

# Prevalence of Hepatitis A Virus and Hepatitis E Virus in Western Thar Region

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## ABSTRACT

**Introduction:** Hepatitis A Virus (HAV) and Hepatitis E Virus (HEV) pose major health problems in India. Both viruses are enterically transmitted, resulting in Acute Viral Hepatitis (AVH) in developing countries. This study was done to determine prevalence of HAV and HEV and their co-infection in patients presenting with AVH in a tertiary care hospital.

**Aim:** To determine the prevalence of HAV and HEV and their co-infection among patients attending a Tertiary Care Hospital in Jodhpur presenting with symptoms of acute hepatitis.

**Materials and Methods:** A cross-sectional study of one year duration was conducted in the Department of Microbiology, Dr S.N. Medical College, Jodhpur. A non random sampling of 174 patients presenting with AVH was considered in the study. On the basis of history, serum samples were analyzed

for IgM anti-HAV and IgM anti-HEV for the detection of HAV and HEV, respectively using commercially available ELISA kits. Data collected was analysed by using Statistical Package for the Social Sciences (SPSS) version 11 and p-value <0.05 was considered significant.

**Results:** The seroprevalence of HAV and HEV positive patients were 13.79% and 4.02%, respectively. The seroprevalence of both HAV and HEV in patients with AVH was 1.15%. The prevalence of HAV and HEV among males (58.3% and 41.6%) was higher than in females (7.97% and 14.28%).

**Conclusion:** The prevalence of HAV is higher than that of HEV but screening of HEV should be done as there are cases of co-infections. In this region of country, these data will play a role in planning of vaccination strategies and for better sanitation programme in future.

**Keywords:** Acute viral hepatitis, Co-infection, Hepatotrophic viruses

## INTRODUCTION

AVH is a major public health problem in developing nations having inadequate sanitary conditions. The hepatitis viruses residing in India are usually in endemic forms. The hepatitis viruses are primarily hepatotropic and their clinical presentations are similar in nature. The hepatitis viruses have different etiology and they also differ in certain characteristics such as epidemiology, immunology, clinical and pathology. Jaundice is an important and common feature of illness since the liver is the principle organ affected [1]. The identification of these viruses has started with the detection of Hepatitis B Virus (HBV) in 1970, followed by HAV in 1973, Hepatitis D Virus (HDV) in 1977, HEV in 1983, Hepatitis C Virus (HCV) in 1989 and lastly Hepatitis G Virus (HGV) in 1996 [2].

Viral hepatitis can be transmitted by food or water contaminated by fecal material [3]. HAV and HEV are two enterically transmitted hepatitis virus.

HAV is a ubiquitous non-enveloped 27 nm, Ribonucleic Acid (RNA) virus in the genus *Hepatovirus* of the family *Picornaviridae*. It has an incubation period of 2-3 weeks, occurs asymptotically in some and the age group most affected are young children. Hepatitis A infection is self-limiting

and exposure to the virus ensures immunity to re-infection [4]. In areas where sanitary conditions have improved, the epidemiology of hepatitis A is changing and the prevalence of cases has shifted to adulthood [3]. Safe and effective hepatitis A vaccines were developed in the early 1990s, so understanding the prevalence of hepatitis A infection has taken a new importance, as the well informed decisions about prevention strategies and appropriate vaccine use can be decided on the basis of this information.

HEV occurs primarily in Asia, Africa and Central America. It is a non-enveloped, single stranded positive sense RNA virus in the genus *Hepevirus* of the family *Hepeviridae*. It has a longer incubation period and affects older children and adults. Hepatitis E infection has a higher mortality rate of 26-57% in women in the last trimester of pregnancy [5,6]. It can also cause premature births [7]. In most studies relatively low seroprevalence rates (10-40%) of prior exposure to HEV are reported [8].

This study was conducted to determine the prevalence of HAV and HEV and their co-infection among patients attending a tertiary care hospital in Jodhpur, India, presenting with symptoms of acute hepatitis.

## MATERIALS AND METHODS

This cross-sectional study was conducted in the Microbiology Department of Dr. Sampurnanand Medical College and associated group of Hospitals, Jodhpur, India, for the duration of one year (January 2016 to December 2016).

**Inclusion criteria:** Individuals from all age group presenting with the signs and symptoms of AVH to Dr Sampurnanand Medical College and associated group of hospitals in this study.

**Exclusion criteria:** Individuals with AVH but rapid card (immunochromatographic) test positive for HBsAg and HCV.

**Sample collection:** Ethical clearance was taken from Institutional Ethical Committee. After obtaining the written informed consent of the patients along with completely filled patients' history form, the expert phlebotomist collected 1-3 ml (from pediatric age group) and 3-5 mL (from young adults and adults) blood samples with universal precautions, by venipuncture, from 174 patients presenting with AVH. Serum was separated from blood samples after centrifugation at 3,000 rpm for 3 minutes.

**Serology:** The serum samples were analyzed for anti HAV IgM and anti HEV IgM for the detection of acute hepatitis A and acute Hepatitis E, respectively using commercially available Enzyme Linked Immunosorbant Assay (ELISA) kits (Medical Biological Service, Opera-MI-Italy). The procedures were followed as per the manufacturer's instructions mentioned in the literatures provided within the ELISA kits. The ELISA tests were performed in the DAVINCI Quattro (Biomeuriex, Marcy l'Etoile, France) and the readings were taken spectrophotometrically within it and recorded quantitatively as Optical Density (OD) value. The cut-off value was calculated as mentioned in the manufacturer's instructions and simultaneously OD values were compared and reported as positive or negative.

Records of liver function tests such as the Alanine Transaminase (ALT), Aspartate Aminotransferase (AST), albumin, and bilirubin tests were obtained from Biochemistry Department.

## STATISTICAL ANALYSIS

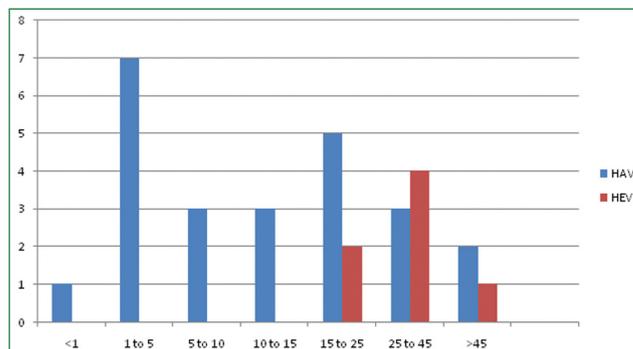
Data was analyzed by using SPSS version 11. Chi-square test was used for analyzing qualitative variable and student 't' test for quantitative variable. The  $p < 0.05$  was taken as statistically significant.

## RESULT

Out of total 174 samples 24 (13.79%) were positive for HAV, 7 (4.02%) were positive for HEV and only 2 (1.15%) sample was positive for both.

Out of 24 HAV positive patients 14 (58.3%) were male and 10 (41.6%) were female. In HEV out of total 7 positive patients 6 (85.75%) were male and 1 (14.28%) was female.

The prevalence of HAV and HEV co-infection in patients with AVH was 1.15%. Among which 1 (50%) was male and 1 (50%) was female. The age group of the co-infection was prevalent between 25 years to 45 years. [Table/Fig-1] shows that HAV infection was seen in all age groups. Lesser numbers of cases were seen in age group above 45 years. It was noted that it was more prevalent in the age group less than 5 years. Highest prevalence was in the patients with age between 1-5 years.



[Table/Fig-1]: Age dependent prevalence of HAV and HEV serological marker.

HEV infection was seen more prevalent in the age group 25-45 years. It was noted that the liver enzymes like ALT, AST were found to be deranged in all the cases. There was only one case of female having HEV infection. The case of HEV infection was during gestational period, had fulminant hepatitis, but no mortality was reported.

## DISCUSSION

This study was conducted mainly to determine the prevalence of HAV and HEV and their co-infection in Jodhpur region. Various studies on AVH caused by HAV and HEV have reported varying prevalence of both viruses. Kaur et al., reported as low as 2.3% prevalence rate of HAV [9] while 67% rate was reported by Kwon et al., [10]. Joon et al., found 10.54% of HEV prevalence in their study performed in Southern part of India [11] and a higher prevalence rate of 49.7% was recorded in a study done on North-Western part of India [12]. In this study, only 13.79% of the suspected cases had a positive viral marker. This was comparatively lower than the 49% [8] and 29.9% [11] as seen in another studies. The water supply in Jodhpur city and nearby regions is pretreated and filtered that explains the lower rate of water borne viral hepatitis.

Prevalence of HAV-HEV co-infection cases varies in different parts of India. Authors have reported it as low as 0.8% [13], 5.2% [14] and high as 11.5% [11]. The prevalence of HAV-HEV co-infection found in this study was 1.15% cases.

The cases of co-infection with HEV and HAV improved after symptomatic treatment without affecting the prognosis. Supportive treatment usually improves acute hepatitis A infection, but severe complications such as liver failure or

hepatic encephalopathy are reported with HAV and HEV co-infection [15]. Generally, the socioeconomic conditions of sanitation and hygiene are closely related to the incidence of Hepatitis A.

Age was seen as a factor associated more closely with the prevalence of HAV in compare to the HEV. High prevalence rate of HAV infection was observed in children below the age of 5 years. This result is similar to other studies where prevalence of HAV infection in children reported higher than 80% [13,16,17]. In developing nations where sanitary conditions are compromised and people live in crowded places, children get infected with HAV at early age and before the age of 10 years, 90% of population carry anti-HAV antibodies and become immune to the virus [18].

Prevalence of HEV infection was seen predominantly among young adults in the age group 15-45 years. The risk of HEV infection and its severity increases with age. The children do not get exposed to HEV, so low prevalence rate of anti-HEV is found in their sera. Takahashi et al., found in their study that Hepatitis E is more common in young adults (15-44 years) and the low prevalence of anti-HEV in children is attributable to lack of exposure to HEV in children [19]. There is possibility of HEV infection usually being anicteric and remains unnoticed in children. The findings of this study also agree with the results found in some other studies too [20,21].

The prevalence of HEV infection was markedly lower in the adult population than that of HAV infection (100%) in Mongolia [22]. The age specific sero prevalence of anti-HEV antibodies was studied in Pune, India where it was noticed that antibodies against HEV were uncommon in children and a peak prevalence of 33-40% seen in early adulthood.

Higher prevalence rate of both HAV and HEV were found in males compared to females which is similar to the results of other studies [8,20]. The reason for higher prevalence in males can be explained by their greater exposure in professional and social activities.

No mortality was reported in this study. One case of co-infection was seen in a female during gestational period and the patient survived due to prompt diagnosis and treatment.

HAV and HEV infections are endemic in India and infections occur throughout the year. The main source of water contamination is due to poor sanitation, contamination of drinking water and lack of knowledge of community regarding the prevention [23].

## LIMITATION

This study had some limitations like no molecular tools were used to identify the strains of HAV and HEV commonly causing AVH in this region. Identification of other hepatitis viruses like HBV, HCV, etc., was not included in this study.

Since, this was a hospital based study the findings of this study may unlikely be reflective of the findings in the community. A community based research study is recommended.

## CONCLUSION

The screening of HEV in all the patients who are suspected for HAV, especially pregnant women where outcome of infection is poor, must be performed. Strict application of standard case definition is required as there was low rate of the confirmed cases of viral hepatitis among the suspected cases and awareness of health staff about the suspected acute cases of viral hepatitis in general is need to be raised.

A supply of safe drinking water and safe sewage disposal can play an important role to control HAV/HEV infections.

Our study reports that HAV and HEV infections are not infrequent in this region. Data of this study will be useful for planning future strategies for vaccination and/or better sanitation program in western Thar region.

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