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Original Research Article

PREVALENCE OF HEPATITIS A AND E IN TERTIARY CARE HOSPITAL, SALEM, TAMIL NADU

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ABSTRACT

Background: Hepatitis A virus (HAV) and Hepatitis E virus (HEV) are major causes of acute viral hepatitis in settings with poor sanitation, with HEV posing a high risk to affectable groups. This study aimed to determine the prevalence of suspected cases and examine demographic, seasonal, and liver function patterns. **Materials and Methods:** This cross-sectional study included 323 patients who attended the Mohan Kumaramangalam Medical College and Hospital in Salem from April to December 2024. All underwent ELISA testing for anti-HAV IgM and anti-HEV IgM. Age, gender, and seasonal distribution were recorded, and liver function parameters (total and direct bilirubin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP)) were documented for all seropositive cases. **Result:** HAV IgM positivity was 75 (23.2%), while HEV IgM positivity was 9 (2.8%). HAV–HEV co-infection was identified in 1 (0.3%). Overall, 83 (25.7%) patients had enteric hepatitis. HAV positivity was highest in the 0–10 years age group (47%), and HEV positivity ranged from 1.4% to 5.1% across age groups. Males vs females showed HAV positivity of 25.3% vs 20.6% and HEV positivity of 3.3% vs 2.1%. The monsoon season had the highest positivity for both HAV (28.1%) and HEV (4.1%). HAV-positive patients showed elevated bilirubin (4.8 mg/dL), ALT (713 IU/L) and AST (635 IU/L), while HEV-positive patients had even higher values, including bilirubin (6.1 mg/dL) and ALT (829 IU/L). **Conclusion:** HAV was the predominant infection, particularly in children, and both HAV and HEV high during the monsoon season. Elevated liver enzyme levels in positive cases highlight the need for improved sanitation and strengthened surveillance.

INTRODUCTION

Acute viral Hepatitis A caused by the transmission of hepatitis A virus (HAV) and Hepatitis E virus (HEV) remains a public health problem in many low- and middle-income countries, particularly where sanitation and water supply are suboptimal. Recent hospital-based data in India showed that HEV often contributes a substantial part of acute viral hepatitis cases, sometimes exceeding the burden of HAV.[1,2] HAV infection in India has occurred mainly in early childhood, leading to widespread immunity in adolescence. However, with improvements in hygiene and socio-economic conditions, the age of primary exposure is changing toward older children, adolescents, and adults. That increases concerns because an older age at infection is associated with more severe clinical outcomes.[3,4] HEV, in opposite tends to affect adolescents and young adults, and carries increased risk in certain high-risk groups such as pregnant women, where case-fatality were notably higher.[5] The potential for HAV-HEV co-infection, though less frequent, is relevant since it may cause more severe liver injury and acute liver failure.[6]

Epidemiological studies have reported geographic and temporal variations in seroprevalence of HAV and HEV in India. One retrospective study found HAV IgM positivity of 9.4%, HEV IgM positivity of 23.3% and a 5.2% rate of co-infection among patients with suspected viral hepatitis.[7] Seasonal spreading's where high are often associated with monsoon-related water contamination, highlighting the influence of environmental factors on disease spread.[8] However, most available Indian data are

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region-specific, temporally variable, and often outdated, creating a need for recent state-level evidence to understand current transmission trends and population susceptibility.

Acute viral hepatitis due to these spreads places burdens on health systems through hospital admissions, liver-function abnormalities and occasionally causes acute liver failure.[9-11] With this changing epidemiology, up-to-date from diverse hospital settings are needed to inform local prevention strategies. In our setting, it is important to assess the seroprevalence of acute HAV and HEV (through IgM detection) among patients presenting with suspected viral hepatitis, analyse demographic and seasonal patterns, and correlate viral markers with liver function test abnormalities. Therefore, this study aimed to assess the prevalence of IgM anti-HAV and anti-HEV antibodies among patients suspected of acute viral hepatitis, to evaluate the associated demographic characteristics (age and sex), seasonal distribution, and to examine the relationship with liver function test (LFT) parameters.

MATERIALS AND METHODS

This cross-sectional observational study was conducted on 323 patients at the Virology Research and Diagnostic Laboratory, Department of Microbiology, Government Mohan Kumaramangalam Medical College and Hospital, Salem, over nine months from April to December 2024. Ethical approval was obtained from the Institutional Ethics Committee, and informed consent was obtained from all patients before data collection.

Inclusion Criteria

Patients of all ages, both inpatients and outpatients, presenting with symptoms of acute viral hepatitis and consenting to anti-HAV and anti-HEV IgM enzyme-linked immunosorbent assay (ELISA) testing were included.

Exclusion Criteria

Patients with a known diagnosis of chronic liver disease, such as chronic hepatitis B or C, those who had received a hepatitis A vaccination within the previous six months, individuals unwilling or unable to provide consent, and those with incomplete clinical records or missing follow-up data were excluded.

Methods

All patients underwent venous blood sampling for serological tests. IgM antibodies against HAV and HEV were detected using a commercially available ELISA test. For all patients who tested positive for HAV or HEV IgM also underwent LFT, including total bilirubin, direct bilirubin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP), were recorded. Demographic variables, including age, gender, and seasonal distribution based on the month of presentation, were extracted. The above clinical and laboratory information was systematically entered into a structured database for analysis.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS v23. Continuous variables are expressed as mean values with standard deviations, and categorical variables are presented as frequencies and percentages.

RESULTS

HAV positivity was highly observed in the 0–10-year age group (47%) and decreased progressively with age, reaching 6.3% among those > 40 years. HEV positivity remained low across all age groups (1.4%–5.1%). By gender, HAV positivity was 25.3% in males and 20.6% in females, whereas HEV positivity was 3.3% in males and 2.1% in females. [Table 1]

Table 1: Age and gender distribution of HAV and HEV positivity

Parameters	Category	N	HAV+ N, %	HEV+ N, %
Age group (years)	0–10	68	32 (47.0%)	1 (1.4%)
	11–20	52	19 (36.5%)	1 (1.9%)
	21–30	78	12 (15.3%)	4 (5.1%)
	31–40	62	8 (12.9%)	2 (3.2%)
	>40	63	4 (6.3%)	1 (1.6%)
Gender	Male	182	46 (25.3%)	6 (3.3%)
	Female	141	29 (20.6%)	3 (2.1%)

HAV positivity was highest during the monsoon season (28.1%), followed by winter (21.7%) and summer (16.5%). HEV positivity is also higher in the monsoon (4.1%), with lower rates in winter (2.1%) and summer (1.2%). [Table 2]

Table 2: Seasonal distribution of HAV and HEV positivity

Season / Months	N	HAV+ (%)	HEV+ (%)
Summer (Mar–May)	85	14 (16.5%)	1 (1.2%)
Monsoon (Jun–Sep)	146	41 (28.1%)	6 (4.1%)
Winter (Oct–Dec)	92	20 (21.7%)	2 (2.1%)

HAV IgM positivity was 23.2%, HEV IgM positivity was 2.8%, HAV–HEV co-infection was 0.3%, and the overall prevalence of any enteric hepatitis was 25.7% of the cases. [Table 3]

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Table 3: Distribution of enteric hepatitis status

Category	Subtype	N (%)
Enteric hepatitis status	HAV IgM positive	75 (23.20%)
	HEV IgM positive	9 (2.80%)
	HAV–HEV co-infection	1 (0.30%)
	Any enteric hepatitis	83 (25.70%)

HAV-positive patients had a mean total bilirubin of 4.8 mg/dL, direct bilirubin of 2.9 mg/dL, ALT of 713 IU/L, AST of 635 IU/L, and ALP of 244 IU/L. HEV-positive patients had total bilirubin of 6.1 mg/dL, direct bilirubin of 3.8 mg/dL, ALT of 829 IU/L, AST of 751 IU/L, and ALP of 261 IU/L. Negative cases recorded total bilirubin of 1.2 mg/dL, direct bilirubin of 0.6 mg/dL, ALT of 84 IU/L, AST of 76 IU/L, and ALP of 138 IU/L. [Table 4]

Table 4: LFT test profile in HAV+, HEV+, and negative cases

Category	Subtype	HAV+ (n=75)	HEV+ (n=9)	Negative cases (n=239)
LFT parameter	Total bilirubin (mg/dL)	4.8 ± 2.1	6.1 ± 2.9	1.2 ± 0.6
	Direct bilirubin (mg/dL)	2.9 ± 1.4	3.8 ± 1.7	0.6 ± 0.3
	ALT (IU/L)	713 ± 326	829 ± 384	84 ± 42
	AST (IU/L)	635 ± 298	751 ± 341	76 ± 38
	ALP (IU/L)	244 ± 88	261 ± 97	138 ± 52

DISCUSSION

This study aimed to assess the prevalence of HAV and HEV in suspected viral hepatitis cases and to look at their demographic, seasonal, and LFT patterns. HAV was the main infection in children, especially during the monsoon, while HEV appeared less often. Both viruses showed raised liver enzymes, suggesting clear hepatic involvement. Our findings show that HAV still affects younger age groups and has strong seasonal variation, whereas HEV is less common but still clinically important. These trends reflect their different transmission routes, with HAV mainly spread by early-life faecal–oral exposure and HEV more linked to contaminated water in older age groups

HAV positivity was highest among younger children and decreased with increasing age, whereas HEV positivity was low across all age groups. Male patients showed higher positivity rates for both HAV and HEV than female patients. Similarly, Palewar et al. reported 6.7% HAV positivity among 1,807 cases, with the highest rates in the 6–10-year group (29%), 0–5 years (13.3%) and 11–15 years (13.3%), while HEV positivity (8.5%) increased in the 21–25 years (14.9%) and 26–30 years (14.28%) groups, and showed female predominance for both HAV (52.5%) and HEV (53.89%).[12] In contrast, Singel et al. found 13.7% HAV positivity (42/577) and 10.5% HEV positivity (5 cases), with HAV affecting ages 2–68 years and HEV occurring mostly in those 30–70 years, alongside female predominance (HAV: 22 females vs. 20 males; HEV: 3 females vs. 2 males).[13] These variations compared with our findings may be attributable to differing sample populations, referral patterns and regional water quality variations.

Similar to our demographic pattern, Murhekar et al. also reported HAV positivity highest in children ≤9 years (29.5%) and decreasing to 2.8% in those ≥60 years, while HEV increased in adulthood and high at 29.5% in the 20–29-year group; HAV was 12.1% in males and 13.2% in females, whereas HEV was higher in males (16.9%) than females (14.9%).[14] Jain et al. found that males formed 62.9% of 987 cases and had higher HAV (58%) and HEV (66%) positivity than females (42% and 34%), with HAV predominantly in paediatric cases (74.8%) and HEV more common in adults (71.1%).[15] Across multiple studies, the age-related patterns consistently demonstrated higher HAV prevalence in childhood and an increasing HEV burden in adulthood. These consistencies across large datasets strengthen the epidemiological validity of the age-specific distribution identified in our study.

In our study, HAV positivity was highest during the monsoon season, followed by winter and lowest in summer. HEV showed a similar seasonal, with high positivity during the monsoon and a decrease through winter and summer. This seasonal concentration likely reflects increased contamination of drinking water during monsoon flooding and overburdened sanitation infrastructure. Palewar et al. found that both HAV and HEV infections occurred full the year but were highest during the monsoon and post-monsoon months (June–October).[12] In contrast, Parameswari et al. observed relatively detection rates throughout the six months, with the highest cases in March (60 cases), followed by May (56 cases) and June (55 cases).[16] Differences between studies could be linked to local rainfall intensity, water supply systems and urban–rural variations. Multiple studies consistently report a marked increase in both HAV and HEV infections during the monsoon season, indicating a strong seasonal influence on their transmission. These findings also align with HEV's known endemicity in several southern Indian states, where intermittent seasonal clusters have been documented due to periodic contamination of municipal water sources.

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In our study, HAV IgM positivity was higher than HEV IgM positivity, and co-infection was identified in only one case. Enteric hepatitis remained moderate when considering HAV, HEV, and co-infection together. Similarly, Parameswari et al. reported a high HAV prevalence of 42.9%, low HEV prevalence of 2.49%, and 1.24% co-infection among 321 samples, though our HAV (23.2%), HEV (2.8%), and co-infection (0.3%) rates were lower.16 In contrast, Murhekar et al. documented 12.6% HAV positivity and a much higher 16.1% HEV positivity, with 1.3% co-infection across 24,000 samples.[14] This suggests possible regional micro-epidemiological differences, variation in outbreak cycles, or differing sensitivities of test methods.

Likewise, Anumolu et al. observed 71% HAV IgG seroprevalence in adolescents and 18.7% HAV IgM positivity among 1,227 samples tested over two years.[17] Jain et al. recorded 22.9% HAV positivity, 9.83% HEV positivity, and 3.24% co-infection among 987 cases, showing similar HAV but higher HEV and co-infection rates compared to our findings.[15] Therefore, the study's results confirm changes in HEV and co-infection rates, while HAV remained consistent. While HAV circulation remains steady, HEV transmission may be more episodic and influenced by local environmental factors. This reinforces the need for periodic surveillance to detect shifts in HEV activity.

In our study, HAV-positive patients showed elevated liver enzyme levels, whereas HEV-positive patients showed even higher elevations. In contrast, those who tested negative cases had lower values of LFT. This gradient supports the clinical understanding that HEV often produces more pronounced hepatic inflammation in adults, whereas HAV tends to produce moderate but self-limiting injury in children. Jain et al. observed elevated mean bilirubin of 7.38 mg/dL in HAV and 7.78 mg/dL in HEV, alongside ALT levels of 692.2 U/L and 797.8 U/L, respectively.[15] These biochemical variations likely arise from differences in age, comorbidities, genotype distribution, and time of presentation. This study included a substantial sample size from a government tertiary centre, used standardised ELISA testing for viral markers, and incorporated both demographic and seasonal analyses, which strengthens the internal validity and reproducibility of the findings.

Khongviwatsathien et al. reported even higher elevations in acute HAV (AST 1004 U/L, ALT 1551 U/L) than in HEV (AST 443 U/L, ALT 539 U/L), although bilirubin levels were high in both (8.94 mg/dL vs. 5.90 mg/dL).[18] Istrate et al. found HAV cases showing elevated AST (870 U/L), ALT (1817.5 U/L), and bilirubin (5.87 mg/dL) levels, while HEV cases had lower AST (145.5 U/L), ALT (401 U/L), and lower ALP levels (154.5 U/L vs. 205 U/L in HAV).[19]

HAV mainly affects children and follows a clear monsoon pattern, while HEV is less common but still leads to liver injury. These findings are similar to earlier reports and create the need for better surveillance and prevention measures. In future, multi-centre and long-term studies are needed to track changing patterns of HAV and HEV. Adding HEV genotyping may help explain strain-related virulence. Sample analysis of water and sewage should also be included to understand transmission better, and community seroprevalence surveys are important to know the real immunity levels in different age groups.

Limitations

This study was limited by its single-centre design and dependence on routinely recorded clinical and laboratory data, which may have introduced information bias. The nine-month study duration limits long-term observation of seasonal changes. Interpretation is also limited by the absence of genotyping data and lack of detailed environmental exposure assessment, which restricts deeper inference regarding transmission dynamics.

CONCLUSION

HAV was the main cause of enteric hepatitis, especially in children, whereas HEV occurred less across age groups. Both infections are high during the monsoon season. HAV+ and HEV+ positive patients showed increased liver enzyme levels compared to negative patients. Overall, one-fourth of the suspected cases had acute enteric hepatitis, highlighting the need for strengthened preventive and surveillance measures.

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