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# A Study of the Clinical and Biochemical Profile of Acute Viral Hepatitis

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## Abstract

**Aim:** This study was performed to compare the clinical, biochemical and etiological properties of acute viral hepatitis (AVH) and to compare clinical and laboratory parameters of faeco-orally transmitted hepatitis: hepatitis A+ hepatitis E (A+E) with hematologicaly transmitted hepatitis: Hepatitis B, C, D (B+C+D).

**Material and Methods:** Biochemical and clinical data were collected from 40 patients with AVH. They were tested for hepatitis B surface antigen (HBsAg), IgM anti-Hepatitis A virus (Immunoglobulin M HAV), IgM anti-HBc (Immunoglobulin M hepatitis B core antigen), IgM anti- hepatitis D (Immunoglobulin M HDV), or IgM anti- hepatitis C (Immunoglobulin M HCV). Finally $X^2$ test was used to analysis of data.

**Results:** Most patients were young adults and presented with jaundice and other constitutional features, although anicteric hepatitis was also seen. Hepatitis E was the most common AVH. Malaise, fever, icterus, vomiting and nausea were significantly more in Hepatitis A +E compared with Hepatitis B + C in acute course. Serum bilirubin both total and direct was significantly elevated in hepatitis A + E compared with Hepatitis B + C in acute course.

**Conclusions:** Hepatitis E was the most common AVH .There were some differences in clinical and laboratory findings regarding to the etiology but it does not necessarily distinguish one cause of hepatitis from another.

**Keywords:** Acute viral hepatitis , hepatitis E, hepatitis B, hepatitis C, hepatitis A, hepatitis D.

## 1. Introduction

Acute viral hepatitis (AVH) is a systemic infection affecting liver predominantly. AVH is caused by any of several agents and presents as a syndrome ranging from entirely subclinical and inapparent to rapidly progressive and fulminant liver failure.[1] Almost all cases of viral hepatitis are caused by one of the five viral agents hepatitis viruses A, B, C, D and E [1]. Risk factors for AVH may be contacts, recent travel, tattooing, dental treatment, blood transfusion, sexual preference, ingestion of shell fish etc [2].

AVH is a major public health problem in India. India has intermediate HBV endemicity, with a carrier frequency of 2%-4%. Seroprevalence studies reveal that 90%-100% of the population acquires anti-HAV antibody and becomes immune by adolescence. HEV is also the major cause of sporadic adult acute viral hepatitis and fulminant hepatic failure.[3] In Maharashtra the incidence of Hepatitis E is increasing over the years. National Institute of Virology found an alarming increase in prevalence of Hepatitis A and E in Mutha River, Pune over the last 8 yrs.[4]

In general, hepatitis type A and type E run the same clinical course and hepatitis B and C may be associated with serum sickness like syndrome. Hepatitis E is generally self limited and is mostly symptomatic in the age group of 15-45 years. Hepatitis A and E is transmitted mainly by faeco-oral route while Hepatitis B, C and D through parenteral route. Hepatitis B and C are the major causes of transfusion transmitted hepatitis and continue to be a major cause of chronic liver disease throughout the world.[2]

Hepatitis affects the quality of life in acute as

well as in chronic course. Acute hepatitis tends to be a prolonged illness and accounts for many days lost from work in the most productive age groups. The aim of the study was to assess the clinical profile of patients presenting with acute viral hepatitis, identify the type of virus and assess biochemical parameters, severity and complications of this common illness so that primary care physicians are aware of its manifestations.

## 2. Materials and Methods

Type of study was prospective observational study. Patients more than 12 years old ,with history of recent onset yellowish discoloration of skin, sclera and urine or with other prodromal symptoms of acute viral hepatitis with laboratory evidence of raised SGPT>40IU/L were subjected to serological examination. Those with positive serology for HAV, HBV, HCV, HDV and HEV were included in this study. Patients with underlying chronic liver disease, patients with negative serological disease, patients with drug induced hepatitis, alcoholic hepatitis, cholestatic hepatitis of pregnancy, hepatitis due to metabolic disease and hepatitis due to multisystem failure and seronegative patients were excluded.

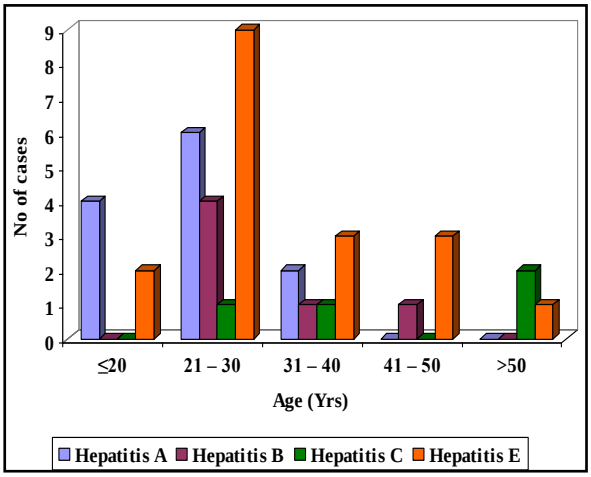
Forty patients admitted over a one year period were taken for the study. All patients were diagnosed as viral hepatitis by clinical symptoms and signs with liver function tests indicating hepatocellular damage and through serological tests. All patients were asked about prodromal symptoms like malaise, weakness, anorexia, nausea, vomiting, pain in abdomen and uncommon symptoms like sore throat, nasal discharge and diarrhoea. The patients were asked direct questions about the presence of rash, itching, joint pains and clay or light colored faeces. More stress was given on diminution or loss of appetite, especially for fatty food and distaste for smoking. Any noticeable loss of weight was recorded. Inquiry was made regarding the colour of urine, faeces and sclera at the onset and as the illness progressed. The duration of each of the symptoms and especially their relation of the appearance of jaundice was noted. Recent and past history of any injections, blood transfusion, and vaccination was elicited. Past history of jaundice and any other major illness was also asked for. Physical examination was done to see the characteristic features of viral hepatitis such as icterus, its degree, lymphadenopathy, pallor and other general examination findings like pulse, blood pressure and edema were seen. Spider naevi, purpuric spots, scratch marks and palmar erythema were also looked for. Abdomen was palpated to see the tenderness and enlargement of liver, splenomegaly and ascites. Signs of liver cell failure like fetor hepaticus, spiders, gynecomastia, testicular atrophy, and of hepatic encephalopathy like abnormal behaviour, flapping tremors were also looked for. Other systemic examination was done to find out if any associated abnormalities in respiratory, cardiovascular or central nervous system were present.

Laboratory evaluation consisted of hemogram, blood indices, and detailed liver function tests including bilirubin, alanine and aspartate transaminases, alkaline phosphatase, serum proteins, prothrombin time, blood sugars, renal function tests, and ultrasound. HAV, HEV, HBV, HCV and HBsAg were done at the time of inclusion of patients. These tests were done by ELISA method on serum. $X^2$ test was used to analyse the data. Odds ratio (OR) for few variables was calculated by univariate and multivariate logistic regression.

## 3. Results

Maximum numbers of patients were young adults and most common age group was 21-30 years. (Figure 1)

**Figure 1: Age wise distribution of cases**




More males (70%) than females were affected.(Table 1)

**Table 1: Sex wise distribution of cases**

| Sex | No of cases | Percentage |
|---|---|---|
| **Male** | 28 | 70 |
| **Female** | 12 | 30 |
| **Total** | 40 | 100 |

Fever, malaise, yellowish discolouration of eyes, anorexia, nausea and vomiting, generalised weakness were common symptoms. Anicteric hepatitis was observed in 7 patients (17.5%) out of which 4 were hepatitis C, 2 were hepatitis B and 1 was hepatitis A. Icterus was the most common sign followed by tender hepatomegaly. (Figure 2), (Table 2)

**Figure 2: Bar Diagram showing symptoms wise distribution of cases in study group**

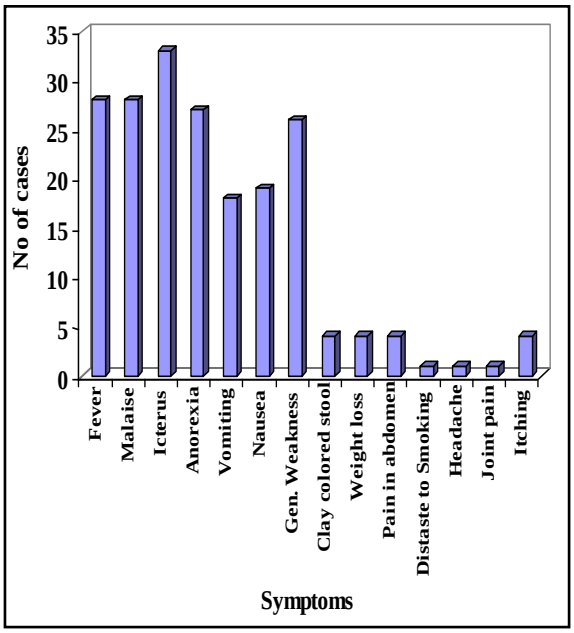



**Table 2: Sign Wise Distribution of Cases**

| Sign | No of cases | Percentage (n=40) |
|---|---|---|
| **Tender Hepatomegaly** | 14 | 35 |
| **Icterus** | 33 | 82.50 |
| **Pallor** | 13 | 32.50 |
| **Pedal oedema** | 5 | 12.50 |
| **KF ring** | 1 | 2.50 |

Haemoglobin was slightly on lower side for 16 patients. Total leukocyte count and platelets were in normal range for maximum patients. (Table 3)

**Table 3: Hematological tests in cases**

| Hematological test | | No of cases | % (n=40) |
|---|---|---|---|
| **Hb** | ≤10 gm% | 16 | 40 |
| | >10 gm% | 24 | 60 |
| **PLT** | ≥1.5 lakh | 36 | 90 |
| | <1.5 lakh | 4 | 10 |
| **TLC** | <4000 | 2 | 5 |
| | 4000 – 11000 | 35 | 87.50 |
| | >11000 | 3 | 7.50 |

Direct hyperbilurubinemia was seen in 95% of patients and liver enzymes were elevated in all the patients. (Table 4)

**Table 4: Liver function tests in cases**

| Liver function test | | No. of cases | % (n=40) |
|---|---|---|---|
| **Sr. Bilirubin Total** | 0.2 – 1 | 2 | 5 |
| | >1 | 38 | 95 |
| **Sr. Bilirubin Direct** | 0.3 – 0.8 mg/dl | 5 | 12.50 |
| | >0.8 | 35 | 87.50 |
| **Sr. protein total** | 6 – 8 gm% | 32 | 80 |
| | <6 | 8 | 20 |
| **Sr. Albumin** | 3.5 – 4.5 gm% | 25 | 62.50 |
| | <3.5 | 15 | 37.50 |
| **Sr. Globulin** | 2.5 – 3.5 gm% | 32 | 80 |
| | >3.5 | 8 | 20 |
| **SGPT** | 0 – 40 IU/l | 0 | 0 |
| | >40 | 40 | 100 |
| **SGOT** | 0 – 40 IU/l | 0 | 0 |
| | >40 | 40 | 100 |
| **Alkaline phosphatase** | 25 – 90 IU/l | 24 | 60 |
| | >90 | 16 | 40 |
| | >180 | 4 | 10 |
| **PT INR** | ≤1.2 | 28 | 70 |
| | >1.2 | 12 | 30 |

Transaminases were remarkably raised (above 1000mg/dl) in hepatitis A and E (Figure 3).

**Figure 3: Bar Diagram Showing SGPT and diagnosis wise distribution of cases in study group**

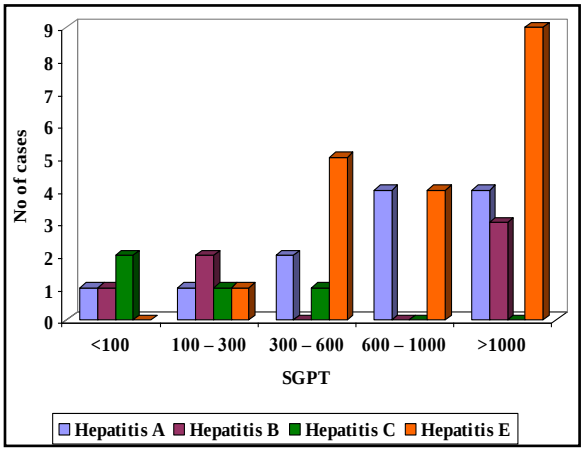
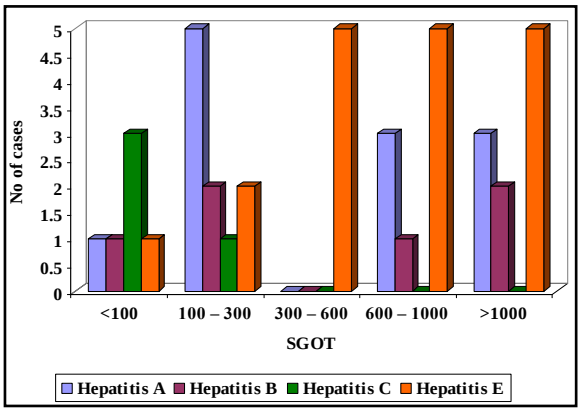


**Figure 4: Bar diagram showing SGOT and diagnosis wise distribution of cases in study group**




Hepatitis E was the most common hepatitis in this study. (Table 5)

**Table 5: Diagnosis wise distribution of cases**

| Diagnosis | No. of Cases | Percentage |
|---|---|---|
| **Hepatitis A** | 12 | 30 |
| **Hepatitis B** | 6 | 15 |
| **Hepatitis C** | 4 | 10 |
| **Hepatitis E** | 18 | 45 |
| **Total** | 40 | 100 |

Hypoalbuminemia, coagulopathy and anemia were the most common complications while renal failure and ascites were rare. 3 patients had renal failure of which 1 each had hepatitis A, B and C. (Table 6)

**Table 6: Complication wise distribution of cases**

| Complication | No of cases | Percentage (n=40) |
|---|---|---|
| **Hypoalbuminemia** | 15 | 37.50 |
| **Anemia** | 11 | 27.50 |
| **Ascitis** | 1 | 2.50 |
| **Septic shock** | 1 | 2.50 |
| **Acute kidney injury** | 3 | 7.50 |
| **Coagulopathy** | 12 | 30 |

Fever was seen in 24 cases in hepatitis A and E and 4 cases in hepatitis B and C. Malaise was seen in 26 cases in hepatitis A and E and 2 cases in hepatitis B and C. Icterus was seen in 29 cases in hepatitis A and E and 4 cases in hepatitis B and C. vomiting was seen in 17 cases in hepatitis A and E and 1 case in hepatitis B and C. Nausea was seen in 17 cases in hepatitis A and E and 2 cases in hepatitis B and C. (Table 7). To test whether this difference was statistically significant or not, chi-square test was used as test of significance. P values < 0.05 were taken as significant. According to this, fever, malaise, icterus, vomiting, nausea and pedal oedema were significantly more in hepatitis A+E.

**Table 7: Comparison of symptoms in hepatitis A+E and hepatitis B+C group**

| Symptom | Hepatitis AE (n=30) | Hepatitis BC (n=10) | Chi-square | OR (95%CI) |
|---|---|---|---|---|
| **Tender Hepatomegaly** | 12 | 2 | 0.58 | 2.67(0.48-14.79) |
| **Splenomegaly** | 3 | 0 | 0.12 | - |
| **Fever** | 24 | 4 | 5.71 * | 6 (1.27-28.26) |
| **Malaise** | 26 | 2 | 15.87 ** | 26 (3.99-169.25) |
| **Icterus** | 29 | 4 | 16.68 ** | 43.5(4.1-461.21) |
| **Anorexia** | 22 | 5 | 1.86 | 2.75(0.63-12.09) |
| **Vomiting** | 17 | 1 | 5.59 * | 11.8(1.32-105.01) |
| **Nausea** | 17 | 2 | 4.04 * | 5.23(0.95- 28.91) |
| **Gen. Weakness** | 22 | 4 | 3.66 | 4.12(0.92-18.52) |
| **Clay colored stool** | 3 | 1 | 0.37 | 1(0.09-10.87) |
| **Weight loss** | 2 | 2 | 1.48 | 0.29(0.03-2.36) |
| **Pain in abdomen** | 2 | 2 | 1.48 | 0.29(0.03-2.36) |
| **Pallor** | 9 | 4 | 0.34 | 0.65(0.14-2.84) |
| **Pedal oedema** | 0 | 4 | 13.33 ** | - |
| **Itching** | 3 | 1 | 0.37 | 1(0.09-10.87) |

*P<0.05, **P<0.0001

Mean serum bilirubin (total) was 8.94 (± 8.72) in hepatitis A and E and 2.06 (± 0.91) in hepatitis B and C. Mean serum bilirubin (direct) was 5.48 (± 4.90) in hepatitis A and E and 1.18 (± 0.88) in hepatitis B and C. This difference was analyzed and found to be statistically significant. (p<0.05) (Table 8)

**Table 8: Comparison of liver function test in hepatitis A+E and hepatitis B+C**

| LFT | Hepatitis A and E (n=30) | | Hepatitis B and C (n=10) | | Chi-square | P Value |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | |
| **Sr. Bilirubin Total** | 8.94 | 8.72 | 2.06 | 0.91 | 2.47 | <0.05 |
| **Sr. Bilirubin Direct** | 5.48 | 4.90 | 1.18 | 0.88 | 2.74 | <0.01 |
| **SGPT** | 1130.23 | 893.06 | 584.40 | 712.96 | 1.75 | >0.05 |
| **SGOT** | 877.67 | 832.32 | 573.60 | 821.03 | 1.004 | >0.05 |
| **Alkaline phosphates** | 142.27 | 179.69 | 162.80 | 119.65 | 0.34 | >0.05 |
| **PT INR** | 1.24 | 0.26 | 1.26 | 0.62 | 0.12 | >0.05 |
| **Total protein** | 6.33 | 0.94 | 6.55 | 0.83 | 0.66 | >0.05 |
| **Sr. Albumin** | 3.45 | 0.58 | 3.61 | 0.44 | 0.78 | >0.05 |
| **Sr. Globulin** | 2.84 | 0.70 | 2.94 | 0.52 | 0.40 | >0.05 |

## 4. Discussion

Acute viral hepatitis is a grave public health problem in India and Maharashtra affecting young, productive population. It accounts for severe morbidity and days lost from work. Even today, hygiene is very poor in many urban and rural parts of this state which is the reason for feco-orally transmitted hepatitis.

In the present study, maximum numbers of patients were in age group of 21 to 30 yrs (50%). Recently a study conducted by Irshad M also found higher incidence in young adults.[5]Males were more affected compared to females in this study. Similar finding was also observed in a study conducted by Zhang *et al* who studied clinical features and risk factors with a large number of sporadic hepatitis patients. Of the two hundred and ten patients, 85.2% were male.[6]

Fever, malaise, generalised weakness and yellow discoloration of eyes were common symptoms of hepatitis in the present study group. Icterus was the commonest sign on examination followed by tender hepatomegaly and pallor in hepatitis. Similar findings were also observed in a study conducted by Zhang *et al*, in which most common clinical symptoms were jaundice (85.7%), fatigue (70.5%) and anorexia (64.8%).[6] Prevalence of anicteric hepatitis was 17.5% in the present study**.** Study by Sultan M *et al* reported incidence of anicteric hepatitis to be 27.3%. [7]

In this study, among forty hepatitis cases, majority were hepatitis E (45%), followed by Hepatitis A, Hepatitis B and Hepatitis C. Hepatitis E was seen in all age group and both sexes. Another study conducted by Acharya SK *et al* shows similar results.[8] Similar finding was also observed in a study conducted by Chandra NS, *et al* which investigated the contribution of hepatitis E virus infection in sporadic hepatitis cases in Rajasthan and neighbouring states**.** [9]

In this study no case of fulminant hepatic failure was found. In a study conducted by Nandi *et al*, there were four (1.8%) cases of acute liver failure. Two cases were due to hepatitis E and one case each was due to hepatitis A and hepatitis B. [10]

In this study only three case of renal failure was present but outcome was good. Wilkinson *et al* who studied forty eight patients of fulminant hepatic failure found twenty cases of acute renal failure out of which four were prerenal and sixteen had acute tubular necrosis.[11] Kramer *et al* found that acute kidney injury complicating acute viral hepatitis A occurred but was relatively rare.[12]

In this series only four cases were cholestatic viral hepatitis. These patients recovered completely after three months. One patient was positive for HBsAg and other was hepatitis A. The patient with hepatitis A had Kayser-Fleischer ring secondary to cholestasis. N Assy *et al* reported that a severe cholestatic syndrome may follow the acute phase of viral hepatitis, most commonly seen with hepatitis A, Hepatitis C, and hepatitis E. Although jaundice may be profound for up to six months complete recovery occurs.[13]

Acute symptoms were more severe in A+E (feco-orally transmitted) as compared to B+C (hematologically transmitted) and this was found to be statistically significant. In laboratory parameters, mean serum bilirubin values were more at presentation for faeco-orally transmitted hepatitis than haematologically transmitted hepatitis. A study conducted in Iran by Salehi M *et al* which compared hepatitis A with parenterally transmitted hepatitis found that patients with hepatitis A were more likely to have anorexia, vomiting, fever, chill, abdominal pain and prodromal symptoms coryza, cough, throat pain.[14]

Hepatitis is therefore a major heath care problem in India as it occurs epidemically and sporadically. It hampers the quality of life in acute phase and accounts for days lost from work as it

mostly affects young, working population. It can lead to complications which will worsen the healthcare burden. So it is very essential for all health care professionals to be aware of all aspects of it so that it is detected and treated early.

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