



## Original Research Article

## Occurrence of Hepatitis E virus infection in patients screened for Hepatitis A virus

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## ABSTRACT

**Background:** Infectious hepatitis can be caused by Hepatitis A and Hepatitis E viruses. Hepatitis E infection is a water-borne disease transmitted by faeco-oral route. It is a cause of major health problems in developing countries. Outbreaks can happen due to improper hygiene and poor sanitation. Hepatitis E infection shows similar mode of transmission and clinical features of Hepatitis A infection.

**Aim:** This study was conducted to investigate the occurrence of Hepatitis E virus infection in patients screened for hepatitis A virus.

**Materials and Methods:** This prospective surveillance study was conducted between March 2020 to March 2021 on 57 serum samples which is came for the screening of anti-Hepatitis A virus IgM by enhanced Chemiluminescence method. These samples were collected and tested for anti- Hepatitis E virus IgM by Enzyme linked immunosorbent assay.

**Results:** Among 57 samples, 11 samples (19.3%) were positive for Hepatitis A Virus IgM, 13 samples (22.8%) were positive for Hepatitis E virus IgM, and 7 samples (12.3%) were positive for both.

**Conclusion:** Hepatitis E virus infections were more than Hepatitis A virus. Hepatitis E and Hepatitis A virus co- infection was also observed. Screening of both viruses is suggested for infectious hepatitis.

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## 1. Introduction

Developing countries face a major health problem due to enterically transmitted Hepatitis A virus (HAV) and Hepatitis E viruses (HEV) which are the causative agents of acute viral hepatitis.<sup>1</sup> Waterborne diseases are generally caused due to lack of hygiene and environmental sanitation.<sup>2,3</sup> Seeping pipes, heavy monsoons, raw sewage flowing and floods are some of the major reasons for these diseases.<sup>4</sup> HEV is one of the common waterborne diseases in India. The infections are common in middle aged adults and pregnant women, then in children below 10 years of age.<sup>1</sup>

Hepatitis E virus belongs to the genus Orthohepevirus in the family Hepeviridae having single stranded positive-sense RNA.<sup>5</sup> It is a non-enveloped virus having a size of 32-34nm.<sup>6</sup> The route of infection by HEV is faeco-oral route predominantly by genotype 1 and 2. In contrast genotype 3 and 4 spread through undercooked pork and exposure to wild animals.<sup>7</sup> HEV genotypes 5 and 6 are isolated from wild boars, 7 and 8 from dromedary and Bactrian camels. Fruits and vegetables manured or watered using fecal waters of HEV infected animals may also become the route of transmission of disease.<sup>8</sup> Humans can also be infected through direct contact with the infected animals.<sup>4</sup>

Symptoms of HEV manifests between 2 to 6 weeks after infection. Loss appetite, malaise, nausea, vomiting, abdominal pain and jaundice along with fever are the major symptoms. Acute viral hepatitis due to HAV and acute

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HEV infection shows similar type of clinical symptoms, but HAV symptoms are less severe than HEV.<sup>9</sup> Patients suffering from hepatitis, immunosuppressive conditions like hematological illness, immunosuppressive viral disease or oncological disease, blood transfusions and transplant recipients may show chronic presentation of HEV.<sup>10</sup>

In pregnant women HEV infection shows high risk of low birth weight, perinatal mortality, prematurity, maternal mortality and fulminant hepatitis. In developing countries, HEV is associated with HAV outbreak in the form of dual infection.<sup>10</sup> Antibodies to HEV like IgM and IgG can be detected in infection. Routine serological testing for HEV is not popular.<sup>11</sup> Increase prevalence of HEV and HAV co-infections are seen in recent times.<sup>12</sup> This study was conducted to investigate the occurrence of Hepatitis E virus infection in patient screened for hepatitis A virus.

## 2. Materials and Methods

The present prospective surveillance study was conducted in the department of microbiology, for a period of one year from March 2020 to March 2021. Tested and stored samples received in the lab for Hepatitis A IgM enhanced chemiluminescence (ECLIA) assay were included for study. ECLIA for HAV IgM were done as per manufacturer's instructions and interpreted as positive and negative. Sample received for testing only Hepatitis B virus and / or Hepatitis C virus antibody were excluded. Sample size was 57.

Samples received for HAV IgM ECLIA in the laboratory, which completed the testing process, were stored at -20°C till HEV IgM testing is performed. HEV IgM were performed by ELISA on the stored samples. HEV IgM ELISA was done using a commercial ELISA kit, HEV IgM ELISA 3.0, MP Diagnostics, Germany. ELISA was performed with kit positive and negative controls as per the manufacturer's instructions. Later the reading of the ELISA plate was taken in a ELISA reader, Biorad, USA. The results were interpreted as reactive and non-reactive.

## 3. Results

A total of 57 samples were tested for HAV IgM by ECLIA and 11 (19.3%) samples were positive for the HAV IgM. The results of HAV IgM ECLIA is shown in Table 1. Of the 57 samples tested for HEV IgM ELISA 13 (22.8%) were reactive. The results of the HEV IgM ELISA are shown in Table-Table 2.

**Table 1:** Results of HAV IgM ECLIA

	Number	Percentage
Positive	11	19.3%
Negative	46	80.7%
Total	57	100.0%

**Table 2:** Result of HEV IgM ELISA

	Number	Percentage
Reactive	13	22.8%
Non-Reactive	44	77.2%
Total	57	100.0%

Among 13 HEV IgM ELISA reactive samples, 7 (53.8%) were positive for HAV IgM ECLIA and were 6 (46.2%) negative. Among the 44 HEV IgM negative samples 4 (9.1%) were positive for HAV IgM ECLIA and 40 (90.9%) were negative.

Out of 11 HAV IgM ECLIA positive samples 7 (63.6%), were reactive for HEV IgM ELISA and were 4 (36.4%) were non-reactive. Out of 46 HAV IgM ECLIA negative samples 6 (13.0%) were reactive for HEV IgM ELISA and 40 (87.0%) were non-reactive. Of the 57 samples 7 (13.2%) were positive for both HAV IgM and HEV IgM.

## 4. Discussion

Patients having acute viral hepatitis show similarity in symptoms for HAV and HEV and it is difficult to differentiate by the clinical features.<sup>13</sup> Both infections are transmitted similarly by faeco-oral route.<sup>14</sup> Generally screening for HAV is done in endemic areas and often HEV screening is missed. HEV is known to cause life threatening infection in pregnant women, organ transplant patient and immunocompromised patient.<sup>15</sup>

Out of 57 samples screened 11 (19.3%) samples were positive for HAV and 13 (22.8%) samples were reactive for HEV. Out of 11 HAV positive sample 4 (36.4%) were positive for HAV alone. Of the 13 HEV reactive samples 6 (46.2%) were reactive for HEV alone. All HAV and HEV reactive patients had abnormal liver function tests and elevated bilirubin levels. Since none of the samples were screened for other Hepatitis viruses, the status of infections from other Hepatitis viruses and viruses causing hepatitis were unknown. It was evident in the results that occurrence of HEV infections was more common than HAV infection.

In this study of the 57 samples 7 (13.2%) were positive for both HAV and HEV, indicating occurrence of co-infections. A similar study conducted by Kaur M et al; showed 65 (68.42%) were positive for HEV and 2 (2.1%) samples were positive for HAV infection and 6 (6.31%) samples were showing both the positive for both.<sup>1</sup> Another study done on 958 samples by Joon A et al showed 19.31% samples were positive for HAV, 10.54% tested positive for HEV infection and the occurrence of co-infection with both HAV and HEV was 11.5%.<sup>16</sup> Our findings in this study emphasize the need for screening both HAV and HEV viruses whenever infectious hepatitis is suspected.

## 5. Conclusion

Occurrence of Hepatitis E virus infection was more common than Hepatitis A virus. Hepatitis E and Hepatitis A virus co-infection were also observed. Screening of both Hepatitis E and Hepatitis A viruses is suggested in suspected infectious hepatitis.

## 6. Source of Funding

None.

## 7. Conflict of Interest

The author declares no conflict of interest.

## References

1. Kaur M, Sidhu SK, Singh K, Devi P, Kaur M, Singh NJ. Hepatitis E virus: A leading cause of waterborne viral hepatitis in Northwest Districts of Punjab, India. *J Lab Physicians*. 2017;9(02):121–4.
2. Kadri SM, Rehman SU, Rehana K, Benetou DR, Ahmad DF, Abdullah A. Hepatitis A and E outbreak surveillance during 2015–2017 in Kashmir, India: Is the water to blame? *J Epidemiol Glob Health*. 2018;8(3-4):204–7.
3. Vitral CL, Silva-Nunes MD, Pinto MA, Oliveira JD, Gaspar AMC, Pereira RCC. Hepatitis A and E seroprevalence and associated risk factors: A community-based cross-sectional survey in rural Amazonia. *BMC Infect Dis*. 2014;14(1):1–9.
4. Mevis FM, Sabeena S, Sanjay R, Robin S, Devadiga S, Prasad V. Currently circulating genotypes of hepatitis e virus in India. *Indian J Med Microbiol*. 2014;37(4):563–571.
5. Narayanan S, Abutaleb A, Sherman KE, Kottlilil S. Clinical features and determinants of chronicity in hepatitis E virus infection. *J Viral Hepat*. 2019;26(4):414–21. doi:10.1111/jvh.13059.
6. Kumar S, Ratho RK, Chawla YK, Chakraborti A. The incidence of sporadic viral hepatitis in North India: A preliminary study. *Hepatobiliary Pancreat Dis Int*. 2007;6(6):596–9.
7. Paul RC, Nazneen A, Banik KC, Sumon SA, Paul KK, Akramid A. Hepatitis e as a cause of adult hospitalization in Bangladesh: Results from an acute jaundice surveillance study in six tertiary hospitals. *PLoS Negl Trop Dis*. 2014;14(1):1–17.
8. Horvatits T, Wiesch JSZ, Lütgehetmann M, Lohse AW, Pischke S. The clinical perspective on hepatitis E. *Viruses*. 2019;11(7):1–19.
9. Lenggenhager D, Weber A. Hepatitis E Virus and the Liver: Clinical Settings and Liver Pathology. *Gastroenterol Clin North Am*. 2017;46(2):393–407.
10. López-Santaella T, Muñoz T, Medeiros-Domingo M, Moreno-Espinosa S, Consuelo-Sánchez A, Muñoz-Hernández O, et al. Serological and molecular study of Hepatitis E virus in pediatric patients in Mexico. *Ann Hepatol*. 2020;19(3):295–301.
11. Sarthi M, Kumar K, Jayasimha V, Kumar C, Patil S, Taj K. Prevalence of hepatitis A virus as cause of acute viral hepatitis in central Karnataka, India. *Int J Contemp Pediatr*. 2017;4(1):87–9.
12. Gurav YK, Babu GR, Vinu KP, Lole KS. Suspected spread of hepatitis a virus from a restaurant among adults in rural area of the Kerala state, India. *Epidemiol Infect*. 2019;147:e210. doi:10.1017/S0950268819000967.
13. Arora D, Jindal N, Shukla RK, Bansal R. Water borne hepatitis A and hepatitis E in Malwa Region of Punjab, India. *J Clin Diagnostic Res*. 2013;7(10):2163–6.
14. Twagirimugabe T, Saguti F, Habarurema S, Gahutu JB, Bergström T, Norder H. Hepatitis A and E virus infections have different epidemiological patterns in Rwanda. *Int J Infect Dis*. 2019;86:12–4.
15. Melgaço JG, Gardinali NR, DeMello VDM, Leal M, Lewis-Ximenez LL, Pinto MA. Hepatitis E: Update on Prevention and Control. *Biomed Res Int*. 2018;2018:5769201. doi:10.1155/2018/5769201.
16. Khuroo MS, Saleem M, Teli MR, Skidmore S, Sofi MA, Khuroo MI. Incidence and severity of viral hepatitis in pregnancy. *Am J Med*. 1981;70:252–5.

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