

ORIGINAL RESEARCH

Clinico-biochemical, ultrasonographic profile and etiology of acute viral hepatitis in hospitalized children: A cross-sectional study

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ABSTRACT

Background: Hepatitis is a significant public health issue worldwide, including in India, with various viral agents causing acute viral hepatitis (AVH). This study aimed to analyze the etiology, clinical features, laboratory parameters, and sonological findings of AVH in children. **Methods:** A cross-sectional study was conducted at the Department of Paediatrics, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, from November 2022 to October 2023. A total of 104 pediatric cases of acute viral hepatitis, aged 1-18 years, were included. Clinical evaluation, laboratory investigations, and ultrasound findings were recorded. **Results:** The majority of cases (89.42%) were attributed to Hepatitis A virus (HAV). Clinical features included jaundice (88.5%), loss of appetite (86.5%), hepatomegaly (77.9%), fever (71.2%), and vomiting/nausea (66.3%). Serum bilirubin was deranged in 84.6% of cases. Ultrasonography revealed hepatomegaly (88.6%), gall bladder sludge (41.3%), and splenomegaly (28.8%). Acute liver failure occurred in 14 cases, with a mortality rate associated with severe cases. **Conclusion:** AVH, primarily caused by HAV, remains a significant health burden in India. Prevention strategies focusing on improved sanitation, clean water supply, and universal immunization against HAV and HBV are crucial to reduce morbidity and mortality.

Keywords: Acute viral hepatitis, children, Hepatitis A, clinical features, laboratory parameters, ultrasound findings.

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INTRODUCTION

Hepatitis is inflammation of the liver that can be self-limiting or proceed to fibrosis (scarring)¹. Many developing countries, including India, are experiencing viral hepatitis epidemics. It remains a major public health issue in both developing and industrialized countries. Hippocrates was the first to describe epidemic jaundice caused by hepatitis². Acute viral hepatitis (AVH) is one of the significant public health issues in India, caused by hepatitis A, B, C, D, and E viruses.

There are many other viruses that can also cause hepatitis. These viruses include herpes simplex virus, varicella-zoster virus, Epstein-Barr virus, HIV, rubella, CMV (cytomegalovirus), adenovirus, enterovirus, parvovirus B19, and arboviruses³. Hepatitis A and hepatitis E are the most frequent viral agents of acute viral hepatitis, which have a major health burden in India. There are predisposing factors

for hepatitis such as poor hygiene, improper sanitation, overcrowding, and contamination of water and food⁴. As problems and fatal outcomes are reported in the older age group, health education regarding vaccine availability, particularly in remote areas, is very critical and may be incorporated into the national immunization schedule⁵. In underdeveloped nations, the Hepatitis E virus (HEV) produces sporadic infections as well as severe pandemics of viral hepatitis and fulminant hepatic failure⁶. Hepatitis B and C are serious global health issues. Chronic infection can lead to cirrhosis, hepatic decompensation, and hepatocellular cancer⁷. Cholestasis, on the other hand, has been linked to hepatitis E infection⁸.

Hepatitis A is the most common cause of viral hepatitis in children. Infection with HAV is more common in locations with lower socioeconomic status and poor sanitary standards, particularly in

developing, tropical countries. Hepatitis A is transmitted through contaminated water and food. The clinical course of HAV infection varies greatly, from asymptomatic patients to fulminant liver failure. The incubation period of hepatitis A ranges from 15 to 50 days, with an average of 30 days. The detection of HAV RNA or anti-HAV IgM antibodies is used to diagnose acute HAV infection⁹.

Acute liver failure (ALF) is defined as the presence of biochemical evidence of acute liver injury (lasting up to 8 weeks); no evidence of chronic liver disease; and hepatic-based coagulopathy defined as a prothrombin time >15 seconds or international normalized ratio (INR) >1.5 not corrected by vitamin K in the presence of clinical hepatic encephalopathy, or a PT >20 seconds or INR >2 regardless of the presence of clinical hepatic encephalopathy¹⁰.

Herbal medicine use is frequent in our nation, worsening clinical conditions with or without liver failure during hospitalization. It is critical to raise public awareness about preventive measures, including the availability of vaccines, particularly in rural areas.

This study aimed to analyze the etiology, clinical features, laboratory parameters, and sonological findings of AVH in children.

MATERIAL AND METHODS

This cross-sectional study was conducted at the Department of Paediatrics, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, from November 2022 to October 2023. A total of 104 cases of acute viral hepatitis in children aged 1-18 years were included in the study after obtaining informed written consent from parents. Ethical approval was obtained from the Institutional Ethical Committee of the institute.

Inclusion Criteria

- Patients presenting with two or more symptoms of jaundice, loss of appetite, vomiting, nausea, abdominal pain, and itching were enrolled for evaluation.
- Patients with a positive serum report for IgM HAV, HBsAg, IgM HEV, IgM HCV, IgM HDV, and HBc IgM were included in the study.
- Only individuals who gave written consent were enrolled.

Exclusion Criteria

- Patients with acute hepatitis without a hepatotropic viral (HAV, HBV, HDV, HCV, HEV) etiology, such as TORCH infections, enteric fever, malaria, dengue fever, Wilson's disease, autoimmune disease, and drug-induced jaundice, were excluded from this study.
- Patients with a previous history of liver diseases were also excluded from this study.

METHODOLOGY

All children meeting the inclusion criteria were involved in the study. Informed consent was obtained from the accompanying parent or guardian for inclusion in the study. The studied patients were divided into three age groups: 1-5, 6-10, and 11-18 years. History and examination were recorded on a case sheet prepared for the study. A detailed history taken from the guardian was documented. Detailed general and systemic examinations were conducted and recorded on the case sheet. In each case, the presenting complaints and examination findings at admission were noted, and each symptom and sign were monitored until recovery or death. Priority was assigned based on the patient's overall condition.

In each instance, a complete history was acquired regarding fever, jaundice, loss of appetite, abdominal pain, dark urine, loose stools, itching, bleeding manifestations, travel, blood transfusion, family contacts, occupation, drug use history, liver toxicity, drinking water source, food habits, herbal medication intake, residency in an urban/rural area, and income. A thorough general physical examination and systemic examination were performed. After history and examination, subjects were subjected to blood tests (CBC, LFT, PT, INR, and viral serology for HAV, HBV, HCV, HEV, HDV) and an abdominal ultrasound as required.

RESULTS

TABLE 1: DISTRIBUTION OF PATIENTS ACCORDING TO AGE

Age	Frequency	Percent
1-5 yrs.	19	18.3
6-10 yrs.	42	40.4
11-18 yrs.	43	41.3

Out of 104 cases of acute viral hepatitis, 19(18.3%) in 1-5 years age group, 42(40.4%) in 6-10 years age group and 43(41.3%) in the 11-18 years age group. (Table 1).

TABLE 2: DISTRIBUTION OF PATIENT ACCORDING TO SEX

Sex	Frequency	Percent
Male	54	51.9
Female	50	48.1
Total	104	100.0

Among studied children, 54 (51.9%) were male and 50 (48.1%) were female, so there was slight male preponderance (Table 2).

TABLE 3: DISTRIBUTION ACCORDING TO AETIOLOGY

Aetiology	Frequency
HEPA	93
HBV	2
HCV	0
HDV	0
HEV	14

In our study, 93 patients were HEP A (IGM) positive, 2 were HBV (HBsAg) positive and 14 were HEV (IGM) (TABLE 3).

TABLE 4: DISTRIBUTION ACCORDING TO CLINICAL FEATURES.

Clinical features	(n)	Percentage
Fever	65	71.2%
Jaundice	83	88.5%
Nausea & Vomiting	61	66.3%
Itching	18	18.3%
Loose Stools	48	51.9%
Abdominal Pain	60	65.4%
Ascites	18	20.2%
Loss of Appetite	81	86.5%
Bleeding Manifestation	12	13.5%
Hepatomegaly	73	77.9%
Splenomegaly	13	13.5%
Hepatic Encephalopathy	12	11.5%

The presenting complaints of the cases were variable and are given in Table 4. The most common presenting complaints were jaundice (88.5%), loss of appetite (86.5%), hepatomegaly (77.9%), fever (71.2%), vomiting/nausea (66.3%), abdominal pain (65.4%), loose stools (51.9%), ascites (20.2%), itching (18.3%), and splenomegaly (13.5%). There was an overlap of many symptoms (Table 4).

TABLE 5: USG FINDINGS

USG findings	Frequency	Percentage
hepatomegaly	88	88.6%
Splenomegaly	30	28.8%
Ascites	21	20.2%
GB.wall thickening	24	23.1%
GB.bladder.sludge	43	41.3%

In ultrasonography, 86.4% of patients had hepatomegaly, 41.3% had gall bladder sludge, 28.8% had splenomegaly, 23.1% had gall bladder wall thickening, 20.2% had ascites, and 8.7% had normal findings (Table 5).

In the present study, all 104 patients (100%) had increased SGPT levels, 95.1% had increased SGOT levels, and serum bilirubin was raised in 84.6% of cases. Additionally, 73.1% of patients were taking herbal medicines. A total of 14 cases developed acute liver failure with hepatic encephalopathy: 6 cases in grade 1, 3 cases in grade 2, and 5 cases in grade 3. Of the 5 cases that developed grade 3 hepatic encephalopathy, 4 expired and 1 was referred; these patients had ALT levels >5000 along with PT >25 seconds and INR >3.5. Among those who died, 2 had hepatitis A (out of 93 cases), 1 had hepatitis B (out of 2 cases), and 1 had hepatitis E (out of 14 cases). The remaining cases were discharged.

DISCUSSION

A total of 104 patients clinically diagnosed with acute viral hepatitis and admitted to the paediatrics

department of our college were selected for the study and examined. Out of 104 cases, there were 93 cases of Hepatitis A, 2 cases of Hepatitis B, 0 cases of Hepatitis C and D, and 14 cases of Hepatitis E. It was discovered that HAV was the most frequent cause of acute viral hepatitis among children. There were 5 cases of overlapping hepatitis infections in the same individuals. Overlapping hepatitis cases have also been documented by Sharma et al.¹¹ and Hussain Z et al. (2006)¹². According to the current study, the most frequent (89.42%) cause of AVH (acute viral hepatitis) among children is Hepatitis A. This finding bears similarities to another earlier Indian research^{13,14}.

According to a recent Nepalese study, Hepatitis A was present in 83% of patients¹⁵. In our study, 9% of the subjects had HEV, even though it is the most common causal agent in the adult population. The findings of a study by Sudhamshu et al.¹⁶ were comparable. In developing nations, HAV infection remains a significant problem despite the availability of vaccines and better sanitary practices. This is most likely due to individuals from lower socioeconomic classes being unaware of the availability of vaccines and the modes of disease transmission. There was a modest male majority in the present study, which is consistent with other research. According to our study, 41.3% of patients were between 11-18 years, 40.4% were between 6-10 years, and 18.3% were between 1-5 years. A southern Indian study likewise found that the 10-20 years age group was most frequently impacted. Conversely, research conducted in eastern India found that the age range of 5 to 10 years old had a greater frequency¹³.

In terms of clinical features, our study found jaundice (88.5%), loss of appetite (86.5%), hepatomegaly (77.9%), fever (71.2%), vomiting/nausea (66.3%), abdominal pain (65.4%), loose stools (51.9%), ascites (20.2%), itching (18.3%), and splenomegaly (13.5%). Parekh et al. found nearly identical presenting complaints, with jaundice accounting for 94% of cases and fever for 82%¹⁷.

In the present study, serum bilirubin was deranged in 84.6% of cases. Acute liver failure was seen in 14 instances; of these, 9 patients survived, 1 was referred to a higher center, and 4 passed away. The study revealed that patients with deranged serum bilirubin, increased liver enzymes (SGPT >5000 IU/mL), and INR greater than 3.5 had a higher risk of death. Hepatic encephalopathy developed in 13.5% of cases, with grade 1 in 6 cases, grade 2 in 3 cases, and grade 3 in 5 cases. Two Hepatitis A cases out of 93, one Hepatitis B case out of 2, and one Hepatitis E case out of 14 were fatal. Recently, Girish et al.¹⁸ found a similar trend of mortality, suggesting that the Hepatitis B virus had a higher death rate.

Ultrasonography findings showed hepatomegaly in 84.6% of cases, gall bladder sludge in 41.3%, splenomegaly in 28.8%, gall bladder wall thickening in 23.1%, and ascites in 20.2%. In 8.7% of instances,

normal ultrasonography was observed. Similar ultrasonography results were obtained in a recent Bangladeshi study¹⁹.

Herbal medication is widely used in our nation to treat jaundice. It was evident from the present study that 73.1% of patients were using herbal medicines. A review published in the *Hepatology* journal makes it clear that using herbal remedies to treat acute viral hepatitis can lead to further complications and even liver failure²⁰. According to a study by Sudhamshu et al., 73% of patients were using herbal medication when they were admitted¹⁵.

The current study was conducted in a hospital with tertiary care, and only admitted patients were included. Therefore, the clinical profile might not be applicable to the community. Additionally, serology for non-hepatotropic viruses such as cytomegalovirus, herpes simplex virus, and Epstein-Barr virus was not included in the research.

CONCLUSION

In India, acute viral hepatitis (AVH) is a major public health issue. Frequent infections with HAV, HBV, and HEV can result in AVH that is either sporadic or pandemic. Hepatitis A infection is associated with a risk of mortality and unusual presentations. The cornerstones for preventing HAV and HEV infection are improved sanitation, clean drinking water availability, appropriate sewage disposal, and public education. Authorities should prioritize universal immunization against HAV & HBV in order to reduce morbidity and death caused by these prevalent diseases.

REFERENCES

- Hepatitis [Internet]. World Health Organization; [cited 2024 Apr 17]. Available from: <https://www.who.int/health-topics/hepatitis>.
- Krugman S. The Gordon Wilson Lecture. The ABC's of viral hepatitis. *Trans Am Clin Climatol Assoc.* 1992;103:145-56.
- Kliegman R, Geme S, Shah B. Nelson textbook of pediatrics. Viral Hepatitis. 21st ed. Vol.1. Philadelphia PA: Elsevier Health Science Division; 2020;p2106/2107.
- Acharya SK, Batra Y, Bhatkal B. Sero epidemiology of hepatitis A virus infection among school children in Delhi, implications for HAV vaccination. *J Gastroenterol Hepatol* 2003;1(8):8227-28.
- Sood V, Lal BB, Gupta E, Khanna R, Siloliya MK, Alam S. Hepatitis A virus-related pediatric liver disease burden and its significance in the Indian subcontinent. *Indian Pediatric.* 2019;5(6):741-44.
- Hossain MS, Alam MR, Hasan MI, Sharif JU, Kabir MA, Islam MA, et al. Prevalence of serological markers of viruses in patients of acute hepatitis. *Mymensingh Med J.* 2019;25:278-85.
- Posuwan N, Vuthitanachot V, Chinchai T, Wasitthanasem R, Wanlapakorn N, Poovorawan Y, et al. Serological evidence of hepatitis A, B, and C, virus infection in older adults in KhonKaen, Thailand and estimated rates of chronic hepatitis B and C virus infection in Thais, 2017. *Peer J.* 2019;7:e7492.
- Desai HD, Ansari AAZ, Makwana D, Jadeja DM, Gusani J. Clinical/biochemical profile and etiology of acute viral hepatitis in hospitalized young adults at tertiary care center. *J Family Med Prim Care.* 2020 Jan 28;9(1):247-252.
- Chadha MS, Walimbe AM, Chobe LP, Arankalle VA. Comparison of etiology of sporadic acute and fulminant viral hepatitis in hospitalised patients in Pune, India during 1978-81 and 1994-97. *Indian J Gastroenterol* 2003;22:11-5.
- Suchy FJ. Fulminant hepatic failure. In: Kliegman RM, editor. *Nelson Textbook of Pediatrics.* 1st ed. New Delhi: Elsevier India; 2016:1966.
- Sharma CM, Gupta S, Aggarwal B, Chaudhary P. Acute viral hepatitis in children: a prospective hospital based study. *Int J Contemp Pediatr* 2020;7(2):1681-85
- Hussain Z, Das BC, Husain SA, Murthy NS, Kar P. Increasing trend of acute hepatitis A in north India: need for identification of high-risk population for vaccination. *J Gastroenterol Hepatol.* 2006 Apr;21(4):689-93.
- Behera MR, Patnaik L. Clinico-biochemical profile and etiology of acute viral hepatitis in hospitalized children: a study from Eastern India. *Indian J Child Health.* 2016;3(4):317-20.
- Das AK. Changing patterns of aetiology of acute sporadic viral hepatitis in India: newer insights from north-east India. *Int J Cur Res Rev.* 2014;6(19):32-9.
- Bernuau JR, Durand F. Herbal medicines in acute viral hepatitis: a ticket for more trouble. *Eur J Gastroenterol Hepatol.* 2008;20(3):161-3
- Girish N, Sunil B, Devaranavadagi RA. A clinical study of viral hepatitis in children: a prospective hospital-based study. *Int J Contemp Pediatr.* 2018;5:563-68.
- Nandi B, Hadimani P, Arunachalam R, Ganjoo RK. Spectrum of acute viral hepatitis in Southern India. *Med J Armed Forces India.* 2009;65(1):79.
- Parekh Z, Modi R, Banker D. Clinical study of hepatitis in children with special reference to viral markers. *NHL J Med Sci.* 2013;2(1):23-7.
- Salahuddin M, Syed SA, Manzoor H, Mahenaz A, Farhana T. Recent spectrum of acute viral hepatitis in children: an experience in a tertiary centre of Bangladesh. *Adv Res Gastroenterol Hepatol* 2017;6(3):555-86.
- Sudhamshu KC, Sharma D, Poudyal N, Basnet BK. Acute viral hepatitis in pediatric age groups. *J Nepal Med Assoc.* 2014;52(193):687-91.