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Evaluation of Lipid Profile and Lipid Peroxidation status in Patients of Hepatic Cirrhosis

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Abstract:

Liver plays a vital role in lipid metabolism. It contributes both in exogenous and endogenous cycles of lipid metabolism and transport of lipids through plasma. Synthesis of many apo-lipoproteins takes place in liver. Chronic liver disease affects people in their most productive years of life and has a significant impact on the economy as a result of premature death, illness and disability. Derangement of serum lipid Profile is a common observation in cirrhotic. The aim of the study is to know the lipid profile & lipid peroxidation status anomalies in hepatic cirrhosis. An overnight fast blood samples was collected for the estimation of lipid profile & MDA concentration. Lipid peroxidation has been shown to play a role in cellular injury and enhanced lipid peroxidation status has also been demonstrated in experimental models with liver damage. In this study we have tried to show correlation of lipid peroxide with various types of hepatic cirrhosis. Here we tried to evaluate the different lipid parameters such as Total cholesterol, Triglycerides, HDL-c, VLDL-c and LDL-c as the important lipoproteins estimated in the present study of 40 patients of cirrhosis and compared with controls.

Keywords: lipid profile, lipid peroxidation, hepatic cirrhosis

Abbreviations used: Total Cholesterol (TC), Triglyceride (TG), High Density Lipoprotein Cholesterol (HDL-c), Low Density Lipoprotein Cholesterol (LDL-c), Very Low Density Lipoprotein Cholesterol (VLDL-c), Lipid peroxidation (LP), Malondialdehyde (MDA).

Introduction:

Lipids are essential component of biological membranes, free molecules and metabolic regulators that control cellular function and homeostasis.[1] Liver plays a vital role in lipid metabolism. It contributes both in exogenous and endogenous cycles of lipid metabolism and transport of lipids through plasma. Synthesis of many apo-lipoproteins takes place in liver. Chronic liver disease affects people in their most productive years of life and has a significant impact on the economy as a result of premature death, illness and disability.[2] Derangement of serum lipid Profile is a common observation in cirrhotic. Very little was known earlier about the alterations of lipids and

lipoproteins in patients with cirrhosis. Hence in cirrhosis the concentrations of these lipids and lipoproteins are altered. There are very few studies on dyslipidemia in cirrhosis in India but this subject has been deal in detail worldwide. Although there are vast array of biochemical tests available for diagnosing and assessing severity of liver cell damage but desired sensitivity and specificity are lacking. 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 prognosis. Data regarding lipid levels in cirrhosis was available in 1862 when Austin Flint had suggested that the blood cholesterol level was affected by the liver diseases.[3] It was in 1978 that Neil Mclntyre studied the levels of plasma lipoproteins pattern in liver diseases.[4] Lipid peroxidation has been shown to play a role in cellular injury and enhanced lipid peroxidation status has also been demonstrated in experimental models with liver damage. In this study we have tried to show correlation of lipid peroxide with various types of hepatic cirrhosis. Here we tried to evaluate the different lipid parameters such as Triglycerides, Total cholesterol, HDL-c, VLDL-c and LDL-c as the important lipoproteins estimated in the present study of 40 patients of cirrhosis and compared with controls.

Aim of the Study:

To know the lipid profile and lipid peroxidation status anomalies in hepatic cirrhosis.

Material and Methods:

The present study was conducted in Hi-Tech Medical College & Hospital Rourkela, Odisha, India during the period from November 2013 to October 2014. The study protocol was approved by the Ethics committee of Hi-Tech Medical College & Hospital Rourkela. Randomly selected, 40 cirrhosis patients admitted in Hi-Tech Medical College & Hospital, Rourkela along with 40 healthy controls were studied for following parameters.

1. Total Cholesterol (TC) by enzymatic end point CHOD-POD methods.[5]
2. Triglyceride (TG) by enzymatic glycerol phosphate oxidase/peroxidase methods.[6]
3. HDL-Cholesterol by direct enzymatic end point method.[7,8]
4. LDL-Cholesterol by Friedewald's formula.[9]
5. VLDL-Cholesterol by Friedewald'sequtions.

   LDL-c = Tc-HDL-c(TG/5)
6. Measurement of Serum MDA Concentration: Serum MDA was estimated by double heating method. The principle of this method was based on spectrophotometric measurement of color occurring during reaction of thiobarbituric acid (TBA) with MDA. Concentration of TBA reactive substances was calculated by absorbance coefficient of MDA-TBA complex and expressed in nmol /ml.[10]

Statistical analysis:

Data were analyzed by SPSS student t-test and one way ANOVA. A P-value < 0.05 was considered statistically significant.

Results and Discussion:

In the present study, a total of 40 cases and 40 controls were studied. Table 1 shows the different cause of cirrhosis. Chart A shows the percentage of different cause of cirrhotic patients involved in this study. Table 2 shows mean & S.D. of lipid profile and lipid peroxidation in cirrhotic patients compared with the healthy controls:

Table 1. Shows the causes of cirrhosis in study patients

Sr. No.	Causes of cirrhosis	No. of Cases (%)
1.	Alcoholic	21 (52.5)
2.	Infective (B plus C)	10 (25)
3.	Cryptogenic	9 (22.5)
Total		40 (100)

Chart A: Shows percentage of Hepatic Cirrhosis patients

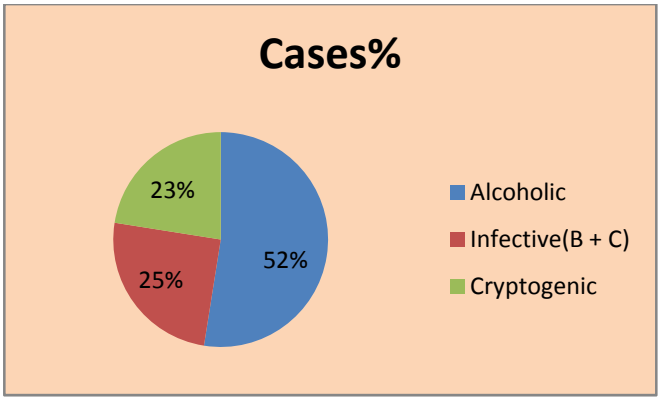

Table 2. Shows mean & S.D. of lipid profile and lipid peroxidation in cirrhotic patients compared with the healthy controls:

Parameters	Cases (n=40)	Controls (n=40)	P-value
Total Cholesterol (mg/dl)	141.5±46.69	192.0±21.31	0.000
TG (mg/dl)	94.3±42.3	192.5±58.6	0.012
HDL-c (mg/dl)	33.50±12.78	41.78±5.04	0.000
LDL-c (mg/dl)	78.48±24.24	103.36±10.44	0.000
VLDL-c (mg/dl)	23.53±15.04	27.52±2.87	0.005
MDA (nmol/ml)	1.8±0.2	0.6±0.19	0.001

***Statistically significant (P-value <0.05)**

Dyslipidemia is a frequent finding in chronic liver disease. Dyslipidemia is also seen in other illnesses like Diabetes Mellitus and chronic renal failure etc. Many national studies are available regarding dyslipidemia in Diabetes Mellitus or Chronic Renal Failure.[11] Chronic liver disease causing disruption of liver tissue and hence derangement of lipid metabolism has been shown in various studies.[12] The present study shows that patients with liver diseases had lower lipid levels and all the parameters of lipid profile as such: TC, TG, HDL-c, LDL-c and VLDL-c were significantly lower in patients with cirrhotic liver compared with control. Similarly, the patients with liver diseases had higher level of lipid peroxidation as compared with control. Lipid peroxidation (LP) refers to oxidative degradation of lipids particularly poly unsaturated lipids of cell wall resulting in cell damage. End products of LP are reactive aldehydes such as malondialdehyde which has been usually estimated to assess the lipid peroxidation status of a person. An increased concentration of end products of LP is the evidence of cellular injury. In case of liver cirrhosis patients in our study there is raised LP status to many folds as compared to healthy controls. Raised LP status in liver cirrhosis patients appear to be important in potentiating the initial tissue damage in early cirrhosis from worse to worst with a ultimate grave prognosis. Besides, the amount of decrease in the serum HDL-c, LDL-c and TC was significant with increasing severity of liver damage. Hepatic cirrhosis treatment includes preventing further damage to the liver, treating its complications, preventing liver cancer or detecting it early and liver transplantation. This decrease in the serum TC and TG levels in patients with cirrhosis of liver compared with healthy control has been observed previously in many other studies, which is expected, as the synthetic functions of the liver are decreased. Study conducted by Perales et al[13] (1997), have shown that in chronic liver disease condition without cholestasis; lipid profile i.e. LDL-c, HDL-c and VLDL-c levels significantly decrease and become worse as the disease progresses. These finding supports our observations that as the liver disease progresses the functioning of liver is affected adversely, causing low levels of LDL-c, HDL-c and TC in patients. Siagris et al[14] (2006) from Greece found lower TC level in patients compared to the comparison group. According to Joel et al[15] (2006) most common cause of cirrhosis is alcoholism accounted for 60 to 70% of cases followed by HBV infection in 10% of cases. In our study 52.5% were alcoholic and 25% were infective and 22.5% cryptogenic respectively (Table 1) which is similar to the finding with Joel et al. In this study we observed decreased levels of TC, TG, HDL-c, LDL-c and VLDL-c in patients with hepatic

cirrhosis. Other study like Taylor et al[16] (1979) also show similar findings. Decrease in lipid levels is also observed in disorders like malabsorption, malnutrition, malignancy and hyperthyroidism. Hence the patients suffering from or diagnosed as having other concomitant illnesses should be excluded from the study.[17]

Conclusion:

These findings suggest that the patients with liver diseases had lower lipid levels and all the parameters of lipid profile as such TC, TG, HDL-c, LDL-c and VLDL-c were significantly lower in patients with hepatic cirrhotic. Similarly, the patients with liver diseases had higher level of lipid peroxidation. An increased concentration of end products of LP is the evidence of cellular injury. Lipid derangements are commonly seen in chronic liver disease. Dyslipidemia is a common finding in chronic liver disease. It helps diagnosis of severity of liver disease and also acts as a good prognostic sign. Estimation of serum lipid profile and lipid peroxidation allows better assessment of hepatic function and evaluation of prognosis of patients with hepatic cirrhosis.

References:

1. Chiang JY. Nuclear receptor regulation of lipid metabolism: potential therapeutics for dyslipidemia, diabetes and chronic heart and liver diseases. Curr Opin Investing Drugs 2005; 6:994-1001.
2. Wolf DC. Cirrhosis: http:/emedicine.medscape.com/article/185856. Overview. (Accessed 22/10/14)
3. Flint A. Experimental research into a new excretory function of the liver. Am J Med Sci 1862;44:305-65.
4. Mclytyre N et al. Plasma lipids and lipoproteins in liver diseases. Gut 1978;19:526-30.
5. Richmond W. Preparation and properties of cholesterol oxidase from Nocardia sp and its application to the enzymatic assay of total cholesterol in serum. Clin Chem 1973;19:1350-6.
6. Foosati P, Prencipe L. Serum triglyceride determined colorimetrically with an enzyme that produce hydrogen peroxide. Clin Chem 1982;28:2077-80.
7. Rifai N, Warnick GR. Laboratory measurements of lipids, lipoproteins and apolipoproteins. AACC press, Washington, DC, USA 1994.
8. Burtis, CA, Ashwood, ER. Tietz Textbook of Clinical Chemistry, 2nd Edition, Saunders, Philadelphia, 1994.
9. Friedewald WT, Levy RI, Fredrickson DS. Clin Chem 1972;18:499.
10. Stocks J, Doromandy TL. The auto oxidation of human red cell lipids induced by hydrogen peroxide. Br. J Haematol 1971;120:98 -111.
11. Amin K, Jayed M, Abid M et al. Pattern of dyslipidemia in patients with CRF. Professional Med J 2006;13:79-86.
12. Wisniewska Ligier M, Wozniakowska Gesicka T, Kups J et al. Lipid metabolism in children with chronic hepatitis C, A preliminary report. Hepaotgastroenterology 2006;53:887-91.
13. Sposito AC, Vinagre CG, Pandullo FL et al. Apolipoprotein and lipid abnormalities in chronic liver failure. Braz J Med Biol Res 1997;30(11):1287-90.
14. Siagris D, Christofidou M, Theocharis GJ et al. Serum lipid pattern in chronic hepatitis C: histological and virological correlations. J Viral Hepat. 2006;13(1):56-61.
15. Heidelbaugh JJ, Bruderly M. Cirrhosis, chronic liver failure: Part-I. Diagnosis & Evaluation American Family Physician 2006;74.
16. Taylor GO, Bamgboye AE. Serum cholesterol and diseases in Nigerians. Am J Clin Nutr 1979;32:2540-5.
17. Andrikoula M, Avades T. Hypolipidaemia is not always indicating liver dysfunction. A review of primary and indicating liver dysfunction. A review of primary and oprotein deficiencies. Minerva Med. 2006;97:487-94.