e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com doi: 10.25258/ijpqa.16.12.84

International Journal of Pharmaceutical Quality Assurance 2025; 16(12); 506-511

Original Research Article

Assessment of Hepatitis E Virus Seroprevalence in Patients Presenting with Suspected Acute Viral Hepatitis

Kumari Ritu[1], Tanushree Narain[2], Pratulya Nandan[3], Vijay Kumar[4]

[1]Tutor, Department of Microbiology, Patna Medical College and Hospital, Patna, Bihar, India
[2]Tutor, Department of Microbiology, Patna Medical College and Hospital, Patna, Bihar, India
[3]Professor, Department of Microbiology, Patna Medical College and Hospital, Patna, Bihar, India
[4]Professor, Department of Microbiology, Patna Medical College and Hospital, Patna, Bihar, India

Received: 17-11-2025 / Revised: 10-12-2025 / Accepted: 26-12-2025
Corresponding Author: Dr. Tanushree Narain
Conflict of interest: Nil

Abstract:

Background: Hepatitis E virus (HEV) is an emerging cause of acute viral hepatitis (AVH), particularly in regions with limited sanitation. Clinical differentiation from other hepatotropic viruses is challenging without laboratory confirmation.

Aim: To assess the seroprevalence of HEV among patients presenting with suspected AVH and analyze associated demographic, clinical, and biochemical features.

Methodology: A hospital-based, cross-sectional study was conducted at Patna Medical College and Hospital over six months. Ninety patients with suspected AVH were enrolled. Serum samples were tested for anti-HEV IgM by ELISA. Demographic, clinical, and biochemical data were collected and analyzed using SPSS 26.0.

Results: HEV seropositivity was 20% (18/90). No significant associations were observed between HEV infection and age, gender, or residence. Clinically, jaundice (88.9%) and fatigue (77.8%) were most common in HEV-positive patients, similar to HEV-negative cases. Biochemically, HEV-positive patients had significantly higher ALT (610.4 ± 198.6 U/L) and AST (575.2 ± 187.3 U/L) compared to HEV-negative individuals ($p < 0.01$), indicating greater hepatocellular injury.

Conclusion: HEV infection affects all adult age groups irrespective of gender or residence and presents with clinical features indistinguishable from other AVH causes. Significantly elevated transaminases may suggest HEV infection, emphasizing the need for routine laboratory testing for timely diagnosis and public health management.

Keywords: Hepatitis E virus, Acute viral hepatitis, Seroprevalence, Liver enzymes, ELISA.

Introduction

Acute viral hepatitis (AVH) has been a major health issue of concern in the world and has been a major contributor of morbidity, especially in the low- and middle-income nations. AVH continues to be a prevalent cause of acute liver disease despite improvements in sanitation, vaccination, as well as widespread awareness about health among the population with developing nations bearing a disproportionate burden of the disease [1]. It is defined as the inflammation of the liver due to the infection by hepatotropic viruses, mostly hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV) and hepatitis E virus (HEV). The viruses are also different in the way they are transmitted, their epidemiological patterns, and their clinical outcomes though they tend to have overlapped clinical manifestations hence it is difficult to be etiologically differentiated without laboratory confirmation.

Of the viral agents that cause AVH, hepatitis E virus has become a pathogen that has become of great concern especially in the areas where there is a lack of access to clean drinking water and proper sanitation. HEV has been also identified to have one of the biggest causes of sporadic and epidemic hepatitis, particularly in some regions of Asia and Africa where environmental and socioeconomic factors were conducive to its spread [2]. Huge outbreaks in the past were also reported with the presence of contaminated water supplies, which makes it clear that the presence of infrastructural shortcomings correlates with HEV infection. Over the past few years, the growing awareness of HEV as an etiologic agent of acute hepatitis has raised the importance of targeted epidemiological monitoring and enhanced methods of diagnosis.

Hepatitis E virus is transmitted by the fecal-oral route and is a non-enveloped, single strand, RNA virus. The most common source of infection is contaminated drinking water especially in endemic regions. The flood causes are usually associated with

floods, failure of sanitation, and seasonal water deficits, which are all conducive to the process of water pollution [3]. The virus is extensively spread all over the world and a large percentage of the global population lives in regions that are susceptible to being exposed to the virus. HEV infection is also estimated to be causing millions of symptomatic cases each year, accentuating its role in public health [4]. Though with hygiene and water quality there has been a reduction in the number of several enterically transmitted infections, HEV still remains widespread and is the cause of frequent outbreaks in endemic areas.

The clinical manifestation of HEV infection does not differ in most cases of acute viral hepatitis. The clinical manifestations are typically non-specific prodromal symptoms, including fever, anorexia, malaise, nausea, and vomiting, after which jaundice, and biochemical indicators of hepatic damage including increased liver enzymes are observed in the patients [5]. In the vast majority of immunocompetent people, the disease has an acute course, which is self-limiting, and recovery is possible after a few weeks. Nevertheless, clinical range of HEV infections is wide and can be categorized as asymptomatic or mild infections up to severe and possible life-threatening diseases.

Some groups of people are especially susceptible to dire consequences after being infected with HEV. The most high-risk group is that of pregnant women particularly where the infection happens in the third trimester. The HEV infection in this population has been linked to acute liver failure, maternal mortality which is highly increased, and unfavorable fetal outcomes, including stillbirth and preterm birth [6]. Moreover, patients with pre-existing chronic liver disease can acquire acute-on-chronic liver failure in case of HEV infection, and the immuno-compromised patients can have more severe or atypical disease progression. These are high risk groups which help in the morbidity and mortality rate of HEV and emphasize the need to diagnose and manage it well and early.

Although HEV has a significant impact on the total burden of acute viral hepatitis, it is still not well known and poorly diagnosed in clinical practice. In most medical institutions, the diagnostic assessment of AVH is mainly directed at the hepatitis A and B viruses, whereas the HEV-testing is not given much attention [7]. Such restricted diagnostic attention can be explained by either a lack of awareness of clinicians or a lower perceived significance of HEV or the unavailability of certain serological tests in regular laboratories. Therefore, many HEV infections will remain unnoticed resulting in misdiagnosis of the cases like non-A, non-B hepatitis or may not be diagnosed at all. This underdiagnosis does not only have an impact on the care of individual patients but also has a wider public health impact since the cases that are not detected will keep on contributing to the spreading of the disease to the community.

EVH epidemiology is also complicated and differs substantially in various geographic areas and groups of people. Seroprevalence rates are reported to be quite varied in terms of environmental factors, socioeconomic status, sanitation, and the nature of the studied population [8]. Moreover, differences in study design, diagnostic tests and inclusion criteria also lead to discrepancy in reported prevalence rates. The variability highlights the need to create region-specific and population-specific data to correctly consider the actual burden of HEV infection and make diverse decisions based on the importance of public health.

Patients with suspected acute viral hepatitis in tertiary care settings make a clinically significant group in the assessment of HEV seroprevalence. These patients tend to manifest with typical signs of AVH, but the etiology of the condition might not be easily detected using clinical characteristics. The evaluation of seroprevalence of HEV among these patients is also beneficial as it informs us about the role of HEV in cases of acute hepatitis and enables one to establish trends in the context of infections in particular healthcare settings. Further, the local seroprevalence data may be used to inform diagnostic algorithms, enhance the consideration of HEV testing in the regular assessment of AVH, and contribute to creating prevention-focused strategies.

It is on this backdrop that the importance of measuring the seroprevalence of hepatitis E virus in patients with clinically suspected acute viral hepatitis in tertiary care units becomes of great significance. These types of assessments can not only increase the knowledge about the local epidemiology of HEV but can also help with better management of patients and increased surveillance of their health in the population. With the help of determining the burden of HEV infection among the population, the healthcare systems can more effectively spend resources, increase clinical awareness, and eventually lower the toll of this preventable and frequently neglected viral infection.

Methodology

Study Design: This study was a hospital-based, cross-sectional observational study designed to assess the seroprevalence of Hepatitis E Virus (HEV) among patients presenting with clinically suspected acute viral hepatitis.

Study Area: The study was conducted in the Department of Microbiology, Patna Medical College and Hospital (PMCH), Patna, Bihar, India.

Study Duration: The study was carried out over a period of 6 months, from May 2025 to October 2025.

Study Population: The study population comprised patients attending the hospital with clinical suspicion of acute viral hepatitis (AVH). Clinical suspicion was based on symptoms such as acute onset jaundice, fever, malaise, fatigue, anorexia, nausea, vomiting, right upper quadrant abdominal pain, dark-colored urine, and laboratory evidence of elevated liver enzymes.

Sample Size: A total of 90 patients fulfilling the inclusion criteria were enrolled in the study. Patients were selected using a consecutive sampling method during the study period.

Inclusion Criteria

- Patients aged 18 years and above
- Patients presenting with clinical features suggestive of acute viral hepatitis
- Patients willing to participate and provide written informed consent

Exclusion Criteria

- Patients with known chronic liver disease
- Patients diagnosed with autoimmune hepatitis, drug-induced hepatitis, or metabolic liver disorders
- Patients with previously confirmed hepatitis of non-viral etiology
- Patients unwilling or unable to provide informed consent

Data Collection: After obtaining informed consent, demographic, clinical, and relevant epidemiological data were collected using a pre-designed and structured proforma. Information included age, sex, place of residence, presenting symptoms, and duration of illness.

Procedure: Under strict aseptic precautions, 5 mL of venous blood was collected from each participant. Blood samples were allowed to clot and then centrifuged to separate serum. The serum samples were stored at appropriate temperatures until testing.

All serum samples were tested for anti-HEV IgM antibodies using a commercially available enzyme-linked immunosorbent assay (ELISA) kit, following the manufacturer's instructions. Internal quality control measures were strictly adhered to during laboratory testing.

Routine biochemical investigations, including liver function tests (serum bilirubin, alanine aminotransferase [ALT], aspartate aminotransferase [AST], and alkaline phosphatase), were performed in the central laboratory of the hospital as part of standard patient care.

Statistical Analysis: All collected data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Continuous variables, such as age and liver enzyme levels, were expressed as mean ± standard deviation (SD), while categorical variables, including sex, residence, and HEV serostatus, were summarized as frequencies and percentages. Comparisons between HEV seropositive and seronegative groups were performed using Student's t-test for continuous variables and the Chi-square test for categorical variables. The strength of associations was evaluated, and a p-value < 0.05 was considered statistically significant. Wherever applicable, 95% confidence intervals (CI) were reported to provide precision of estimates and to aid interpretation of the results."

Result

Table 1 summarizes the demographic characteristics of 90 study participants. Among the 18 HEV-positive patients, the mean age was 33.1 ± 9.8 years, compared to 34.6 ± 10.9 years in the HEV-negative group, with no significant difference ($p = 0.541$). The male-to-female ratio was similar between groups, 11:7 in HEV-positive and 43:29 in HEV-negative patients ($p = 0.892$). Regarding residence, 6 HEV-positive patients (33.3%) were from urban areas and 12 (66.7%) from rural areas, while in the HEV-negative group, 28 (38.9%) were urban and 44 (61.1%) were rural ($p = 0.658$). Overall, Table 1 indicates that HEV seropositivity was not significantly associated with age, gender, or place of residence in this cohort.

Table 1: Demographic characteristics of study participants (N = 90)

Variable	HEV Positive (n = 18)	HEV Negative (n = 72)	Total (n = 90)	p-value
Total patients	18	72	90	–
Mean age (years)	33.1 ± 9.8	34.6 ± 10.9	34.3 ± 10.6	0.541
Male : Female ratio	11:07	43:29:00	54:36:00	0.892
Urban residence	6 (33.3%)	28 (38.9%)	34 (37.8%)	0.658
Rural residence	12 (66.7%)	44 (61.1%)	56 (62.2%)	0.658

Table 2 presents the clinical presentation of 90 patients with acute viral hepatitis. Among HEV-positive patients (n = 18), the most common symptom was jaundice, seen in 16 cases (88.9%), followed by fatigue/malaise in 14 patients (77.8%), anorexia in 12 patients (66.7%), nausea/vomiting in 11 patients (61.1%), and abdominal pain in 8 patients (44.4%). In the HEV-negative group (n = 72), the frequencies of these symptoms were similar: jaundice in 60 patients (83.3%), fatigue/malaise in 51 (70.8%), anorexia in 45 (62.5%), nausea/vomiting in 40 (55.6%), and abdominal pain in 32 (44.4%). None of the

differences between HEV-positive and HEV-negative groups were statistically significant ($p > 0.05$). Overall, Table 2 indicates that the clinical manifestations of acute viral hepatitis were comparable regardless of HEV serostatus.

Table 2: Clinical presentation of patients with acute viral hepatitis (N = 90)

Symptom	HEV Positive (n = 18)	HEV Negative (n = 72)	p-value
Jaundice	16 (88.9%)	60 (83.3%)	0.748
Fatigue/Malaise	14 (77.8%)	51 (70.8%)	0.764
Anorexia	12 (66.7%)	45 (62.5%)	0.802
Nausea/Vomiting	11 (61.1%)	40 (55.6%)	0.781
Abdominal pain	8 (44.4%)	32 (44.4%)	1

Table 3 compares the biochemical parameters between HEV-positive (n = 18) and HEV-negative (n = 72) participants. The mean total bilirubin was slightly higher in HEV-positive patients (8.1 ± 2.9 mg/dL) compared to HEV-negative patients (7.8 ± 2.7 mg/dL), but this difference was not statistically significant ($p = 0.614$). Liver enzymes, however, were significantly elevated in HEV-positive patients: ALT averaged 610.4 ± 198.6 U/L versus 430.7 ± 176.2 U/L in HEV-negative cases ($p = 0.002$), and AST was 575.2 ± 187.3 U/L versus 415.9 ± 168.4 U/L ($p = 0.003$). Alkaline phosphatase levels were similar between the groups (305.6 ± 104.8 vs. 296.3 ± 98.7 U/L, $p = 0.713$). Overall, Table 3 indicates that HEV infection is associated with significantly higher transaminase levels, reflecting greater hepatocellular injury, while bilirubin and alkaline phosphatase levels were comparable.

Table 3: Biochemical parameters of study groups (N = 90)

Parameter	HEV Positive (n = 18)	HEV Negative (n = 72)	p-value
Total bilirubin (mg/dL)	8.1 ± 2.9	7.8 ± 2.7	0.614
ALT (U/L)	610.4 ± 198.6	430.7 ± 176.2	0.002*
AST (U/L)	575.2 ± 187.3	415.9 ± 168.4	0.003*
Alkaline phosphatase (U/L)	305.6 ± 104.8	296.3 ± 98.7	0.713

Table 4 shows the age-wise distribution of HEV seropositivity among 90 participants. Among the 18 HEV-positive cases, 2 (11.1%) were under 20 years, 8 (44.4%) were aged 21–40 years, 5 (27.8%) were 41–60 years, and 3 (16.7%) were over 60 years. In comparison, of the 72 HEV-negative participants, 7 (9.7%) were under 20 years, 21 (29.2%) were 21–40 years, 31 (43.1%) were 41–60 years, and 13 (18.1%) were over 60 years. None of the differences were statistically significant ($p > 0.05$). Overall, Table 4 indicates that HEV seropositivity was most frequent in the 21–40 years age group, although age was not significantly associated with infection.

Table 4: Age-wise distribution of HEV seropositivity (N = 90)

Age group (years)	HEV Positive (n = 18)	HEV Negative (n = 72)	p-value
<20	2 (11.1%)	7 (9.7%)	1
21–40	8 (44.4%)	21 (29.2%)	0.245
41–60	5 (27.8%)	31 (43.1%)	0.289
>60	3 (16.7%)	13 (18.1%)	1

Table 5 compares the residence of study participants with HEV seropositivity among 90 cases. Of the 18 HEV-positive patients, 6 (33.3%) were from urban areas and 12 (66.7%) from rural areas. Among the 72 HEV-negative participants, 28 (38.9%) were urban residents and 44 (61.1%) were from rural areas. The difference in HEV seropositivity between urban and rural residents was not statistically significant ($p = 0.658$). Overall, Table 5 indicates that HEV infection was slightly more common in rural populations, but residence did not show a significant association with seropositivity.

Table 5: Comparison of residence with HEV seropositivity (N = 90)

Residence	HEV Positive (n = 18)	HEV Negative (n = 72)	p-value
Urban	6 (33.3%)	28 (38.9%)	0.658
Rural	12 (66.7%)	44 (61.1%)	0.658

Discussion

In the current study, the HEV seropositive was detected in 18 of 90 patients, which translates to a prevalence of 19.4 percent among the patients with suspected acute viral hepatitis (AVH). This is similar to data in the past that has been done in South

Asia, whereby HEV has been consistently reported as a major cause of acute hepatitis incidences albeit different rates across regions and the population of the study. The prevalence of HEV in our cohort is in line with the HEV prevalence rate of 15-25 percent in endemic countries reported by Pauli et al. (2017) [9], which further supports the current relevance of HEV to the public health community. Shrestha et al. (2020) [10], on the other hand, reported somewhat higher prevalence rates up to 30% in the referral hospitals implying that variability might be affected by local outbreaks and diagnostic capacities as well as inclusion criteria of the suspected AVH patients."

Our demographic analysis showed that the average age of HEV-positive patients was 33.1 years old with most of the cases falling within the 21 40-year range. Such an outcome is universal among other statistics in the Asian populations, in which young and middle-aged adults are the disproportionately impacted groups (Dalton, and Izopet, 2018; Pauli et al., 2017) [11,9]. These results are opposite to hepatitis A, mostly affecting children, and hepatitis B that is usually chronic (Dalton & Izopet, 2018) [11]. In our investigation, the difference in age distribution between positive HEV and negative patients did not prove to be statistically significant, which is consistent with the literature according to which, although some age groups are more commonly infected, the age itself might not be a potent independent risk factor in AVH groups (Shrestha et al., 2020) [10]. The proportion of the genders in our cohort was a minor preponderance of males in HEV-positive patients (male-to-female ratio 11:7), which was not statistically significant. Other studies have reported similar trends, although some have found that male dominance is also a potential manifestation of patterns of occupational or environmental exposures (Pauli et al., 2017; Yugo and Meng, 2013) [9,12].

Another variable evaluated as with regard to the seropositivity of HEV was residence. Two-thirds of HEV-positive patients lived in rural places, which numerically was more than the proportion in urban places, although the difference was not significant. This observation is in contrast to previous studies that reported rural living as a great risk factor because of poor sanitation and polluted water supply (Pauli et al., 2017) [9]. The insignificance of the association in our study can be because of the rural infrastructural improvements, urbanization or exposure using other environmental avenues. The same has been observed by Shrestha et al. (2020) [10], who identified that the rural populations continue to be vulnerable, but the urban-rural difference is becoming less clear in certain areas as a result of the changing lifestyles and interventions by the populace to improve their health.

The clinical manifestation of the infection with HEV in our group of patients did not significantly differ in relation to other causes of acute viral hepatitis. Jaundice, fatigue, anorexia, nausea and abdominal pain were all symptoms present in the HEV-positive and HEV-negative patients but showed no statistically significant differences. The results support the existing literature that highlights the inability of HEV infection to be easily distinguished among other AVH on the basis of clinical presentations only (Pischke et al., 2014) [13]. The similarity in the symptoms heightens the need to confirm a diagnosis through laboratory methods, especially using serological tests of the anti-HEV IgM antibodies in order to effectively diagnose the patient and adequately treat the patient.

On the biochemical analyses, the hepatocellular injury was more pronounced in HEV-positive patients. The aminotransferase levels (alanine aminotransferase (ALT) and aspartate aminotransferase (AST)) of HEV-positive people (610.4 ± 198.6 U/L and 575.2 ± 187.3 U/L, respectively) were significantly higher than in HEV-negative patients (430.7 ± 176.2 U/L and 415.9 ± 168.4 U/L). This trend is consistent with the existing literature that HEV infection is mostly associated with hepatocellular but not cholestatic liver damage (Jameel, 2019; Yugo and Meng, 2013) [14,11] [14,11]. Both groups had a similar level of total bilirubin and alkaline phosphatase, which is in line with previous results of cholestatic changes that do not represent HEV infection (Jameel, 2019) [14]. These biochemical variations can be used as supportive, but not conclusive evidence of HEV infection in the AVH patients.

In general, the current research indicates that the demographic variables, including age, sex, and location, did not have any statistically significant relationship with the HEV seropositivity, whereas biochemical indicators, including ALT and AST levels, were also more significant in HEV-positive patients. This supports the use of epidemiological assessment with laboratory confirmation to detect HEV infection. The results also highlight the current issue of HEV-related public health in young adults in endemic areas and justify the preventive strategies, such as enhanced water hygiene, education, and the regular incorporation of HEV testing in suspected AVH cases (Pauli et al., 2017; Pischke et al., 2014) [9,13]. Combining our findings with the current literature we could conclude that HEV is a clinically relevant pathogen that needs a combination of vigilance, biochemical testing and serological confirmation of its detection.

Conclusion

The seroprevalence of Hepatitis E Virus (HEV) in patients with suspected acute viral hepatitis study showed that HEV infection has a broad age distribution and does not have significant demographic preferences in both sexes. The ratio of cases in urban and rural households was similar and that geographic location was not a major factor in determining HEV

seropositivity in this group. Clinically, patients infected with HEV had typical clinical manifestations of acute viral hepatitis including jaundice, fatigue, anorexia, nausea, vomiting, and abdominal pain with similar rates in patients infected with HEV, as compared to patients without HEV infection, indicating that clinical manifestation might not be a reliable factor to distinguish HEV infection and other causes of acute hepatitis. The HEV-positive patients showed markedly higher liver transaminases than the HEV-negative ones, which implies a more intense hepatocellular injury in the process of HEV infection, but the other liver-function parameters were significantly similar. The comparison by age revealed that there was HEV seropositivity among all age groups and no statistically significant age group could be predominant. On the whole, the results indicate the significance of laboratory testing of HEV in the patient with acute hepatitis since the demography and clinical characteristics may not be sufficient to cover the presence of the infection, whereas high levels of transaminases can give an indication of its presence. This emphasizes the need for awareness and timely diagnostic evaluation to guide appropriate management and public health interventions.

References

1. World Health Organization. Global hepatitis report. Geneva: WHO; 2017.
2. Rein DB, Stevens GA, Theaker J, Wittenborn JS, Wiersma ST. The global burden of hepatitis E virus genotypes 1 and 2 in 2005. Hepatology. 2012;55(4):988–97.
3. Kamar N, Bendall R, Legrand-Abravanel F, Xia NS, Ijaz S, Izopet J, Dalton HR. Hepatitis E. Lancet. 2012;379(9835):2477–88
4. Aggarwal R, Jameel S. Hepatitis E. Hepatology. 2011;54(6):2218–26.
5. World Health Organization. Hepatitis E fact sheet. Geneva: WHO; 2020.
6. Khuroo MS, Khuroo MS. Hepatitis E: an emerging global disease—from discovery towards control and cure. J Viral Hepat. 2016;23(2):68–79
7. Panda SK, Thakral D, Rehman S. Hepatitis E virus infection during pregnancy. Indian J Gastroenterol. 2007;26(1):3–9.
8. Kumar A, Kumar N, Pandey R, Naik S. Hepatitis E virus infection: a global perspective. J Clin Exp Hepatol. 2013;3(2):114–24.
9. Pauli E, Heffron C, Roth NJ, Shanbhogue RL, Kamili S. Hepatitis E virus infection in South Asia: epidemiology and public health implications. Trop Med Int Health. 2017;22(9):1073–81.
10. Shrestha A, Adhikari R, Shrestha SK, Paudel S, Rauniyar R. Epidemiological features of hepatitis E virus infection in South Asia. Trop Med Health. 2020;48(1):101.
11. Dalton HR, Izopet J. Transmission and epidemiology of hepatitis E virus genotype 3 and 4 infections. Cold Spring Harb Perspect Med. 2018;8(11):a032144.
12. Yugo DM, Meng XJ. Hepatitis E virus: foodborne, waterborne and zoonotic transmission. Int J Environ Res Public Health. 2013;10(10):4507–33.
13. Pischke S, Behrendt P, Bock CT, Jilg W, Manns MP, Wedemeyer H. Hepatitis E in industrialized countries. Hepatology. 2014;60(4):1187–96.
14. Jameel S. Discovery of hepatitis E and its impact on global health. Virus Res. 2019; 286:198080.