

A Hospital Based Clinico-Etiologic and Laboratory Profile of Acute Viral Hepatitis in Pediatric Population: A Prospective Study**Rajni Kumari¹, Vinod Kumar Mishra², Jeetendra Kumar³, Sanjeev Kumar⁴**¹Senior Resident, Department of Paediatrics, BMIMS, Pawapuri, Nalanda, Bihar, India²Associate professor, Department of Paediatrics, BMIMS, Pawapuri, Nalanda, Bihar, India³Assistant Professor, Department of Paediatrics, BMIMS, Pawapuri, Nalanda, Bihar, India⁴Assistant Professor, HOD, Department of Paediatrics, BMIMS, Pawapuri, Nalanda, Bihar, India

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Conflict of interest: Nil

Abstract**Background:** Acute viral hepatitis is defined as an infection of the hepatic tissue due to hepatotropic and/ or non hepatotropic viruses causing hepatocellular inflammation which is a self – limiting illness usually resolving completely within 4-6 weeks of time. Viral hepatitis is a major public health issue throughout the world affecting millions of children .**Aim:** The aim of the present study was to analyze the etiology, clinical features, laboratory parameters and sonological findings of acute viral hepatitis in pediatric population.**Methods:** A prospective study was conducted at the Department of Pediatrics , BMIMS, Pawapuri, Bihar from May 2022 to October 2023. A total number of 100 cases of acute viral hepatitis in between 1-14 years of age after informed written consent from parents were included in the study.**Results:** Out of 100 cases of acute viral hepatitis, 10 (10%) in 1-5 years age group, 38 (38%) in 6-10 years age group and 52 (52%) in the 11-14 years age group. As the age increased, there were more cases. Among studied children, 55 (55%) were male and 45 (45%) were female, so there was slight male preponderance. The most common presenting complaints were jaundice (91%), loss of appetite (84%), dark colored urine (86%), vomiting (72%) and pain abdomen (62%). There was overlap of many symptoms. Unlike the adult age group 68.2% patients presented with history of fever ranging from 100-104° F. There were many cases of AVH initially investigated and treated as enteric fever and referred to us after blood test showed liver dysfunction or they developed jaundice in due course of illness. Itching was more common with increase in age. Those cases with elevated liver enzymes, PT INR of more than 3.5 progressed to hepatic encephalopathy. In ultrasound findings, hepatomegaly (92%) was found in most of the cases followed by gall bladder sludge (45%), splenomegaly (38%), gall bladder wall thickening (32%), and ascites (24%). Normal ultrasound was found in 12% cases.**Conclusion:** In majority of cases hepatitis A was the most common cause of acute viral hepatitis in children. On the basis of clinical findings and biochemical characteristics the viruses cannot be differentiated. Thus, serological testing is essential for correct etiological diagnosis. It's important to create awareness in the society regarding preventive measures including availability of vaccine especially in rural area.**Keywords:** Children, Clinical profile, Hepatotropic, Viral hepatitis

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Introduction

Viral hepatitis defined as infection of the liver caused by hepatotropic and/or non-hepatotropic viruses. The condition can be self-limiting or can progress to fibrosis (scarring). [1] Acute hepatitis is a self-limiting illness characterized by an abrupt onset of symptoms with the hepatocellular inflammation usually resolving completely within 4-6 weeks. When there is a continuing inflammation beyond six months (three months in children), it is labelled as chronic hepatitis. [2] Acute hepatitis is caused by various pathogenic factors invading the

liver, damaging hepatocytes and liver function, and resulting in severe clinical symptoms.

At first, patients experience fatigue, fever and loss of appetite, and in more severe cases, nausea, vomiting or tea-colored urine occur, followed by jaundice. The disease course does not exceed half a year. These common pathogenic factors are viruses, bacteria, parasites, chemical poisons, drugs and poisons, alcohol, etc [3] .

Viral hepatitis continues to be a major health problem in both developing and developed countries. This disorder is caused by at least 5 pathogenic hepatotropic viruses recognized to date: hepatitis A (HAV), B(HVB), C (HCV), D (HDV), and E (HEV) viruses. Many other non-hepatotropic viruses (and diseases) can cause hepatitis, usually as a component of a multisystem disease. These include herpes simplex virus, cytomegalovirus, Epstein-Barr virus, varicella zoster virus, HIV, rubella, adenovirus, enteroviruses, parvovirus B19, and adenovirus [4]

Severity of Hepatitis A may vary from uncomplicated subclinical/clinical acute viral hepatitis (AVH) to acute or acute-on-chronic liver failure. In Indian subcontinent, proportion of overall AVH, acute liver failure, and acute-on-chronic liver failure cases attributed to HAV infection is around 70-85%, 40-60%, and 10-40%, respectively. [5] Hepatitis B and hepatitis C are major global health problem. They can cause chronic infection which progress to cirrhosis, hepatic decompensation, and hepatocellular carcinoma.

The aim of the present study was to analyze the etiology, clinical features, laboratory parameters and sonological findings of Acute Viral Hepatitis in pediatric population.

Materials and methods

A prospective study was conducted in the Department Of Pediatrics , BMIMS, Pawapuri, Nalanda, Bihar, India from May 2022 to October 2023.A total number of 100 cases of acute viral hepatitis in between 1-14 years of age after informed written consent from parents were included in the study.

Inclusion Criteria

- Patients presenting with two or more symptoms of loss of appetite, jaundice, nausea, vomiting, pain abdomen and itching were enrolled for evaluation.
- Positive serum report of IgM HAV, IgM HEV, hepatitis B surface antigen [HBsAg], and IgM HCV, HBc IgM.

Exclusion Criteria

- Acute hepatitis without hepatotropic viral (HAV, HBV, HCV, HEV) etiology like TORCH infection, enteric fever, malaria, dengue, Wilson’s disease, autoimmune and drug induced jaundice.
- Those patients with previous history of liver diseases were also excluded from the study.

After history and clinical examination they were subjected to blood tests (complete blood count, liver function tests, prothrombin time, INR, and viral serology for hepatitis A, B, C and E and ultrasound examination of the abdomen). Those patients having positive viral serology and/or alanine transferase more than 10 times the upper limit were included in the study.

History was also focused on dietary habit after development of symptoms and intake of herbal medications. The studied patients were divided in three age groups; 1-5, 6-10 and 11-14 years. Clinical features, laboratory parameters, ultrasound findings were compared in three age groups. Acute liver failure (ALF) was diagnosed by PT >15 sec or INR >1.5 with features of encephalopathy OR PT >20 sec or INR >2.0 with or without features of encephalopathy. History, clinical findings and laboratory results were recorded.

Results

Table 1: Demographic profile

Age group (years)	Male	Female	Total (%)
1-5	4	6	10 (10%)
6-10	22	16	38 (38%)
11-14	29	23	52 (52%)
Total	55	45	100

Out of 100 cases of acute viral hepatitis, 10 (10%) in 1-5 years age group, 38 (38%) in 6-10 years age group and 52 (52%) in the 11-14 years age group. As the age increased, there were more cases. Among studied children, 55 (55%) were male and 45 (45%) were female, so there was slight male preponderance.

Table 2: Clinical presentation of cases

Symptoms	1-5 years (n=10)	6-10 years (n=40)	11-18 (n=50)	Total
Jaundice	10 (100%)	36 (90%)	45 (90%)	91 (91%)
Loss of appetite	10 (100%)	30 (75%)	44 (88%)	84 (84%)
Nausea	7 (70%)	22 (55%)	40 (80%)	69 (69%)
Vomiting	8 (80%)	24 (60%)	40 (80%)	72 (72%)
Pain Abdomen	8 (80%)	22 (55%)	32 (64%)	62 (62%)
Itching	0	8 (20%)	28 (56%)	31 (35.2%)

Dark Urine	8 (80%)	36 (90%)	42 (84%)	86 (86%)
Fever	6 (60%)	30 (75%)	34 (68%)	70 (70%)
Loose Stool	6 (60%)	24 (60%)	26 (52%)	56 (56%)
Hepatomegaly	10 (100%)	36 (90%)	40 (80%)	86 (86%)
Splenomegaly	1 (10%)	10 (25%)	12 (24%)	23 (23%)
Ascites	2 (20%)	8 (20%)	8 (16%)	18 (18%)

The most common presenting complaints were jaundice (91%), loss of appetite (84%), dark colored urine (86%), vomiting (72%) and pain abdomen (62%). There was overlap of many symptoms. Unlike the adult age group 68.2% patients presented with history of fever ranging from 100-104° F.

There were many cases of AVH initially investigated and treated as enteric fever and referred to us after blood test showed liver dysfunction or they developed jaundice in due course of illness. Itching was more common with increase in age.

Table 3: Ultrasonography findings

USG findings	n (%)
Hepatomegaly	92 (92%)
Splenomegaly	38 (38%)
Ascites	24 (24%)
Gall bladder wall thickening	32 (32%)
Gall bladder Sludge	45 (45%)
Normal	12 (12%)

Those cases with elevated liver enzymes, PT INR of more than 3.5 progressed to hepatic encephalopathy. In ultrasound findings, hepatomegaly (92%) was found in most of the cases followed by gall bladder sludge (45%), splenomegaly (38%), gall bladder wall thickening (32%), and ascites (24%). Normal ultrasound was found in 12% cases.

Table 4: Outcome of cases with acute liver failure and hepatic encephalopathy

Acute Hepatic encephalopathy					Coagulopathy	PT/INR	ALT	Etiology	
Outcome	liver failure	Grade 1	Grade 2	Grade 3				Hepatitis A	Hepatitis B
Expired	6 cases	-	-	6	6	>25 sec/>3.5	>5000	3	3
Discharged	8 cases	6	2	-	6	<25 sec/<3.5	3000-5000	8	-

A total of 14 cases developed acute liver failure with hepatic encephalopathy, 6 cases grade -1, 1 case grade -2 and 6 cases to grade -3. All the 6 cases that developed hepatic encephalopathy grade -3 were expired, and had increased ALT >5000 along with PT >25 second and INR >3.5. Out of these 6 cases 3 had hepatitis A and 3 had hepatitis B.

Discussion

Viral hepatitis continues to be a major health problem in both developing and developed countries. This disorder is caused by the 5 pathogenic hepatotropic viruses recognized to date: hepatitis A (HAV), B(HBV), C(HCV), D(HDV), and E(HEV) viruses. Many other viruses can also cause hepatitis usually as a component of multisystem disease. These include herpes simplex virus, cytomegalovirus, Epstein-Barr virus, varicella zoster virus, HIV, rubella, adenovirus, enterovirus, parvovirus B19, and arboviruses.⁶ However, most frequent viral agents of AVH with major health burden in India are hepatitis A and hepatitis E. [7] The clinical spectrum of acute viral hepatitis ranges

from entirely subclinical and inapparent infection to rapidly progressing and fulminant hepatic failure. Hepatitis A (HAV) and E (HEV) viruses are fecorally transmitted and self-limiting, whereas hepatitis B (HBV), C (HCV) and D (HDV) are transmitted parenterally and may progress to chronic hepatitis. India is hyperendemic for hepatitis A and E. [8] Acute hepatitis resulting from most etiology has similar clinical features. The characteristic clinical features of acute hepatitis include nausea, vomiting, right hypochondrial pain, and jaundice. The prodromal phase of nonspecific symptom including fever, myalgia and anorexia is characteristic of viral hepatitis, but may also be seen in other conditions.

Out of 100 cases of acute viral hepatitis, 10 (10%) in 1-5 years age group, 38 (38%) in 6-10 years age group and 52 (52%) in the 11-14 years age group. As the age increased, there were more cases. Among studied children, 55 (55%) were male and 45 (45%) were female, so there was slight male preponderance. Study done in southern India also

reported 10-20-year age group being most commonly affected. [9] On the contrary, another study done in eastern India reported higher prevalence in age group 5 to 10 years. [8] Another study done by Sudhamshu et al also reported maximum number of cases (49.6%) in 11-15 year age group. [10] The most common presenting complaints were jaundice (91%), loss of appetite (84%), dark colored urine (86%), vomiting (72%) and pain abdomen (62%). There was overlap of many symptoms. Unlike the adult age group 68.2% patients presented with history of fever ranging from 100-104° F. There were many cases of AVH initially investigated and treated as enteric fever and referred to us after blood test showed liver dysfunction or they developed jaundice in due course of illness. Itching was more common with increase in age. Parekh et al reported almost similar presenting complaints most common being jaundice (94%) followed by fever (82%). [11] Behera et al also reported similar finding as in our study, yellowish discoloration of eye and urine was the most common symptoms in their study. [8]

Those cases with elevated liver enzymes, PT INR of more than 3.5 progressed to hepatic encephalopathy. In ultrasound findings, hepatomegaly (92%) was found in most of the cases followed by gall bladder sludge (45%), splenomegaly (38%) gall bladder wall thickening (32%), and ascites (24%). Normal ultrasound was found in 12% cases. A recent study from Bangladesh observed similar ultrasound findings. [12] A total of 14 cases developed acute liver failure with hepatic encephalopathy, 6 cases grade -1, 1 case grade -2 and 6 cases to grade -3. All the 6 cases that developed hepatic encephalopathy grade -3 were expired, and had increased ALT >5000 along with PT >25 second and INR >3.5. Out of these 6 cases 3 had hepatitis A and 3 had hepatitis B.

Conclusion

Hepatitis A is the most common cause of acute viral hepatitis in children. On the basis of clinical findings and biochemical characteristics the viruses cannot be differentiated. Thus, serological testing is essential for correct etiological diagnosis. It's important to create awareness in the society regarding preventive measures including availability of vaccine especially in rural area. Better sanitation, provision of clean drinking water, proper sewage disposal and public education are the mainstays for prevention of HAV and HEV infection.

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