

Analysis of Serum Lipoproteins, Apolipoproteins in Acute Viral Hepatitis Caused by HBV, HCV

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ABSTRACT

Introduction: Liver is the most important organ which is responsible for formation and clearance of Lipoproteins, Lipids, Apolipoproteins. Acute Viral hepatitis constitute most common among all hepatitis. Estimation of Changes in lipids, lipoproteins, apolipoproteins aid in diagnosis.

Materials and Methods: All the patients were divided into two groups for a comparative study between Viral hepatitis patients and others without any sepsis. They are study group and control group. All patients blood sample has processed for routine examination of Liver function tests, Renal function test, Blood glucose, Detection of viruses, complete blood count, Peripheral smear, Blood coagulation status. HBV and HCV positive samples serum lipid profiles were compared with control subjects and tabulated.

Results: Total Cholesterol (TC), High Density Lipoprotein - Cholesterol (HDL-C), Apolipoprotein A1, Apolipoprotein B levels shown lower levels in study group when compared to control group and in contrast Low Density Cholesterol - Cholesterol (LDL-C) and Triglycerides(TG's) shown higher levels in study group. Total Cholesterol, Triglycerides, HDL-C, LDL-C, Apolipoprotein A1, Apolipoprotein B levels were lower in acute phase than in recovering phase of viral hepatitis.

Conclusion: Assessing this variations in lipidemic levels will help in diagnosing the acute viral hepatitis condition and helps in starting therapy towards prevention of cardiovascular diseases.

Keywords: Lipoproteins, Apolipoproteins, Viral Hepatitis.

INTRODUCTION

Liver is the most important organ which is responsible for formation and clearance of Lipoproteins, Lipids, Apolipoproteins. It receives cholesterol from diet and peripheral tissues by metabolizing of those products, lipoprotein complexes are formed and released into blood circulation.^{1,2}

Lipoprotein are molecular complexes that consist of lipids and proteins (conjugated proteins). They function as transport vehicles for lipids in blood plasma. Lipoproteins deliver the lipid components (cholesterol, Triacylglycerol etc.) to various tissues for utilization. The protein components of lipoproteins are known as Apolipoproteins which recognize the cell membrane surface receptors and also activate enzymes involved in lipoprotein metabolism.³

It was observed that on damage of Liver functions, metabolism of lipids changes in vivo in turn leads to disturbance of the concentrations of lipids and lipoproteins in the blood. Albumin is solely synthesized by liver. Serum albumin is a good marker to assess chronic liver damage. Low serum albumin is commonly observed in patients with severe liver damage.³ Based on these documentations, changes in lipids, lipoproteins, apolipoproteins can be considered as a diagnostic factors for liver damage conditions.

Hepatitis which is a general term referred to as inflammation of the liver. Hepatitis may occur due to various infectious or noninfectious causes. In this study Acute viral hepatitis is considered which accounts for more than 50% of cases of acute hepatitis in the United states.

Acute viral hepatitis causing etiological factors most commonly are all Hepatotrophic viruses (Hepatitis A virus, Hepatitis B virus, Hepatitis C virus, Hepatitis D virus, Hepatitis E virus). Among them Hepatitis B and Hepatitis C viruses are causing major public health problem. Nearly two billion people in the world have been acutely infected by HBV and there are nearly 350 million people chronically infected with HBV.⁴⁻⁶ Among HCV there are an estimated 170-200 million people all over the world.⁷ Hepatitis B and Hepatitis C viruses can lead to chronic infection. Chronic hepatitis carriers remain infectious and may transmit the disease for many years.⁸

Vaccines to prevent hepatitis B have been available since 1986 and have been incorporated into atleast 177 national immunization programs for children. Hepatitis B immunization is successfully leading in the world. Now-a-days Hepatitis C cases are arising.

Acute Viral hepatitis constitute most common among all hepatitis. Estimation of Changes in lipids, lipoproteins, apolipoproteins aid in diagnosis and also helps in treating the dyslipidemic states and inturn reducing the morbidity due to

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How to cite this article: Sundara Veena Nethala, Geethanjali Anke. Analysis of serum lipoproteins, apolipoproteins in acute viral hepatitis caused by HBV, HCV. International Journal of Contemporary Medical Research 2016;3(1):73-76.

conditions like coronary heart disease. The present study has done to detect the alterations in serum lipids in acute viral hepatitis patients.

MATERIALS AND METHODS

We did this randomized study at Siddhartha Medical College among patients attending medicine, surgery departments considering both sexes. Informed consent has taken from all patients. All the patients were divided into two groups for a comparative study between Viral hepatitis patients and others without any sepsis. They are study group and control group.

Study group (60 patients) were those patients who shown positivity to HBV or HCV. Control group (60 patients) were those patients who admitted to hospitals with complaints other than sepsis like trauma, Diabetes, stroke. Detailed Medical history has taken and complete examination has done.

Patient's blood sample has drawn into test tubes in the early morning as fasting sample and stored at 4°C until proceeds for serum lipid profile estimation and detection of viruses. All patients blood sample has processed for routine examination of Liver function tests, Renal function test, Blood glucose, Detection of viruses, complete blood count, Peripheral smear, Blood coagulation status.

Detection of Viruses

HBV and HCV viruses estimation has done using lateral flow Immunochromatographic method by Anti HBsAg and Anti HCV antibodies in the serum.

Serum Lipid Profile estimation has done by following methods:

1. Estimation of serum total cholesterol (TC) by cholesterol oxidase / phenol aminoantipyrine method.
 2. Estimation of serum triglycerides (TG) by glycerol phosphate oxidase – phenol aminoantipyrine method.
 3. Estimation of serum High density lipoprotein (HDL) by cholesterol oxidase / phenol aminoantipyrine method.
 4. Estimation of serum Low density lipoprotein (LDL) by Friedewald formula
 5. Estimation of Apolipoprotein A1 and Apolipoprotein B were estimated by immunological turbidimetry method.
- HBV and HCV positive samples serum lipid profiles were compared with control subjects and tabulated.

STATISTICAL ANALYSIS

Statistical Significance was calculated by t value, df and P value using Graphpad software.

RESULTS

Study group (60 patients) were those patients who shown positivity to HBV or HCV. Control group (60 patients) were

those patients who admitted with problems other than hepatitis symptoms.

Control group were selected such that sex and age should correlate with study group (Table No:1). In this study the mean age group of both study and control group was about 34.5(±2.8).

Seroprevalence of AntiHBsAg was 88.3%(53 patients) and Anti HCV positivity was 11.6% (7patients). Serum Lipid profile status among HBV and HCV patients are almost similar.

Serum lipid profile has compared between Study group and Control Group and depicted in Table No:2

Total Cholesterol (TC), High Density Lipoprotein - Cholesterol (HDL-C), Apolipoprotein A1, Apolipoprotein B levels shown higher levels in study group when compared to control group and in contrast Low Density Cholesterol - Cholesterol (LDL-C) and Triglycerides (TG's) shown lower levels in study group.

All the lipoproteins and apolipoproteins in acute viral hepatitis Statistically significance was estimated (Table No:3).

Total Cholesterol, Triglycerides, HDL-C, LDL-C, Apolipoprotein A1, Apolipoprotein B levels were lower in acute phase than in recovering phase of viral hepatitis.

DISCUSSION

Liver is the most important organ for metabolism of lipoproteins and apolipoproteins. Hepatitis refers to inflammation of liver, condition which alters the metabolism of lipids *in vivo*. Acute viral hepatitis has become most important and causing public health issue. Diagnosing viral hepatitis now-a-days is not such a problematic condition because of availability of many rapid diagnostic kits based on Immunochromatographic principle and also ELISA tests are available with more sensitivity and specificity.

S.No.	Characteristics	Study group	Control group
1	Number of cases	60	60
2	Age	34.5(±2.8)	34.8(±1.5)
3	Males	41	41
4	Females	19	19
<i>P</i> value has calculated using Graphpad software, it is statistically not significant			
Table-1: Showing Mean Age and Sex distribution.			

S.No.	Serum Lipids	Study group (n=60) Mean ± S.D	Control group (n=60) Mean ± S.D
1	Total Cholesterol	165.7±2.3	205.7±3.4
2	Triglycerides	160.4±2.3	154.6±5.6
3	HDL-C	44.7±8.5	45.2±7.6
4	LDL-C	101.4±2.3	93.7±3.8
5	Apolipoprotein A1	108.2±6.5	119.5±2.9
6	Apolipoprotein B	110.2±7.2	118.6±5.6
Table-2: Comparing of Serum Lipid profile among study and control group			

S.No.	Serum Lipids	t value	df	P value	Significance
1	Total Cholesterol	75.4807	118	< 0.0001	ESS
2	Triglycerides	7.4211	118	< 0.0001	ESS
3	HDL-C	0.3397	118	0.7347	NSS
4	LDL-C	13.4277	118	< 0.0001	ESS
5	Apolipoprotein A1	12.2976	118	< 0.0001	ESS
6	Apolipoprotein B	7.1333	118	< 0.0001	ESS

ESS-Extremely Statistically significant; NSS-Not Statistically significant.

Table-3: Showing Statistical significance of serum lipid profile estimation

Estimation of changes in levels of lipoprotein and apolipoproteins are also aid in the diagnosis of acute viral hepatitis cases as well as useful in prognostic assessment.

In the present study age, sex of control group selected such that those match well with study group. In the study group those patients who were either HBV or HCV positive were selected for estimation of lipids. Among all patients serum liver enzymes such as AST, ALT and GGT were raised. Blood coagulation status of patients were within limits.

As per this study, Total Cholesterol (TC), High Density Lipoprotein - Cholesterol (HDL-C), Apolipoprotein A1, Apolipoprotein B levels shown lower levels in study group when compared to control group and in contrast Low Density Cholesterol - Cholesterol (LDL-C) and Triglycerides(TG's) shown higher levels in study group. All the lipoproteins and apolipoproteins except LDL-C levels in acute viral hepatitis were extremely statistically significant when compared to normal subjects.

Concepcion Alvarez et al⁹ reported that decrease in Total Cholesterol, HDL-C during sepsis especially in viral infections and there is increase in Triglycerides, decrease in Apolipoprotein A1, Apolipoprotein B during sepsis. Libo luo et al¹⁰ reported that total cholesterol, HDL-C and apoA1 were decreased significantly in acute hepatitis cases when compared to normal subjects and increase in Triglycerides and LDL-C among patients than in normal subjects.

In contrast to the present study, Maggi et al,¹¹ Fabris et al,¹² Serfaty et al¹³ reported that there is increase in total cholesterol and whereas, decrease in LDL levels in HCV infected patients compared to control groups. Marzouk et al¹⁴ reported lower prevalence of Triglycerides among HCV patients. Supporting to these studies Ehab H Nashaat¹⁵ documented that decrease in Total Cholesterol, LDL, Triglycerides among HCV patients.

We observed that Total Cholesterol, Triglycerides, HDL-C, LDL-C, Apolipoprotein A1, Apolipoprotein B levels were lower in acute phase than in recovering phase of viral hepatitis.

Concepcion Alvarez et al⁹ documented the return of serum lipids to more normal concentration parallels the recovery from sepsis. Libo luo et al¹⁰ documented as plasma levels of Total Cholesterol, HDL-C, LDL-C and apoA1 were lower at the active phase of the diseases than at the recovering phase and reported that lipid metabolism in vivo was influenced by acute liver damage significantly.

CONCLUSION

Acute Viral Hepatitis patients has lower levels of Total cholesterol, HDL-C, apoA1 and apoB than noninfected patients. Triglycerides, LDL-C were higher in acute viral hepatitis patients when compared to noninfected patients. Assessing this variations in lipidemic levels will help in diagnosing the acute viral hepatitis condition and helps in starting therapy towards prevention of cardiovascular diseases.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 16-11-2015; **Published online:** 01-12-2015