

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.705.109>

Epidemiological Study of Hepatitis A Virus and Hepatitis E Virus Infection in Patients Presenting with Acute Viral Hepatitis

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ABSTRACT

Keywords

Acute viral hepatitis, Hepatitis A, Hepatitis E, Seroprevalence, Seasonal variation, Hepatic enzymes

Article Info

Accepted:

10 April 2018

Available Online:

10 May 2018

Hepatitis A virus (HAV) and hepatitis E virus (HEV) both are transmitted through the fecal–oral route and cause self-limiting acute viral hepatitis, and poses a major public health problem in India. This study was undertaken to determine prevalence of HAV and HEV in patients presenting with acute viral hepatitis and to study its seasonal trend. A retrospective study conducted in Department of Microbiology, SMS Medical College and attached Hospitals, Jaipur, Rajasthan. A total of 1751 serum samples of suspected patients of HAV and HEV tested for IgM HAV and IgM HEV antibody respectively using ELISA method. Seroprevalence of HAV and HEV was 8.03% and 21.94% respectively and both affected males more than females. HAV infection was more common in young children while HEV infection was more in adults. HAV and HEV infection has a seasonal trend having highest infection rate in summer and monsoon. Health and civic authorities should make an effort to increase the awareness among general public, to facilitate the timely preparation and make necessary arrangement for efficient response to encounter outbreak or epidemic, thus reduce morbidity, mortality and economic burden.

Introduction

Hepatitis A virus (HAV) and hepatitis E virus (HEV) are acquired by consumption of contaminated food and water through the fecal–oral route and cause self-limiting acute hepatitis. HAV and HEV both are endemic and a major health challenge in developing countries like India where conditions of hygiene and sanitation are poor.

Globally, an estimated 1.4 million cases of hepatitis A virus infection occur annually (WHO, 2000). HAV is the most common

cause of acute viral hepatitis in children of 1–3 years age group (Nandi B *et al.*, 2009). However, there has been a gradual upward shift in the average age of acquiring the HAV infection from early childhood to adulthood in different parts of the world (Mathur *et al.*, 2008).

Hepatitis E is found worldwide, but the prevalence is highest in East and South Asia (NCDC, 2014). In areas with high disease endemicity, symptomatic infection is most common in young adults aged 15–40 years. In these areas, although infection does occur in

children, they often have either no symptoms or develop subclinical illness. Every year, there are an estimated 20 million HEV infections worldwide, leading to an estimated 3.3 million symptomatic cases of hepatitis E. WHO estimates that hepatitis E infection caused approximately 44,000 deaths in year 2015 (WHO, 2017).

Outbreaks of HAV and HEV infection occur following monsoon rain, heavy flooding or massive uptake of untreated sewage into city water treatment plant. Hence the present study was undertaken to determine the prevalence of HAV and HEV in patients presenting with acute viral hepatitis and to study its seasonal trend at tertiary care hospital, Jaipur, Rajasthan.

Materials and Methods

It was a retrospective study conducted over a period of one year (July 2016 to June 2017) in the Department of Microbiology, SMS Medical College and attached Hospitals, Jaipur, Rajasthan. The study population included individuals of all age group who were suspected of acute viral hepatitis. Both in-door and out-door patients were included in the study. A total of 1751 serum samples of suspected patients of HAV and HEV analysed for IgM HAV and IgM HEV antibody respectively using ELISA method. The demographic and clinical variables were recorded on a predesigned proforma. It included age, sex, residential address, symptoms of acute viral hepatitis. Laboratory data including levels of serum amino transferase (AST and ALT), alkaline phosphatase (ALP), and GGT (gamma-glutamyl transpeptidase) were also collected.

Results and Discussion

In our study out of total 1751 serum samples, 908 serum samples were tested for IgM HAV

and 843 serum samples were tested for IgM HEV. Of these 908 suspected HAV cases, IgM antibodies were detected in 73 (8.03%) serum samples. Among 843 suspected HEV cases, 185 (21.94%) serum samples were positive for IgM antibodies. Both HAV and HEV positivity was significantly high among males in comparison to females (Table 1).

The cases were classified according to their age groups into 2-12 years, 13-20 years, 21-40 years, 41-60 years and >60 years. HAV infection was seen in all age group and it was more prevalent in the age group between 2 to 12 years. HEV infection was also seen among all age group and maximum prevalence in the age group 21-40 years (Table 2).

In IgM HAV positive patients elevated levels of AST (aspartate aminotransferase), ALT (alanine aminotransferase), ALP (alkaline phosphatase) and GGT (gamma-glutamyl transpeptidase) was seen in 71.23%, 79.45%, 84.93% and 75.34% cases respectively, while among IgM HEV positive patients it was found in 89.72%, 77.29%, 82.16% and 74.59% cases respectively (Table 3).

There was no significant difference of HAV and HEV infection rate among rural and urban area (Table 4).

Maximum positive cases of HAV and HEV were found in from month April to September as summer and rainy season (Figure 1).

Hepatitis A virus (HAV) and Hepatitis E virus (HEV) both are enterically transmitted. The majority of HAV and HEV outbreaks might be explained by the lack of enough sewage and sanitation systems, defecation in open fields, which can contaminate surface drinking water source. Hepatitis A infection during childhood often is asymptomatic and unrecognized, and typically confers lifelong immunity. With increasing age at time of

infection, symptomatic cases become more common. With improved hygiene and sanitation reflecting India's growing economy, more children might escape childhood HAV infection and remain susceptible to infection during adolescence and adulthood (Mathur, 2008).

HEV is the most important cause of epidemic acute viral hepatitis, though HAV is common among children. Most acute liver failures diagnosed in India are attributable to HEV, and HEV is the most severe and common cause of acute viral hepatitis during pregnancy (NCDC, 2014).

In our study prevalence of HAV and HEV was 8.03% and 21.94% respectively; in viral hepatitis surveillance- India (2011–2013) 599605 cases tested for HAV, 7.4% were positive, and among 187040 samples tested for HEV, 10.4% were positive (Kumar *et al.*, 2015). In study by Radhakrishnan *et al.*, prevalence of HAV and HEV was 13.3% and 17.3% respectively, while in other study by Arora *et al.*, it was 19.31% and 78.78% (Radhakrishnan *et al.*, 2000; Arora *et al.*, 2013). A comparatively lower HAV prevalence may be due to improved living standards environmental hygiene and increasing Hepatitis A immunization.

Table.1 Sex distribution of HAV and HEV infection in patients presenting with acute viral hepatitis

	Number of cases (%)		P value
	Male	Female	
HAV	52 (71.2%)	21 (28.8%)	0.001
HEV	142 (76.7%)	43 (23.3)	<0.001

Table.2 Age distribution of HAV and HEV infection in patients presenting with acute viral hepatitis

Age group (years)	Number of cases	
	HAV	HEV
2-12	42 (57.53%)	2 (1.08%)
13-20	16 (21.91%)	30 (16.21%)
21-40	12 (16.43%)	114 (61.62%)
41-60	2 (2.73%)	29 (15.67%)
>60	1 (1.36%)	10 (5.40%)

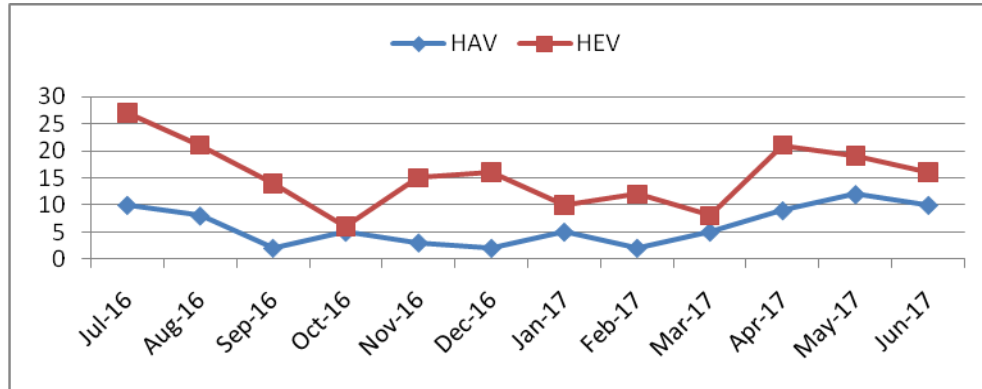
Table.3 Elevated liver enzymes in IgM HAV and IgM HEV antibody positive patients

Liver enzymes	Number of cases (%)	
	HAV	HEV
AST	52 (71.23%)	166 (89.72%)
ALT	58 (79.45%)	143 (77.29%)
ALP	62 (84.93%)	152 (82.16%)
GGT	55 (75.34%)	138 (74.59%)

Table.4 Prevalence of HAV and HEV in rural and urban area

	Number of cases (%)	
	Urban	Rural
HAV	38 (52%)	35 (48%)
HEV	89 (48.1%)	96 (51.9%)

Fig.1 Seasonal variation of IgM HAV and IgM HEV antibody positive patients



HAV infection was more common in young children (2-12 years) while the prevalence of HEV infection was more in adults (21-40 years) in comparison to children (<20 years).

Other Indian authors also observed the similar finding (Chandra *et al.*, 2012; Ren *et al.*, 2017).

Prevalence of both HAV and HEV was higher in males than in females, this finding is consistent with other studies (Joon *et al.*, 2015; Al-Naaimi *et al.*, 2012; Kamal *et al.*, 2010).

It could be because men have more exposure to outside food and drinking material for their professional purpose and social activities.

In this study there was no significant difference in occurrence of HAV and HEV among rural and urban area, while according to viral hepatitis surveillance- India (2011–2013) two-thirds of outbreaks were reported from rural areas (Kumar *et al.*, 2015).

The present study has shown HAV and HEV infection has a seasonal trend having maximum positive cases in summer and monsoon that is April to September. Similarly Kumar *et al.*, in viral hepatitis surveillance-India (2011–2013) observed 17% increase in the total number of reported hepatitis cases during June- September, and laboratory-confirmed HAV cases followed the same seasonal trend with an average increase of 18% (Kumar *et al.*, 2015). Joon *et al.*, reported that HAV and HEV both were seen to be prevalent all around the year with predominance seen towards the end of monsoons and beginning of winters and also a peak rise of HEV during beginning of rainy season (Joon *et al.*, 2015). Seasonal variation in transmission of acute viral hepatitis, possibly related to mixing of contaminated soil into wells and rivers during periods of heavy rains or floods (NCDC, 2014).

Prevention is the most effective approach against acute viral hepatitis. At the community level, transmission of HAV and

HEV can be reduced by: maintaining quality standards for public water supplies and establishing appropriate sewage disposal systems. On an individual level, infection risk can be minimized by: maintaining hygienic practices such as hand-washing with clean water, particularly before handling food and avoiding consumption of water and/or food of unknown purity.

Inclusion of hepatitis A vaccine in childhood immunization programs should be considered to reduce the public health burden of hepatitis in India. In 2011, a vaccine to prevent hepatitis E virus infection has been licensed in China. It has not yet been approved in other countries (WHO, 2017).

HAV and HEV infection should be considered as an etiology of acute infectious viral hepatitis, showing a seasonal trend having maximum positive cases in summer and monsoon that is April to September, as this infection is acquired through feco-oral route.

It is suggested that health and civic authorities should make an effort to increase the awareness among general public, to facilitate the timely preparation and make necessary arrangement for efficient response to encounter outbreak or epidemic, thus reduce morbidity, mortality and economic burden.

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How to cite this article:

Sarita Netra, Rameshwari Bithu and Rakesh K. Maheshwari. 2018. Epidemiological Study of Hepatitis A Virus and Hepatitis E Virus Infection in Patients Presenting with Acute Viral Hepatitis. *Int.J.Curr.Microbiol.App.Sci.* 7(05): 899-904.
doi: <https://doi.org/10.20546/ijcmas.2018.705.109>