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# Sero-Epidemiological Investigationof Hepatitis A Virus (HAV) and Hepatitis E Virus (HEV) among Acute Viral Hepatitis Cases at a Tertiary Care Centrein Punjab

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**ABSTRACT**

**BACKGROUND :** Acute viral hepatitis, primarily caused by enteric viruses like hepatitis A (HAV) and hepatitis E (HEV) carry a significant health burden in India. It poses serious health concerns due to their link with inadequate hygiene and sanitation practices.

**AIM :** In a tertiary care facility in Punjab, North India, the current study sought to determine the prevalence of the hepatitis A and hepatitis E viruses in patients who were presenting with acute viral hepatitis.

**MATERIAL AND METHOD :** A total of 483 serum samples collected from tertiary care hospital in 2022 were analyzed for IgM antibodies against HAV and HEVusing rapid diagnostic tests(RDTs).

**RESULTS :** The results revealed a higher incidence of HAV IgM positivity (13.4%) compared to HEV IgM positivity (8.7%). The combined prevalence of HAV and HEV infections was 22.15%. Gender-wise analysis showed a higher incidence of Hepatitis A in males, while Hepatitis E was more prevalent among females. Additionally, the study found a higher incidence of enteric viral hepatitis in males compared to females. Age-wise distribution indicated a higher proportion of HAV-positive cases in patients < 20 years (76.9%) and HEV-positive cases in young adults of age group 21-30 years (50%). Seasonal variation demonstrated the prevalence of both viruses throughout the year, with peaks in cases observed at the end of the monsoon season and the beginning of winter in this geographical region.

**CONCLUSION :** The study highlights a higher prevalence of Hepatitis A Virus (HAV) as compared to Hepatitis E Virus (HEV) among suspected Acute Viral Hepatitis cases, emphasizing a significant public health concern, and underscores the need for targeted interventions and sanitation measures in our region.

**"KEY WORDS :** Hepatitis A Virus, Hepatitis E Virus, Acute Viral Hepatitis, Rapid diagnostic tests

## Introduction

Acute viral hepatitis is a significant global health concern, primarily attributed to the hepatitis A virus and hepatitis E virus which are enterically transmitted viruses. In our country, communicable diseases poses substantial health burden and have significant public health concerns due to their association with poor hygiene and sanitation.[1,2] India is hyperendemic for both the hepatitis A virus (HAV) and the hepatitis E virus (HEV), according to numerous research from different states that have documented incidences of viral hepatitis.[3] Both HAV and HEV belong to the non-enveloped RNA virus family Hepeviridae, falling under the Hepeto virus genus. These viruses spread through the fecal-oral route and primarily spread through the ingestion of contaminated materials, facilitated by inadequate personal hygiene and sanitation practices.[4,5]

During acute illness, both HAV antibodies (anti-HAV) and HEV antibodies (anti-HEV) can be detected when serum aminotransferase activity is elevated. Initially, IgM class antibodies are the primary

responders and persist for several months.[2] Hepatitis A and E outbreaks and isolated cases have been documented globally, with a notable correlation in areas with contaminated water supplies, inadequate sanitation, unhygienic living conditions, restricted access to medical facilities, and a deficiency in health literacy.[6]

Hepatitis A-related liver disease is relatively uncommon in India and is primarily observed in children whereas HEV plays a major role in causing sporadic cases of acute viral hepatitis and acute liver failure (ALF) in the adult population. This indicates the significant impact of HEV is a potential cause of liver illnesses in India, especially in the adult population.[/3] Studies on acute viral hepatitis have shown co-infection with both the HEV and HAV viruses at rates ranging from 7% to 24%. There are worries that this kind of co-infection could exacerbate the illness and result in a poor prognosis.[7,8]

This study aims to determine the prevalence of HAV and HEV and their correlation with demographic factors in this specific geographic area. This research will contribute to better risk assessment, management and future prevention of acute liver hepatitis cases.

**Materials and Methods:**

The current investigation, which was carried out from January to December 2022 at a tertiary care facility in Punjab, North India, using laboratory records, aimed to ascertain the prevalence of HEV and HAV infection in patients who had been diagnosed with acute viral hepatitis. In this particular time period, 483 individuals from the inpatient department (IPD) and outpatient department (OPD) who were suspected of having acute viral hepatitis were included in the study. Following the manufacturer's instructions, commercially available RDTs (CTK Biotech.) were used to evaluate the serum samples for IgM anti-HAV and IgM anti-HEV.

**Inclusion Criteria:**

In this study, samples that requested both for HEV and HAV IgM were included.

**Exclusion Criteria:**

In this study, samples that requested either for HAV IgM or HEV IgM were not excluded.

**Results:**

A total of 483 serum samples were processed in year 2022for HAV and HEV IgM detectionin Viral Research Diagnostic lab of a Tertiary care Hospital, Patiala Punjab. Post screening, it was reported that there were more HAV IgM positivity cases (65) as compared to HEV IgM positive (42) (Fig. 1). The percentage of individuals testing positive for Hepatitis A was 13.4%, whereas for Hepatitis E, it was 8.7%. The combined prevalence of HAV and HEV infections was found to be 22.15% (Table 1). Notably, no case of co-infection with both HAV and HEV was observed during this one-year study.

Regarding gender distribution, for Hepatitis A, there were a higher number of male patients (41) than female patients (26). However, in the case of Hepatitis E, there were more female patients (27) than male patients (15) (Fig. 2). Overall, the incidence of enteric viral hepatitis was higher in males (24.2%) compared to females (21%), as illustrated in Figure 3.

The majority of positive HAV cases were among children (44.6%), while HEV positivity was predominantly observed in young adults within the age group of21-30 (50%) as depicted in Fig. 4. The seasonal pattern of hepatitis A and hepatitis E (as shown in Fig. 5) reveals that both viruses were prevalent consistently throughout the year. There was a notable peak in the number of cases during the transition from the monsoon season to the onset of winter in this particular geographical region. A surge in HAV cases was also noted in summers (May-22%,

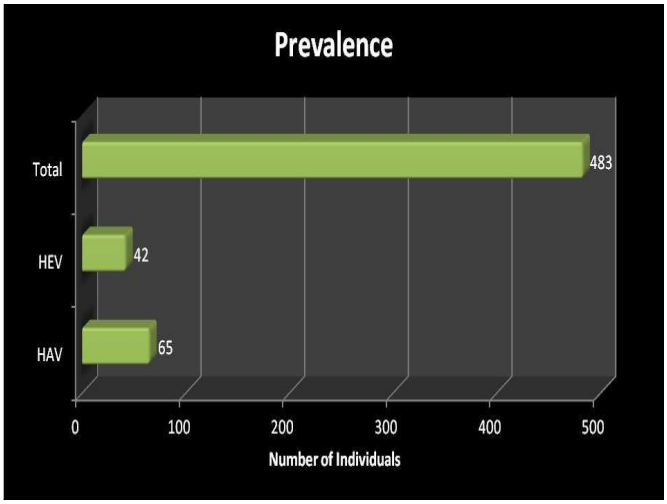



**Figure 1: Prevalence of HEV and HAV amongst Hepatitis Positive individuals**

**Table 1: Month-wise distribution of HAV and HEV Positive individuals**

| Month | Total Samples collected | HAV | | HEV | | Overall Hepatits Prevalance |
|---|---|---|---|---|---|---|
| | | +ve | % +ve | +ve | % +ve | |
| **Jan** | 14 | 1 | 7.14 | 2 | 14.29 | 21.43 |
| **Feb** | 15 | 1 | 6.67 | 4 | 26.67 | 33.33 |
| **Mar** | 28 | 0 | 0.00 | 5 | 17.86 | 17.86 |
| **Apr** | 76 | 5 | 6.58 | 7 | 9.21 | 15.79 |
| **May** | 50 | 11 | 22.00 | 5 | 10.00 | 32.00 |
| **Jun** | 58 | 13 | 22.41 | 6 | 10.34 | 32.76 |
| **July** | 50 | 9 | 18.00 | 3 | 6.00 | 24.00 |
| **Aug** | 57 | 8 | 14.04 | 5 | 8.77 | 22.81 |
| **Sep** | 41 | 7 | 17.07 | 2 | 4.88 | 21.95 |
| **Oct** | 0 | 0 | 0 | 0 | 0.00 | 0.00 |
| **Nov** | 48 | 4 | 8.33 | 2 | 4.17 | 12.50 |
| **Dec** | 46 | 6 | 13.04 | 1 | 2.17 | 15.22 |
| **Total** | **483** | **65** | 13.46 | **42** | 8.70 | 22.15 |

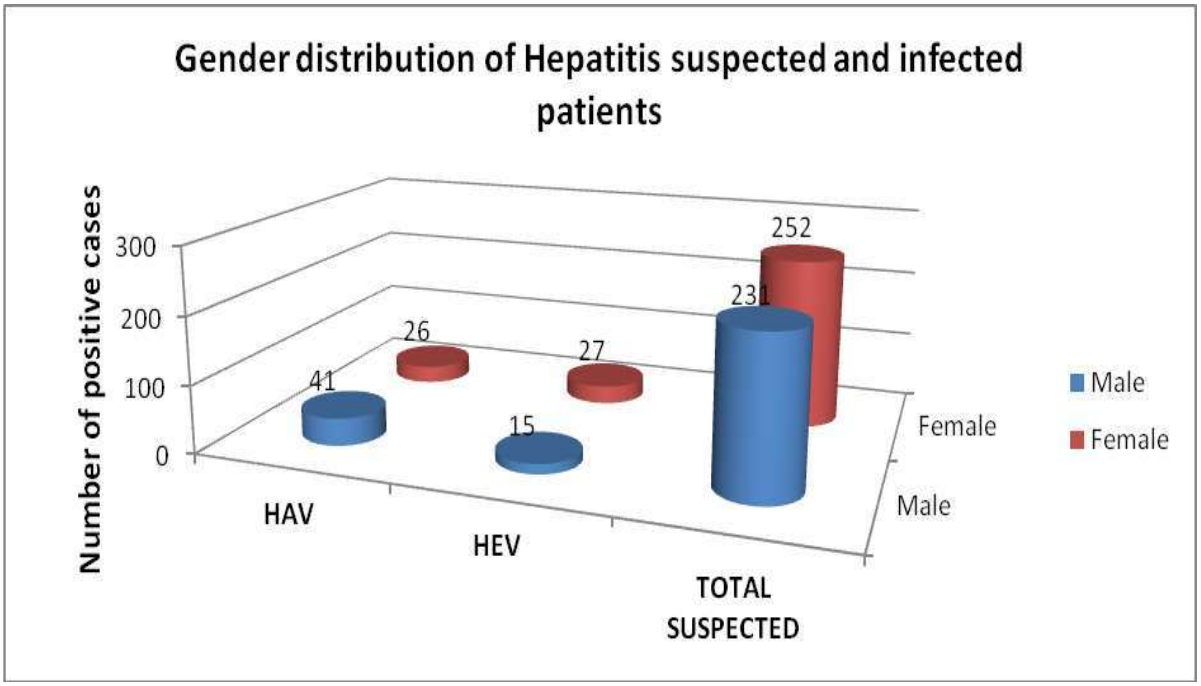



**Figure 2: Gender wise distribution of Total Hepatitis suspected and infected patients**

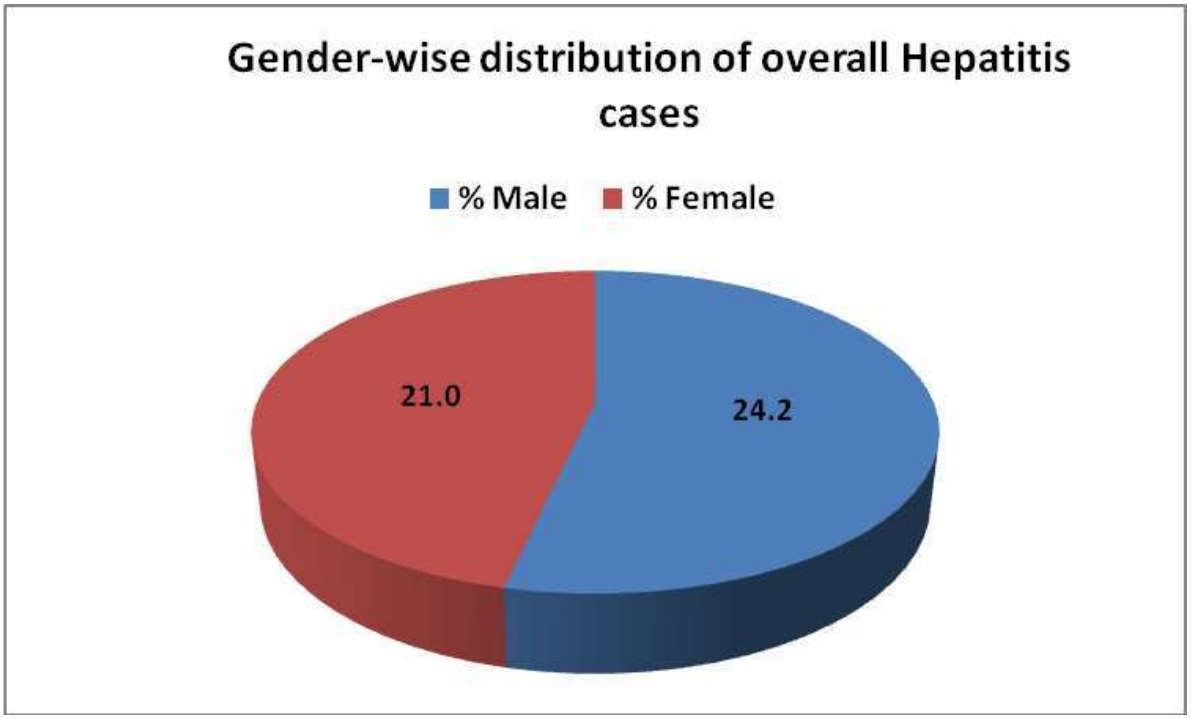



**Figure 3 : Gender-wise distribution of Total Hepatitis cases (HEV + HAV)**

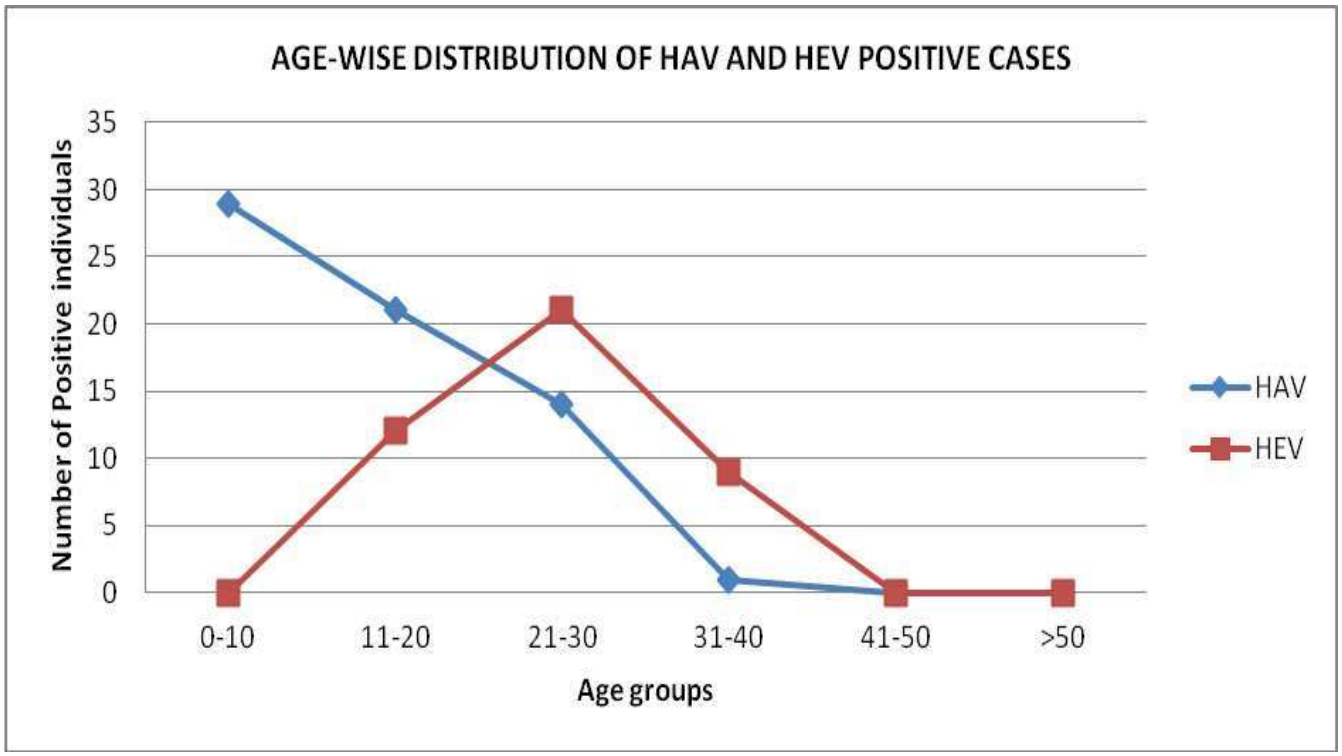



**Figure 4: Distribution of HAV and HEV positive patients categorized by age groups.**

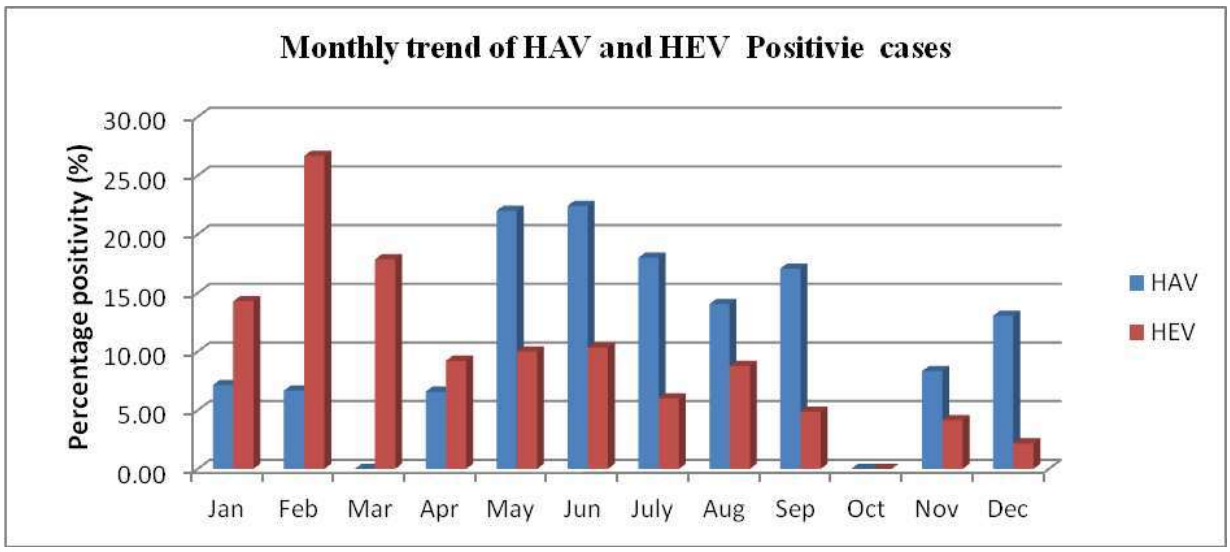



**Figure 5: The impact of weather conditions on the occurrence of HAV and HEV infections among patients.**

**Discussion:**

The viruses that cause hepatitis A and E are common in developing countries like India and are responsible for both isolated and widespread occurrences of acute hepatitis globally.[1] The hepatitis A virus is often regarded as the most frequent cause of viral hepatitis worldwide.[3] HEV is particularly prevalent in India, where it frequently results from sewage pollution of drinking water sources. The illness can present as outbreaks or isolated episodes of viral hepatitis. The study's conclusions provide important new information on the distribution and prevalence of HEV and HAV in the community of acute viral hepatitis cases under investigation.

Given that India is regarded as a hyper-endemic zone for HAV, the current finding indicates that HAV has a higher seroprevalence of 13.5% compared to HAV (8.7%), which is consistent with findings from other regions of the nation.[ 9,10] The results of a previous study carried out in North India are consistent with the lack of concurrent infection involving both HEV and HAV during the study period.11]It is crucial to remember that co-infection rates might differ greatly depending on the population and geography, requiring constant monitoring.[10] The observed gender distribution disparities in HAV and HEV cases, with more males affected by HAV and more females affected by HEV, is s in agreement with other studies in the region.[2,8] These variations may be influenced by different risk factors and exposure patterns among genders.

The age-wise distribution of cases, with a higher proportion of HAV-positive cases in children and HEV-positive cases in young adults of age group 21-30 years, shows concordance with the previous studies.[2,10] This may reflect differences in exposure sources and behavior patterns in these age groups.

The seasonal variation in HAV and HEV cases, with peaks in monsoon and winter seasons, aligns with previous studies in India.[2,12] This is attributed to the remarkable stability of HAV, which can survive in water for up to 10 months. Consequently, the virus exhibits relative resistance to heat and chemical inactivation, contributing to its dissemination.[2] Thus, seasonal hepatitis A and E occurrences are most likely linked to disruptions in sanitation and water supplies. This information is crucial for public health planning and preparation.

**Conclusion:**

This study provides important information about the seasonal trends, demographic distribution, and prevalence of HEV and HAV infections in the population. To lessen the effects of these viruses, targeted vaccination campaigns, hygienic initiatives, and public health initiatives can be informed by these findings. However, continued surveillance and research are essential to monitor trends and adapt strategies as needed.

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**Conflict Of Interest :** None

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