Research Article

Seroprevalence of Hepatitis A Virus (HAV) and Hepatitis E Virus (HEV) Co-infection in the Patients Presenting with Acute Viral Hepatitis Attending a Tertiary Care Hospital in North India

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Abstract

Introduction: Hepatitis A virus (HAV) and Hepatitis E virus (HEV) are both transmitted enterically, resulting in acute viral hepatitis (AVH) in developing countries like India. HAV has a world-wide distribution and affects infants and young children in developing countries, and its epidemics are not very common. HEV is restricted to tropical countries and affects older children and young adults, and its epidemics are common. Co-infection with both viruses may lead to serious complications.

Aim: This study was done to determine prevalence of HAV and HEV in patients presenting with AVH and the co-infection of HAV and HEV in these patients.

Materials and Methods: A cross-sectional study of one year's duration was conducted in the Department of Microbiology, Dr. Ram Manohar Lohia Hospital, New Delhi. 1230 patients presenting with AVH were considered in the study. Serum samples were analyzed for IgM anti-HAV and IgM anti-HEV for the detection of HAV and HEV infection, respectively, using commercially available ELISA kits.

Results: The seroprevalence of HAV- and HEV-positive patients was 15.5% and 27.2%, respectively. The seroprevalence of both HAV and HEV in patients with acute viral hepatitis was 5.1%. The prevalence of HAV and HEV among males (14.6% and 29.8%) was higher than in females (16.6% and 23.4%). These infections were predominantly seen during end of monsoons and beginning of winter.

Conclusion: The prevalence of HEV is much higher than that of HAV; co-infection rate of 5.1% mandates the screening for HEV which will be of immense importance in pregnant women and improving levels of personal hygiene among lower socio-economic population.

Keywords: Acute viral hepatitis, Co-infection, Hepatitis A virus, Hepatitis E virus, Prevalence

Introduction

Hepatitis A and hepatitis E are enterically transmitted viral diseases having great public health importance in developing countries like India.[1] Feco-oral transmission is favored by poor personal hygiene and inappropriate sanitary conditions.[2]

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Hepatitis A virus (HAV) is a non-enveloped 27-nm, heat-, acid-, and ether-resistant RNA virus in the genus *Hepatovirus* of the family *Picornaviridae.*[3] HAV affects infants and young children in developing countries but its epidemics are rare.[4] The infection is usually sub-clinical or acute and remains self-limited and does not progress to chronic liver disease.[5]

Hepatitis E Virus (HEV) infection occurs endemically as well as primarily in Asia, Africa, and Central America. It is a non-enveloped, single-stranded positive-sense RNA virus in the genus *Hepevirus* family *Hepeviridae.*[6] HEV is restricted usually to older children and young adults,[7] and usually causes self-limiting viral infection followed by recovery. It can induce fulminating acute disease in pregnant women, producing mortality of approximately 80%.[8]

Anti-HAV and anti-HEV IgM antibodies can be detected during acute illness when liver enzymes are elevated and fecal shedding is still occurring. This early antibody response falls rapidly after acute infection, reaching low levels within 6 months. During convalescence, anti-HAV and anti-HEV IgG antibodies become the predominant class.[9]

This study was conducted to determine the prevalence of HAV and HEV infection in patients presenting with acute viral hepatitis and also the prevalence of their co-infection.

Materials and Methods

A cross-sectional study was conducted from January 2016 to December 2016. A total of 1230 patients suffering from suspected acute viral hepatitis (AVH) of both sexes and all age groups attending a tertiary care center in North India, were included in the study.

Inclusion Criteria

Samples with request of both HAV IgM and HEV IgM were included in this study.

Exclusion Criteria

Samples with request of either HAV IgM or HEV IgM were not included in this study.

The serum samples from the selected patients were analyzed for IgM anti-HAV and anti-HEV for the detection of hepatitis A and E using commercially available ELISA kits of Autobio and Dipro Diagnostics, respectively. All tests were carried out as per the manufacturer's instructions.

Results

A total of 1230 serum samples were processed for HAV and HEV IgM. In the age group of <18 years, 738 cases; age group of 19–45, 382 cases and age group of >45 years 110 cases were studied. Among all the samples, 718 samples were of males and 512 samples were of females. Out of 1230 samples, 190 samples were only HAV IgM positive, 334 samples were only HEV IgM positive and 63 samples were found positive for both HAV and HEV IgM. The overall prevalence of HAV and HEV infection was found 42.7%. The prevalence of HAV infection was found to be 15.5%, HEV infection 27.2% and HAV-HEV co-infection 5.1%.

HAV infection in males and females was found to be 14.6% and 16.6%, respectively. In case of HEV infection in males and females, it was found to be 29.8% and 23.4% respectively (Table 1).

Table 1.Sex Distribution of HAV and HEV IgM Positive Cases

	Male	Female
Total	718	512
HEV	214 (29.8%)	120 (23.4%)
HAV+HEV	41 (5.7%)	22 (4.2%)
HAV	105 (14.6%)	85 (16.6%)

In our study, maximum number of HAV infection was found in the age under 10 years. Highest prevalence was in the patients with age between 2 and 10 years. HEV infection was found maximum in the age group of 11–45 years.

Age-wise distribution of HAV and HEV IgM positive cases is depicted in Table 2.

Table 2.Age-Wise Distribution of HAV and HEV Positive Cases

Age Group (Years)	Total Cases Studied	Only HAV Positive		Only HEV Positive	
		Male	Female	Male	Female
<2	87	30	20	4	4
2–10	350	54	48	11	8
11–18	301	12	9	63	37
19–30	214	6	2	61	40
31–45	168	1	5	58	16
>45	110	2	1	17	15

Co-infected cases were found maximum in the age group 2–18 years. Co-infection was not found in the <2 and >45 years of age (Table 3).

Table 3.Age-Wise Distribution of HAV and HEV Co-infected Cases

Age Group (Years)	Coinfection	
	Male	Female
<2	-	-
2–10	13	8
11–18	22	4
19–30	4	3
31–45	2	7
>45	-	-

HAV and HEV was seen to be prevalent all around the year with maximum cases seen during monsoons and beginning of winters (Fig. 1).

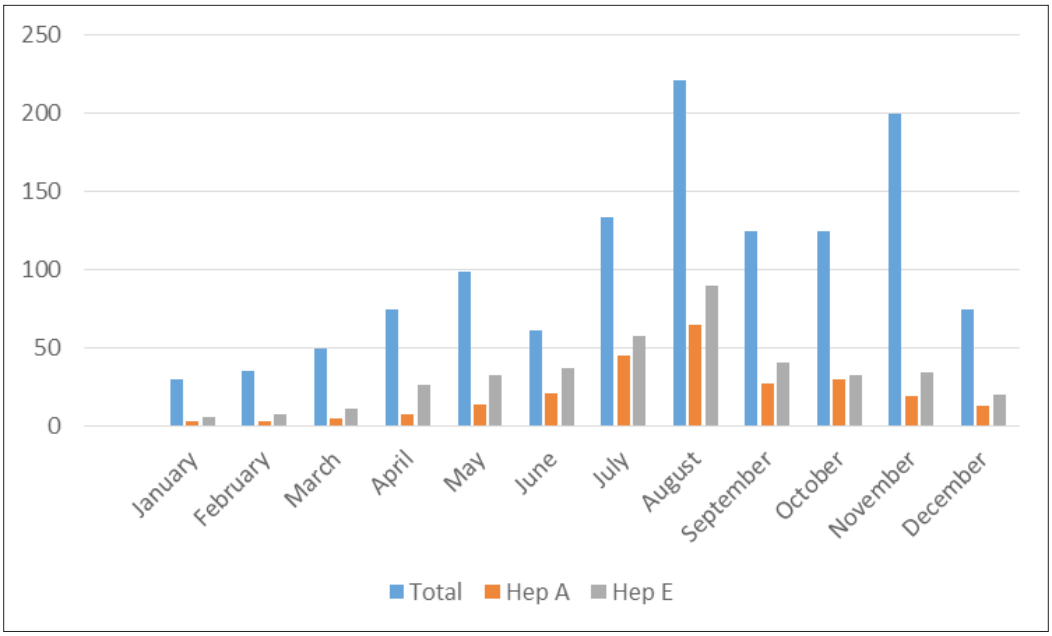

Figure 1.Seasonal Distribution of HAV and HEV Infections

Discussion

Globally, HAV is considered as the common cause of viral hepatitis,[10] but in our study HEV (27.2%) was identified as the major cause of acute viral hepatitis and more common than HAV (15.5%), which is concordant with the results of other studies from different regions of the country.[11,12] The reasons may be the high prevalence of anti-HAV antibodies in general population, availability of vaccine against HAV and improved living standards and environmental hygiene.[13]

It is believed that HAV infection is a disease of infants and young children and the same was found in our study with 80% of total HAV positivity in children below 10 years. On the other side, HEV was found maximum positive in population of 11–45 age group with slightly more frequent in males than females. This justifies the preponderance of HEV infection in older children and young adults.

Co-infection with HAV and HEV was found in 63 cases with the seroprevalence of 5.1%. It is similar in various other studies also.[12,14,15]

In our study, co-infection was found more common in age group 3–18 years and is in conjunction with other studies.[12,16] Although this finding was paradoxical in the presence of improved sanitary conditions, public education, vaccination for HAV infection and less prevalence of HEV infection in age group <15 years and same mode of transmission, doubtful immunity from both the viruses or with a divergent strain of virus can be the possible reason for the co-existence of infections.[17]

Co-infection with HAV and HEV does not affect the prognosis of the patient much as these cases usually resolve with conservative treatment but in rare cases may lead to acute liver failure.[15,16] Diagnosis of HAV-HEV co-infection is difficult by clinical presentation and biochemical analysis; serology and PCR may help in timely diagnosis and identification of causative agent and support in prevention and management of acute liver failure in children and adults.

Cases were reported throughout the year as these infections are endemic in India, with the peak number in June–September, i.e., the rainy season. It is possibly due to cross

contamination of drinking water with sewage during the rainy season.[18]

Both HAV and HEV prevalence was detected higher in males than in females. Outdoor and social activities of males may make them more vulnerable for exposure than females.[19]

Infection usually resolves without any sequel but in rare cases may lead to fulminant liver failure. No specific treatment is available, complete rest following infection is important for recovery.

HAV and HEV infections are transmitted enterically and have similar risk factors; therefore, the most effective method to prevent infection is to interrupt the route of transmission and focus on proper sanitary conditions, hygiene and public education.[14,17] Simultaneously, vaccines can be used as a preventive strategy. Although HAV vaccine is in the market but it is not easily accessible and is less cost effective due to high prevalence of anti-HAV antibody in the general population in a country like India. HAV vaccine can be used in high-risk population like chronic liver disease patients, travelers visiting endemic areas, and during onset of epidemics. As HAV infection is common in younger children, inclusion of single-dose inactivated HAV vaccine in immunization schedule of children can be useful in prevention of infection.[9,14,17]

Conclusion

The high prevalence of HEV mandates the screening for HEV because it may lead to grave consequences, especially in pregnant women. Improving levels of personal and food hygiene and proper sanitary conditions are of immense public health value in prevention of feco-orally transmitted Hepatitis A and E viruses.

Conflict of Interest: None

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