



## Assessment of cases of acute viral hepatitis in correspondence with serum lipid levels: An analytical study

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### Abstract

**Introduction:** Acute viral hepatitis (AVH) continues to be a major public health burden in developing countries like India. Studies have previously documented a variable prevalence of hepatotropic viruses: Hepatitis A Virus (HAV) (1.7- 67%), Hepatitis B Virus (HBV) (7.3- 42%), Hepatitis C Virus (HCV) (1.16- 10.6%) and HEV (Hepatitis E Virus) (16.3- 66.3%)<sup>[2,4]</sup>. As liver is an essential organ in lipid metabolism, several stages of lipid synthesis and transportation. Therefore, it is reasonable to expect an abnormal lipid profile in those with severe liver dysfunction. In the setting of acute or chronic hepatic dysfunction circulating lipids and lipoproteins are altered with respect to quantity as well as electrophoretic mobility and appearance. For reduced liver biosynthesis capacity, low levels of TG and cholesterol is usually observed in chronic liver diseases. This present study was conducted to assess the correlation between acute viral hepatitis with serum cholesterol and serum triglyceride values.

**Methods:** this is a case control analytical study, conducted among 50 presumptive cases of acute viral hepatitis, who admitted under department of general medicine, MGM Medical College & LSK Hospital, Kishanganj, Bihar during the period of April 2022 to January 2023. Probable cases of acute viral hepatitis having clinical symptoms suggestive of hepatitis or liver Function Test Reports consistent with Acute Viral Hepatitis, And those cases that were sero-positive for either Hepatitis-A, B, C or E were included in the present study. Similar number of controls (n=50) were selected in the present study. All the controls were matched for non-modifiable risk factors such as gender and age.

**Results:** In this present study, patients with acute viral hepatitis at time of acute phase, Serum cholesterol, triglycerides, low density lipoprotein (LDL) were significantly higher ( $p < 0.01$ ) while high density lipoprotein (HDL) was significantly lower ( $p < 0.01$ ) in acute viral hepatitis compared to controls. Baseline parameters were similar between cases and controls ( $p > 0.05$ ). Jaundice (100%) and high coloured urine (100%) were the commonest presentations. Hepatitis A virus (56%) and Hepatitis E virus (32%) were commonest aetiological agents. There was no statistically significant difference in the levels of very LDL between cases and controls ( $p > 0.05$ ). Complications were seen in 8 (16%) cases with hepatic encephalopathy being the commonest 4 cases (8%). Serum cholesterol, triglycerides, LDL were significantly higher and HDL was significantly lower in hepatitis with complications compared to uncomplicated hepatitis ( $p < 0.01$ ).

**Conclusions:** Acute viral hepatitis leads to significant alterations of serum lipid levels in blood. While total cholesterol, triglycerides and low density lipoprotein levels are higher, the levels of high density lipoproteins are lower during acute phase of viral hepatitis compared to controls.

**Keywords:** Acute viral Hepatitis, serum lipids.

## Introduction

Liver is the principal organ involved in metabolism of lipids, lipoproteins and apolipoproteins. In physiological circumstances most plasma endogenous lipids & lipoproteins are synthesized in liver and then are secreted into the blood circulation<sup>[1,2],[3]</sup>. According to previous researches, chronic liver disease with dysfunction interfere with lipid metabolism and it may alter plasma lipid and lipoprotein levels<sup>[4]</sup>.

Acute hepatitis may be defined by an inflammatory process of the liver persisting for less than six months. Hepatitis 'C' virus (HCV) belonged to genus Hepacivirus, hepatitis B virus (HBV) or HCV accounts approximately 78 % of hepatocellular carcinoma (HCC)<sup>[1],[2]</sup>. As liver plays an important role in lipid metabolism, several stages of lipid synthesis and transportation. Therefore, it is understandable to expect an abnormal lipid profile in those with severe liver dysfunction.

In clinical, the course of acute hepatitis may vary from mild symptom that does not require treatment to the fulminant hepatic failure that needs emergency liver transplantation. Acute viral hepatitis is more common to be asymptomatic in younger people. In addition, acute hepatitis may occur less commonly with infections such as Epstein-Barr virus, cytomegalovirus, adenovirus, herpes simplex and Coxsackie virus or with other non-infectious reasons. It is been demonstrated that in the acute and/or chronic liver diseases, hepatic function could be altered and the lipids & lipoproteins are not only present in abnormal amounts but they frequently also have abnormal composition including electrophoretic mobility and appearance.

Some researchers also found relationships between Hepatitis C and serum lipid levels. According to them, Lower serum cholesterol and LDL levels are found in patients infected with hepatitis C when compared with patients with hepatitis B or without infection. Recent studies have shown that chronic hepatitis C infection is

associated with decrease in cholesterol and LDL when compared with matched control subjects.

The present study was conducted to assess the patterns of lipid abnormalities in patient with acute viral hepatitis.

## Materials and Methods

It was a case control analytical study, conducted among 50 presumptive cases of acute viral hepatitis, who were admitted under medicine department, MGM Medical College & LSK Hospital, Kishanganj, Bihar during the period of April 2022 to January 2023.

Probable cases of acute viral hepatitis having clinical symptoms suggestive of hepatitis or liver Function Test Reports consistent with Acute Viral Hepatitis, and those cases that were sero-positive for either Hepatitis-A, B, C or E were included in the present study. Similar number of controls (n=50) were selected in the present study. All the controls were matched for non-modifiable risk factors such as age, gender.

## Inclusion Criteria

### Cases

50 Probable cases of acute viral hepatitis with clinical symptoms suggestive of hepatitis or liver consistent with Acute Viral Hepatitis, and those cases that were sero-positive for either Hepatitis-A, B, C or E, admitted under department of medicine, in a hospital were selected randomly (simple random sampling) and included in the current study.

#### ● Possible cases of Acute Viral Hepatitis

Symptoms such as anorexia, nausea, vomiting, alteration of taste, arthralgia, prodromal phase. High coloured urine, Pale colourstool, Yellow eyes, Abdominal pain and Pruritus in Icteric phase and Liver consistent with Acute Viral Hepatitis.

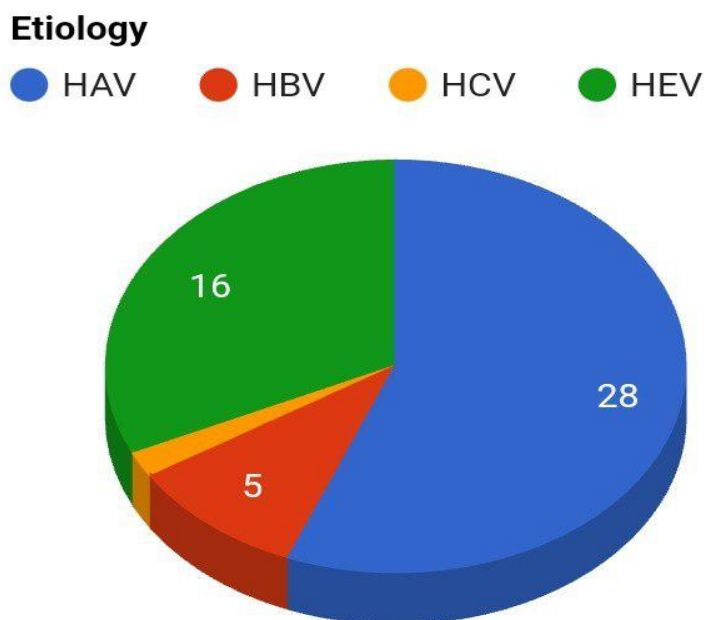
#### ● Recovering Phase of Acute Viral Hepatitis

Absence of constitutional symptoms like anorexia, nausea, vomiting, fatigue, malaise and arthralgia. All the patients were enrolled after written and informed consent. Detailed history was taken. Thorough general and systemic

examination was carried out. All findings were recorded in the Patient's Proforma. Investigations, as mentioned in the Patient's Proforma, were carried out on admission and during recovering phase of acute viral hepatitis.

Fasting serum lipid profile levels of study group were compared with controls two times, once during the acute phase and then in the recovering phase of viral hepatitis.

**Figure 1:** Etiological agent of acute viral hepatitis: Serotype of hepatitis



#### Exclusion Criteria

- Alcoholic
- Hepatitis due to other causes
- Pregnancy
- Cirrhosis of liver
- Diabetes Mellitus
- Thyroid dysfunction

#### Controls

50 healthy controls, without any clinical symptoms or liver function suggestive of acute viral hepatitis and sero-negative for hepatitis A, B, C, or E, were selected in the present study. All the controls were matched for non-modifiable risk factors such as age, gender. All the controls were selected randomly from the outpatient department under the department of medicine.

#### Statistical Methods

Statistical Analyses were done using Statistical Package for Social Survey (SPSS) for Windows version 17.0. A 'p value' <0.05 was considered as statistically significant. The results were tabulated and graphically represented using Microsoft Office for Windows 2008.

#### Results

The present study is conducted among 50 probable cases of acute viral hepatitis admitted under the department of general medicine MGM Medical College & LSK Hospital, Kishanganj, Bihar, In this study, age of patients was ranging from 18-70 years. The maximum incidence of acute viral hepatitis was in 3rd decade (50%). Age group distribution was almost equal in both groups. Differences of age between two groups were not significant (P value > 0.05). Out of 50

both among cases and controls, 24 were male and 26 were female and 22 male and 28 female

respectively. Sex distributions in case and control groups were comparable.(Table 1)

**Table 1:** Sex distribution of cases and controls

Sex	Cases No (%)	Controls No (%)	P Value
Male	24 (48%)	22 (44%)	>0.05
Female	26 (52%)	28 (56%)	>0.05
Total	50 (100%)	50(100%)	>0.05

In this study, HAV infection 56% (28) cases was found to be the most common viral infection followed by 32% (16) cases of HEV infection, HBV infection 10% (5) cases and HCV infection 2% (1) cases.(Figure 1). In this study, the majority of the cases presented with jaundice 100% (50)

cases and dark yellow urine 100% (50) cases, followed by anorexia 90% (45) cases and nausea/vomiting, fever in 70% (35) cases, pain abdomen 30% (15) cases ,and pruritus was noted in 20% (10) cases. (Table 2)

**Table 2:** Clinical manifestations of patients with acute viral hepatitis

Clinical Presentation	No. of Cases	Percentage (%)
Anorexia	45	90%
Nausea/ Vomiting	35	70 %
Fever	35	70 %
Jaundice	50	100%
Yellow Urine	50	100 %
Abdominal Pain	15	30 %
Pruritus	10	20 %
Splenomegaly	07	14%
Hepatomegaly	36	72%

Patients with acute viral hepatitis had a significantly higher level of serum bilirubin and alanine transaminase ( $p<0.01$ ) (Table 4).

**Table 4:** Liver function tests in patients with acute viral hepatitis and controls

Parameter	Cases	Controls	P value
Mean Total Serum Bilirubin	9.92±4.66	0.749±0.36	<0.01
Mean Alanine Transaminase (ALT)	965.16±14.40	49.40±15.21	<0.01

Serum lipid profile with respect to total serum cholesterol, triglycerides, high density lipoprotein, low density lipoprotein and very low density lipoprotein of the patients with acute viral hepatitis and the controls are shown in Table 5. Serum cholesterol, triglycerides, low density lipoprotein were significantly higher ( $p<0.01$ ) in

patients with acute viral hepatitis while high density lipoprotein was significantly lower ( $p<0.01$ ), compared to controls. There was no statistically significant difference in the levels of very low density lipoprotein between the two groups.

**Table 5:** Serum lipid profiles of patient with acute viral hepatitis and controls

Parameter	Cases	Controls	P Value
Total Cholesterol	228.86±31.36	90.66±25.19	<0.01
Serum triglycerides	166.8±71.88	112.19±25.19	<0.01
High density Lipoprotein	13.31±6.69	48.18±9.37	<0.01
Low density Lipoprotein	149.99±28.83	78.10±21.92	<0.01
Very low density Lipoprotein	28.44±9.46	30.54±12.17	0.3381

Complications were seen in 8 (16%) of the cases of hepatitis with hepatic encephalopathy being the commonest (8%) (Table 3). Serum cholesterol, triglyceride and LDL levels were

significantly higher in patients with complications and HDL were significantly lower ( $p < 0.01$ ) in comparison to those with uncomplicated hepatitis.

**Table 3:** Complication in acute viral hepatitis

Complications	No. of Cases (n)	%
Hepatic encephalopathy	4	8
Fulminant hepatic failure	2	4
Bleeding	2	4
Hepato renal syndrome	0	0

## Discussion

The present study is conducted among probable cases of acute viral hepatitis, with an objectives to study clinical presentations of various acute viral hepatitis (viz. Hepatitis A, B, C, and E), and hence to correlate the diagnosis with liver profile levels. In this study we enrolled total 50 cases and 50 controls, who were matched for age, gender and risk factors. In our study the cases of acute viral hepatitis were matched with appropriate controls which form an essential pre-requisite prior to comparison of differences in lipid profiles. Hepatitis A virus was the commonest aetiological agent followed by Hepatitis E virus. Similar results have been documented in previous studies from India<sup>[9,10]</sup>.

All the patients of acute hepatitis were icteric and had high coloured urine. The other common symptoms were anorexia, nausea and vomiting, hepatomegaly and fever. A previous study from India also has shown similar results with jaundice being the commonest symptom<sup>[9]</sup>.

The alterations in the serum lipid fractions showed significant differences in patients with acute viral hepatitis and those without in our side. While, total cholesterol, triglycerides and low density lipoprotein levels were significantly higher in patients with hepatitis the levels of high density lipoproteins were significantly lower. In as early as 1862, Austin Flint suggested that blood cholesterol level were raised in hepatic<sup>[7]</sup>. However, in another study it was shown that total cholesterol levels were lower in patients with acute viral hepatitis<sup>[6]</sup>. Elevated levels of serum triglycerides and very low density lipoproteins in acute hepatitis have also been documented in a previous study which is in conjunction with our findings<sup>[5]</sup>.

In this study, out of 50 patients of acute viral hepatitis, 8%(4) developed hepatic encephalopathy which was the most common complication of acute viral hepatitis, followed by bleeding in 4% (2), fulminant hepatic failure in 4% (2), and no cases of hepato renal syndrome

noted; while Bhattacharya et al<sup>[3]</sup> study showed similar results with most common complication being hepatic encephalopathy present in 6% cases, followed by GI bleed and fulminant hepatic failure in 4% cases.

Low levels of high density lipoproteins as documented in our study have also been reported from previous studies<sup>[5,6]</sup>. According to available literature high density lipoprotein may serve as one of the best indicator of liver damage<sup>[5,6]</sup>. While evaluating liver functions literature suggests that an overall combination of prothrombin activity, serum bilirubin and hepatic transaminase levels and the high density lipoprotein fraction may serve to provide a useful index for evaluating the prognosis in acute hepatitis<sup>[5]</sup>.

### Conclusions

In acute phase of viral hepatitis there is a significant alterations of the lipid levels in blood. While total cholesterol, triglycerides and low density lipoprotein levels are higher, the levels of high density lipoproteins are lower. Variations in lipid fractions may serve as an indicator of severity of liver damage and be helpful in assessing the prognosis of patients with acute viral hepatitis.

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