Original Article

Study Of Serum Triglyceride And Ldl-cholesterol Among Patients Suffereing From Liver Cirrhosis And Its Relation With Severity of The Disease

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Abstract

Background: *Cirrhosis is characterized by abnormal structure and function of the liver. Liver synthesizes the various lipoproteins involved in transporting cholesterol and lipids throughout the body. This makes liver an important site for lipid metabolism as well as its transport. Thus liver cirrhosis is associated with lipid abnormalities and the amount of decrement is expected to be significantly correlated with increasing severity of liver damage.* ***Aims and objectives:*** *To determine serum TG and LDL-C in patients with cirrhosis and study their relationship to the severity of cirrhosis.*

Materials & Method: *This cross-sectional study was carried out in the Department of Biochemistry, Sylhet MAG Osmani Medical College, Sylhet during the period from January to December 2016. Fifty cirrhosis of liver patients fulfilling the inclusion criteria were enrolled as group-A and 50 age-sex matched healthy adults were selected as the control group (group-B).* ***Result:*** *Fasting serum TG and LDL-C were estimated. Severity of liver Cirrhosis was categorized according to Child-Pugh scoring system and increasing severity was categorized as Child Pugh class A, B and C. TG and LDL-C were decreased in patients with liver cirrhosis. The level of severity of liver damage significantly affects the serum LDL-C level in cirrhosis; and may be considered as marker of severity of liver damage in cirrhosis.* ***Conclusion:*** *It may be concluded that hypolipidemia exists in patients with liver cirrhosis and screening for severity of cirrhosis by LDL-C is important for intervention with appropriate therapy to reduce the severity of the disease.*

Key words: *Liver cirrhosis, Serum TG and LDL-C, Child-Pugh score.*

Introduction: Lipids are considered as one of the important biomolecules which control cellular functions and homeostasis and liver is an important site for metabolism of lipids. Liver contributes both in exogenous and endogenous pathways of lipid metabolism and transport of lipids through plasma. Apolipoproteins synthesized in liver are structural components of lipoprotein particles in plasma. The transport of triglycerides, cholesterol and fat soluble vitamins from intestine to liver and from liver to peripheral tissue and transport of cholesterol from peripheral tissue to liver is by lipoproteins. Apolipoproteins activate enzymes important in lipoprotein metabolism and to mediate the binding of lipoproteins to cell surface receptors[1]. Liver is one of the most important organs in energy metabolism. Most plasma apolipoproteins, endogenous lipids and lipoproteins are synthesized in the liver, which depends on the integrity of cellular functions of liver. Under normal physiological conditions, liver ensures homeostasis of lipid and lipoprotein metabolism[2].

Cirrhosis is the severest form of liver disease and is the common outcome of different mechanisms and etiologies of chronic liver injury. The National Center for Health Statistics (NCHS) and Centers for Disease Control (CDC) estimates that in 2009 chronic liver disease and cirrhosis represented the 12th leading cause of death overall and the fifth leading cause of death for patients aged 45 to 54 years[3]. The prevalen

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of cirrhosis is likely increasing, due to the aging hepatitis C cohort and rise in fatty liver disease[4]. In a recent report the overall prevalence of cirrhosis in the general population was 0.27% in adults; based on 2010 US census this would correspond to 633,323 Americans adults afflicted with liver cirrhosis. The prevalence of cirrhosis has a bimodal age distribution, peaking during the fourth and fifth decade and then again after age 75[5]. It can occur at any age, has significant morbidity and is an important cause of premature death. World-wide the most common causes of cirrhosis are chronic viral hepatitis, prolonged excessive alcohol consumption and fatty liver disease. Cirrhosis is the most common cause of portal hypertension and its associated complications[6]. Since Child and Turcotte published criteria to assess liver function reserve in 1964, their classification and its modification suggested by Pugh and Christensen have found widespread use as a clinically reliable method. This scoring model contains clinical and laboratory based hepatic synthetic functions, as liver is a vital organ that performs several synthetic, metabolic, detoxifying and storage functions. Among these, the liver is the vital organ to synthesize blood lipid and lipoprotein and also these are one of the necessary components which control cellular functions and homeostasis, and an impaired lipid metabolism is often found in patients with chronic liver diseases. Thus, it is reasonable to expect abnormal patterns of serum lipids in liver cirrhosis[7]. The aim of this study was to determine the patterns of serum lipid profile in patients with liver cirrhosis, and to detect its relationship with the severity of liver damage assessed by Child-Pugh classification.

Materials & method

This cross-sectional study was carried out in the Department of Biochemistry, Sylhet MAG Osmani Medical College, Sylhet in collaboration with the Department of Medicine, Sylhet MAG Osmani Medical College Hospital during the period from January 01, 2016, to December 31, 2016. A detailed history and clinical examination were done in each patient on admission. Diagnosis of liver cirrhosis was done on combination of clinical features, biochemical investigations and sonography. Those, who met the inclusion criteria by detailed history, clinical examination and relevant investigations were taken as sample. In this way 50 patients with liver cirrhosis (Group-A, Case) were selected.

Age and sex matched 50 healthy subjects (Group-B, Control) were selected from doctors, nurses and other staff working in Sylhet MAG Osmani Medical College Hospital, Sylhet fulfilling the inclusion and exclusion criteria. Patients with cirrhosis of liver attending the Department of Medicine, Sylhet MAG Osmani Medical College Hospital during the study period satisfying inclusion and exclusion criteria were the study population. Diseases affecting blood lipids such as hypertension, diabetes, cardiovascular disease, cerebrovascular disease, chronic kidney disease and hypo or hyperthyroidism; and those were recently using lipid lowering drugs were excluded. Fasting serum TG and LDL-C were estimated. The stage of liver Cirrhosis was characterized according to the Child-Pugh scoring system and increasing severity was categorized as Child-Pugh class A, B and C.

Serum Triglyceride was measured by GPO/PAP method[8].

Serum LDL-Cholesterol was measured by CHOD-PAP method.

Statistical Analysis

Stage of liver Cirrhosis will be characterized according to Child-Pugh scoring system. The score, corresponding to the sum of individual points, allows to classify patients in Child-Pugh grades A: mild (5-6 points), B: moderate (7-9 points) and C: severe (10-15 points)[9] . Collected data were checked and edited first. Science (SPSS) Version 21. Quantitative data were expressed as mean ± SD (standard deviation). Qualitative data were expressed as frequency and percentage. Appropriate tests were done to see the level of significance. The P value <0.05 was considered statistically significant.

Results

In the present study a total number of 50 patients were selected who fulfilled the inclusion and exclusion criteria. Among the subjects 45 were male and 5 were female and their average age is 50 years.

Table-I: Serum lipid level of study subjects

Parameter	Group-A Case (n=50)	Group-B Control (n=50)	t-value	*p-value
S cholesterol (mg/dl)	137.06 ± 26.15	193.74 ± 38.61	-8.594	p<0.001
S HDL-C(mg/dl)	24.74 ± 10.14	40.08 ± 8.95	-8.023	p<0.001
S.Triglyceride (mg/dl)	92.08 ± 27.98	147.00 ± 33.44	-8.906	p<0.001
S. LDL-C (mg/dl)	93.84 ± 20.12	125.60 ± 36.17	-5.426	p<0.001

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Data were presented as Mean ± SD.
*Unpaired 't' test was done, p<0.05 was the level of significance.

Figure-I: showed the frequency of patients according to severity of liver cirrhosis measured by Child-Pugh score. Child-Pugh class C was in 26 (52.0%) patients, Child-Pugh class B was in 15 (30.0%) and Child-Pugh class A was in 9 (18.0%) patients.

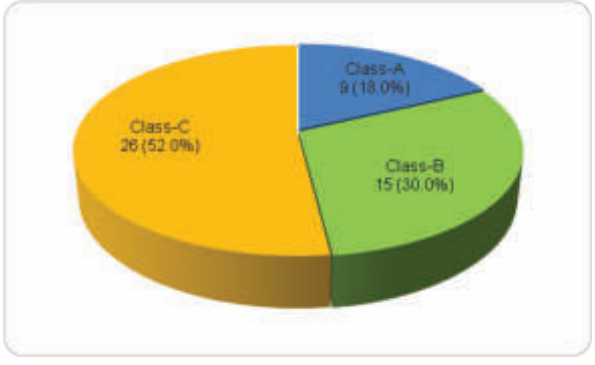

Figure-I: Frequency of patients according to severity of liver cirrhosis (n=50)

Table-II: shows a highly significant difference in lipid profile according to severity of cirrhosis as per child pugh classification.
The mean total cholesterol was significantly differ among the participants of different Child-Pugh classes of liver cirrhosis. The total cholesterol level was significantly lower in class-C compared to class-A and class-B. Moreover, the total cholesterol level was notably lower in class-B compared to class-A. (Table-II).

Table-II: Serum TG and LDL-C according to severity of cirrhosis as per Child-Pugh classification (n=50)

Lipid parameter	Child-Pugh class			F value	p-value
	Class-A (n=9)	Class-B (n=15)	Class-C (n=26)		
S.Triglyceride (mg/dl)	106.56±32.47	87.00±20.21	90.00±29.55	1.558	*p=0.221 A vs B, ᵗp=0.225 A vs C, ᵗp=0.279 B vs C, ᵗp=0.940
S. LDL-C (mg/dl)	113.78±28.73	97.47±7.74	84.85±16.15	9.893	*p<0.001 A vs B, ᵗp=0.074 A vs C, ᵗp<0.001 B vs C, ᵗp=0.072

Data were presented as mean ± SD. Data was analyzed using *one way ANOVA and tPost Hoc (Tukey-b); p<0.05 was the level of significance.

Correlation between severity of cirrhosis and serum triglyceride and LDL-cholesterol of the study subjects were examined by regression analysis.
There was a marked negative correlation of serum LDL-cholesterol level with Child-Pugh class of severity of cirrhosis.

Table-III: Correlation between severity of cirrhosis and serum total cholesterol (n=50)

Parameter		r	*p
Child-Pugh class A,B,C	Serum triglyceride	-.0174	p=0.227
	Serum LDL cholesterol	-0.543	p<0.001

*Regression analysis was performed, p<0.05 was the level of significance.

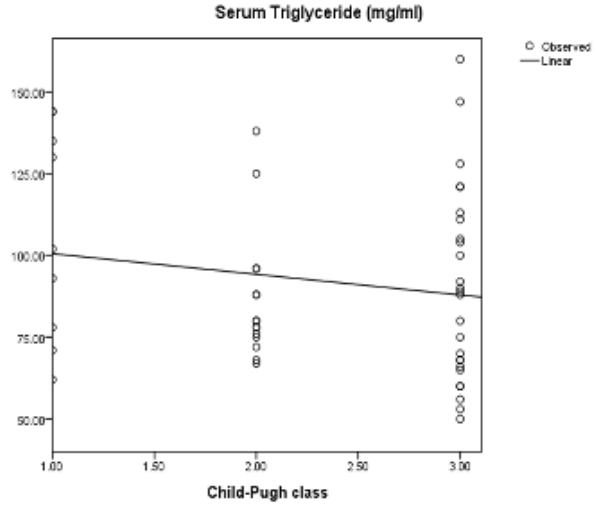

Figure-2 Scatter diagram showing correlation between serum triglyceride level and Child-Pugh class of severity of cirrhosis (n=50).
Child-Pugh class 1, 2 and 3 in the figure are class A, B and C respectively.
*Regression analysis was performed, p<0.05 was the level of significance

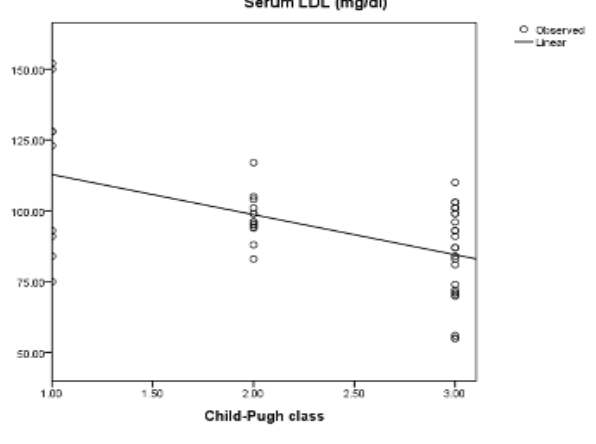

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Figure-3: Scatter diagram showing correlation between serum LDL-cholesterol level and Child-Pugh class of severity of cirrhosis (n=50)

Child-Pugh class 1, 2 and 3 in the figure are class A, B and C respectively.
*Logisticregression analysis was performed, p<0.05 was the level of significance.

Discussion

In this study severity of liver cirrhosis was measured by Child-Pugh score and showed that 52.0% patients had severe liver cirrhosis (Child-Pugh class C), 30.0% patients had moderate liver cirrhosis (Child-Pugh class B) and 18.0% patients had mild cirrhosis (Child-Pugh class A). This result was supported by Qureshi et al., (2014) [10] that 7.9% cirrhotic patients were in class A, 42.1% cirrhotic patients in class B, and 50% cirrhotic patients in class C. Kim et al., (2008) [11] also found that 6.4% of cirrhotic patients were in class A, 44.7% of cirrhotic patients in class B, and 48.9% of cirrhotic patients in class C. Shaikh et al., (2010) [12] found that 38.5% of cirrhotic patients were in class B, and 61.5% of cirrhotic patients in class C. Other study by Wunsch et al., (2013) [13] showed that 47.4% of cirrhotic patients were in class A, 37.9% of cirrhotic patients in class B, and 14.7% of cirrhotic patients in class C. In the present study, serum LDL cholesterol and serum triglyceride level were 93.84 ± 20.12 mg/dl and 92.08 ± 27.98 mg/dl in cirrhosis of liver; whereas serum LDL cholesterol and serum triglyceride level were 125.60 ± 36.17 mg/dl and 147.00 ± 33.44 mg/dl respectively in the comparison group of healthy subjects. So, serum TG and LDl-C were significantly lower in cirrhotic patients than that of healthy subjects (p<0.001 each of the four parameters). This result was correlated with the study of Holkar,Vaishnav and Hivre, (2014) [14] that serum LDL cholesterol and serum triglyceride level were significantly lower in patients with liver cirrhosis than that of control group (p=0.028; p=0.012 respectively). Ghadir et al., (2010) [15] also found similar results that serum LDL cholesterol and serum triglyceride level were significantly lower in patients with liver cirrhosis than that of control group (0.025 and p=0.011). While Nangliya et al., (2015) [16] found that serum LDL cholesterol were significantly lower in patients with liver cirrhosis than that of control group (p<0.001) but serum triglyceride level did not differ significantly between patients with liver cirrhosis and control group (p=0.06). Similarly Mandal et al., (2013) [17] found that serum LDL cholesterol was significantly lower in patients with liver cirrhosis than that of control group (p<0.001) but serum triglyceride level did not differ significantly between patients with liver cirrhosis and control group (p=0.06). The reduced serum LDL-C in cirrhotic patients might be due to the decline in synthetic function and altered metabolism of lipid in cirrhosis of liver.

In this study the mean triglyceride level was 106.56 ± 32.47 mg/dl in Child-Pugh class-A, 87.00 ± 20.21 mg/dl in Child-Pugh class-B and 90.00 ± 29.55 mg/dl in Child-Pugh class-C of liver cirrhosis. No significant difference was observed among Child-Pugh classes of liver cirrhosis (p=0.221). This result was supported by Nangliya et al., (2015) [16] that serum triglyceride did not differ significantly among Child-Pugh classes of liver cirrhosis (p=0.66). But Asraf, (2012) [18], and Kumar and Harisha, (2015) [19] found that serum triglyceride level was significantly different among Child-Pugh classes of liver cirrhosis (p<0.02; p=0.001 respectively). Though serum triglyceride level was not significantly changed but there was reduced tendency of serum triglyceride level as severity of cirrhosis increased.
In this study the mean LDL cholesterol level was 113.78 ± 28.73 mg/dl in Child-Pugh class-A, 97.47 ± 7.74 mg/dl in Child-Pugh class-B and 84.85 ± 16.15 mg/dl in Child-Pugh class-C of liver cirrhosis. The mean LDL cholesterol level was significantly different among Child-Pugh classes of liver cirrhosis (p<0.001). This result was supported by Asraf, (2012) [18] Kumar and Harisha, (2015) [19], and Nangliya et al., (2015) 16 that serum LDL cholesterol level was significantly different among Child-Pugh classes of liver cirrhosis (p<0.001, p=0.001; and p=0.009 respectively).

This study showed that there was a significant negative correlation of serum LDL level with Child-Pugh class of severity of cirrhosis (r=-0.543, p<0.001); but no significant correlation between serum triglyceride level and Child-Pugh class of severity of cirrhosis (r=-0.174; p=0.227). Thus the results from this study explored that the higher the Child-Pugh score of cirrhotic patients, lower the serum LDL level, which is an important significant indicator to reflect liver damage. This result is similar to the study of Abbasi et al., (2012) [7] that there was a significant negative correlation between serum LDL-C level and Child-Pugh class of severity of

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cirrhosis (r =-0.546, p = 0.001). But Abbasi et al., (2012) [7] found that serum triglycerides had significant correlation with Child-Pugh class (r=-268; p= 0.004).

Conclusion

In this study serum triglyceride and LDL cholesterol were significantly lower in patients with liver cirrhosis than that of control subjects.

Serum LDL cholesterol was significantly different among Child-Pugh classes of liver cirrhosis; whereas serum triglyceride level was not significantly different among Child-Pugh classes of liver cirrhosis. A significant negative correlation between serum LDL level and Child-Pugh class of severity of cirrhosis. But no significant correlation observed between serum triglyceride level and Child-Pugh class of severity of cirrhosis. In conclusion serum LDL-C and TG were decreased in patients with liver cirrhosis and the amount of decrements of serum LDL cholesterol was related to the progress in cirrhosis. It helps in diagnosis of severity of liver damage in cirrhosis of liver.

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