir et al. also found that all lipid profile parameters except triglycerides were significantly low in patients with cirrhosis than in the comparison group and significantly related with degree of severity of liver disease.[19]

Limitations of Study:

Our study had some limitations. Our study was a hospital-based study, which caused some bias in patient selection. The study period was also short. Number of cases and controls was limited. Histological diagnosis of cirrhosis was not performed. Therefore, severity of liver damage could not be assessed with certainty. However, the result of this study serves as a baseline for further studies on lipid abnormalities in cirrhotic patients due to Hepatitis C.

Conclusion:

The reduced lipid profiles in patients with cirrhosis due to HCV infection as compared to healthy

participants were significantly associated with the Child-Pugh. The value of lipid profile parameters decrease as the severity of liver cirrhosis increases from Child class A to Child class C.

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