

Prevalence of Hepatitis A Virus and Hepatitis E Virus Infection in Patients from A Tertiary Care Hospital of West India, Ahmedabad

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Abstract

Background: Acute viral hepatitis (AVH) is a major public health problem and is an important cause of morbidity and mortality. Acute Viral Hepatitis A infection among adults in developing country is low due to pre exposure of Hepatitis A virus (HAV) during childhood and adolescence. Anti-HAV prevalence in population worldwide has grouped countries into high, intermediate low and very low endemicity. The anti-HAV prevalence in Indian population is of high endemicity. But, there is heterogeneous exposure of hepatitis A virus in different region of the country. In India the age of acquiring HAV has a world-wide distribution and affects infant 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. Studies suggested that HEV is etiologically responsible for 10%–95% of admitted cases of hepatitis. Exposure rates over a period of time are different in different parts of the country and in different socio-economic groups. **Objective:** To determine the prevalence of Hepatitis A Virus (HAV) and Hepatitis E virus (HEV) infection among patients of suspected acute viral hepatitis admitted in Sola Civil Hospital, Ahmedabad / in a tertiary care hospital, Ahmedabad, Gujarat. To determine any change in the epidemiology of these infections with the age, gender and seasonal trends. **Methods:** This study was conducted in the Department of Microbiology, GMERS Medical College & Hospital, and Sola, which is a leading Tertiary care hospital and the major referral centre of Ahmedabad, Gujarat. A total 1801 patients of suspected acute viral hepatitis with acute exacerbations were included in the study for suspected viral aetiology during a period Jan 2013 to June 2015. Blood sample was collected from each patient and after centrifugation, serum samples were subjected to testing for anti HAV IgM Antibody ELISA & Anti HEV IgM Antibody ELISA. After processing, Serum samples were then stored at – 20°C. **Results:** Out of 1801 suspected of acute viral hepatitis, 135(7.4%) patients were reactive for Anti HAV IgM, 568 patients (31.5%) were reactive only for anti HEV IgM. Dual viral infections were found in only in one patient. HEV (31%) was identified as the most common cause of acute hepatitis followed by HAV (7.4%). About 67.7 % (385/568) of male and 32.2 % (183/568) of female were affected in HEV infection and 56.2 % (76/135) of male & 43.7% of female were affected in HAV infection. More cases of acute viral hepatitis had occurred in June 11.2 % (79/703) followed by April and may which is 10.7% (75/703), 10.5(75/703) respectively. 92.6% (526/568) HEV cases were seen in age group >18 years and 7.4% (42/568) cases were seen in age < 18 years of age group. 81.9% (110/135) HAV cases were seen in age group <18 years and 18.5% (25/135) cases were seen in age group >18 years. **Conclusion:** HEV is the most common cause of acute viral hepatitis infection in our study followed by HAV infection. In both infections male were affected more than female. Though the cases were occurred throughout year, more cases of acute viral hepatitis had occurred in June, April and May. HEV infection is common in young and adults while HAV infection is common in children below 18 years of age. The best means of reducing the spread of infection is by promoting simple measures of personal and community hygiene. However, these data will be useful for planning of future vaccination strategies and for better drinking water supply and sanitation program in country.

Keywords: Acute Viral Hepatitis, Adult, HEV, HAV.

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INTRODUCTION

The viral hepatitis refers to the primary infection of the liver by any one of the heterogeneous group of “Hepatitis Viruses” which currently consists of

types A, B, C, D, E & G. The features common to them are their hepatotropism & ability to cause a similar icteric illness, ranging in severity from the unapparent to the fulminant fatal forms. As all types of Hepatitis

viruses cause a clinically indistinguishable illness, their differentiation is based on their serological and molecular markers.

Type A hepatitis is a subacute disease of global distribution affecting mainly children and young adults. It occurs sporadically or as outbreaks, which may be caused by contaminated food, water or milk. Domestic or institutional spread among children is common. Overcrowding and poor sanitation favour its spread. In the developing countries, infection is acquired in the childhood and by the age of 10. Almost 90% of the population possess the antibody to the virus and are immune. In India, Hepatitis A is more common cause of acute hepatitis in children, but is much less frequent in adults. In affluent countries, and even in those developing countries with improved personal hygiene and sanitation, its incidence has been declining, with an upward shift in the age group affected. In India, the disease is associated with heavy rainfall [1].

In India, Hepatitis E virus is responsible for the majority of epidemic and sporadic hepatitis in adults. The source of infection is faecal contamination of drinking water and the environment. It is therefore known as enterically transmitted NANB and Epidemic NANB (non A non B) hepatitis virus. A high case fatality rate averaging around 20% in pregnant women, particularly in the third trimester, is a characteristic feature of HEV infection [2].

Acute Viral Hepatitis A infection among adult in developing country is low due to pre exposure of Hepatitis A virus (HAV) during childhood and adolescence. Anti-HAV prevalence in population worldwide has grouped countries into high, intermediate low and very low endemicity. Adults of high endemicity are usually immune and epidemics are uncommon. The anti-HAV prevalence in Indian population is of high endemicity. But, there is heterogenous exposure of hepatitis A virus in different region of the country. In India the age of acquiring hepatitis A virus infection is shifting from early childhood to adolescence and adulthood [3].

Acute viral hepatitis (AVH) is a major public health problem in India and other developing nations having inadequate sanitary conditions [6]. Hepatitis-A virus infection (HAV) and Hepatitis E virus infection (HEV) are enterically transmitted viral diseases of great public health importance in the developing countries like India. HAV has a world-wide distribution and affects infants and young children in developing countries but its epidemics are rare; whereas HEV is restricted to tropical countries and affects older children and young adults and its epidemics are common. In developing countries like India, HAV and HEV both are endemic. Hepatitis E virus (HEV), an emerging pathogen, causes significant disease in endemic countries and is the leading cause of enterically

transmitted viral hepatitis illness globally. Large annual epidemics are attributed to HEV, and studies suggested that HEV is etiologically responsible for 10%–95% of admitted cases of hepatitis across South Asia. HEV infection in pregnant women is more common and more fatal in the third trimester. The mortality rate due to HEV-induced hepatitis is as high as 15-20% [4].

Faeco-oral route is one of the leading routes of transmission of infectious diseases and contributes to 4.62 million episodes of diarrhoeal illness worldwide with 1.27 million in SEAR alone. Amongst the faeco-orally transmitted pathogens, Hepatitis A and Hepatitis E viruses are responsible for acute viral hepatitis and more than 300 million people worldwide suffer from viral hepatitis annually. Nearly 300 deaths per year are attributed to fulminating acute disease and about 15,000 people succumb each year to chronic liver disease. The disease has an enormous impact on health and national economy of many countries including India [5].

Hepatitis A virus (HAV) and hepatitis E virus (HEV) causes a self-limiting viral infection that is transmitted by faeco-oral route, primarily through consumption of contaminated food and water. These infections are major health problem worldwide, with a higher incidence in developing countries. Enterically transmitted viral hepatitis is of great public health importance in India. HAV and HEV both are endemic in developing countries like India where conditions of hygiene and sanitation are poor. HAV infections account for 1.4 million new cases per year worldwide, and the risk of infection is inversely proportional to levels of sanitation and personal hygiene. Infections due to HAV is mostly asymptomatic, self-limiting and exposure to the virus provides lifelong immunity. HAV mainly affects infants and young children and in developing countries, nearly all children are infected with HAV by the age of 18 and as the standard of living improves, the peak incidence of hepatitis A moves from young children to older age. Hepatitis E prevalence is highest in the East and South Asia regions, accounting for 60% of hepatitis E global incidence. Despite this high endemicity, the sero-prevalence of antibody to HEV is only 25% in young adults. Among the Indian population, there is low sero-prevalence until age 15, reaching up to 40% in young adults. Exposure rate of HAV and HEV over a period of time are different in different parts of country and in different socioeconomic groups.

OBJECTIVES

This study was undertaken along patients of acute viral hepatitis admitted in GMERS medical college and hospital, sola, Ahmedabad, Gujarat for the following goals

- To determine prevalence of hepatitis virus among individual of acute viral hepatitis
- Correlation of cases with age group and sex
- Correlation of cases with the seasonal trends

- For appropriate management of cases
- Formulation of preventive strategy

METHODOLOGY

This study was conducted in the Department of Microbiology in GMERS Medical College & Hospital, Sola, Ahmadabad which is the centre for Integrated Disease Surveillance Programme (IDSP). The present study was conducted on patients suspected of acute viral hepatitis presented at GMERS Medical College & Hospital, Sola during a period of January 2013 to June 2015.

A total 1801 patients suspected of acute viral hepatitis presented at this institute during two and half year period were included in this study. These were of suspected viral aetiology causing acute viral hepatitis (AVH) for Hepatitis A and Hepatitis E virus or associated viral infection. The samples from hospitalised patients of both sexes and all ages were included. Approximately 3-5 ml of patient's blood was collected and then sent to the Microbiology Department for the Serological evaluation of suspected viral markers.

In Microbiology Department, the serum was separated and then subjected to testing for Anti HAV IgM Antibody ELISA (Kit name- Diapro) and Anti HEV IgM Antibody ELISA (Kit name- Diapro). Results of ELISA tests were interpreted as per manufacturer's instruction. The remaining serum samples were stored in sterile screw capped vials and preserved at -20°C [6].

An AVH case was defined as a person having an acute illness of <15 days duration with a discrete onset of any sign or symptom (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhoea and abdominal pain) and either a) jaundice or b) elevated serum alanine

Aminotransferase (ALT) levels > 100 IU/L documented at least twice at a 1-week interval without any history of pre-existing liver disease. Patients who developed encephalopathy after the onset of icterus were considered to have acute hepatic failure [7].

RESULTS

Table -1: Total HAV, HEV, and dual positivity among acute viral hepatitis cases:

Total samples	HAV Positive	HEV Positive	HEV+HAV Positive
1801	135	568	1
Percentage	7.4%	31.5%	0.05%

A total of 1801 of suspected acute viral hepatitis were admitted in GMERS Medical College & Hospital, Sola, Ahmedabad. They were evaluated for suspected HAV & HEV infection.

Total 1801 cases of acute hepatitis were reported out of which 703(39%) cases were positive for Hepatitis A and E. 135 (7.4%) were positive for Hepatitis-A, 568 cases (31.5%) were positive for

Hepatitis-E and 1case (0.05%) was positive for Hepatitis -A+ E co-infection (Table-1).

Out of 135 HAV positive cases Males were 76(56.2%) and 59(43.7%) were females, of the 385 cases of HEV 385(67.7%) were males and 183(32.2%) were female. Only one case of co infection was in female patient as shown in Table-2.

Table-2: Sex wise distribution among HAV &HEV positive cases

	Male	Female	Total
HAV	76(56.2%)	59(43.7%)	135
HEV	385(67.7%)	183(32.2%)	568
HAV+HEV	0	1	1

Out of 135 the patients of HAV infection 25(18.5%) were in the age group \geq 18 years and 110(81.9%) were in the age group of \leq 18 years. Of the

568, patients of HEV 526(92.6%) were in the age group of \geq 18 and rest 42(7.4%) were in the age group of \leq 18 yrs. as shown in (Table-3).

Table-3: Age group wise distribution among HAV &HEV positive cases:

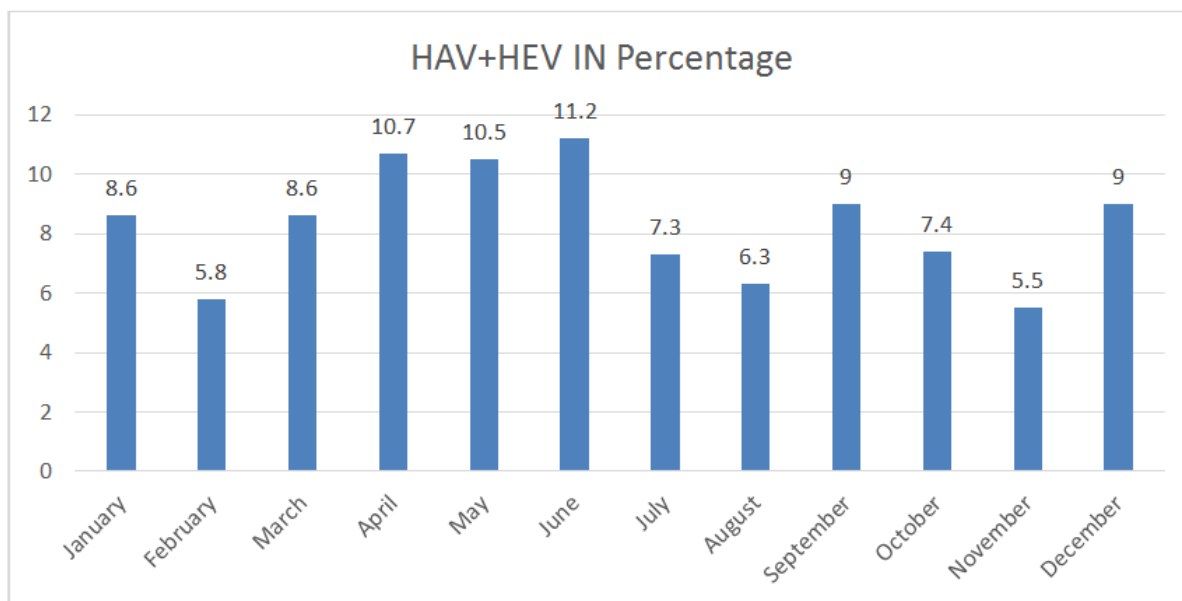
	>18 years	<18 years	Total
HAV	25(18.5%)	110(81.9%)	135
HEV	526(92.6%)	42(7.4%)	568

Seasonal distribution of HAV and hepatitis E virus was studied. Although cases were seen throughout

the year, maximum number of cases was seen in June, April, May as shown in Table-4.

Table-4: Seasonal trends among HAV &HEV positive cases

	January	February	March	April	May	June	July	August	September	October	November	December
HAV	8	6	3	12	13	18	3	8	24	14	8	18
HEV	53	35	58	63	61	61	48	36	39	38	31	45
TOTAL	61	41	61	75	74	79	51	44	63	52	39	63
%	8.6	5.8	8.6	10.7	10.5	11.2	7.3	6.3	9	7.4	5.5	9



DISCUSSION

In the present study, HEV (31.5%) was identified to be the most common cause of acute

hepatitis followed by HAV (7.4% cases). The overall prevalence of hepatitis viruses is in different geographic zone. Various studies are mentioned in the table below:

Year	Place of study	HAV % Positive	HEV % Positive	Reference
2015	Karnataka	19.31	10.54	A Joon, P rao <i>et al.</i> , [8]
2013	North India	26.9	17.9	P Jain <i>et al.</i> , [7]
2016	North India	31.2	1.4	A. K. Sharma <i>et al.</i> , [3]
2013	Punjab	13.63	78.78	Deepak Arora <i>et al.</i> , [4]
2016	Rajasthan	7.6	14.9	Anshu Mittal <i>et al.</i> , [6]
2014	New Delhi	92.6	17.05	Col Atul Kotwal <i>et al.</i> , [9]
2016	New Delhi	9.4	23.3	Monika Agrawal <i>et al.</i> , [10]
2014	Orissa, West bengal	17.2	41.8	Nidhi <i>et al.</i> , [11]
2003	North India	5.2	36.2	M. Beeniwala <i>et al.</i> , [12]
Our study	Ahmedabad	7.4	31.5	

Dual viral infection of HAV and HEV occurring through common feco-oral route was found in only one patient our study very well matched with A. K Sharma *et al.*, [3] study in which dual infection found only in one patient.

In our study, the HEV and HAV prevalence in male has been 67.7% and 56.2% respectively. Males are affected more than female which is similar to the A

Joon *et al.*, study [8]. It could be explained by a greater exposure of men in their professional and social activities. This can be because major route of transmission of HAV and HEV is faeco-oral route and poor sanitation and contaminated food/water supplies and as male go out more for work, so chances of eating outside also increases as shown by other studies.

The present study shows that there is high incidence of Hepatitis E infection among adult > 18 years of age. In our study, the HEV prevalence in children (7.4%) is lower than that reported by other studies (16.3-66.3%). The low prevalence of anti-HEV in children is attributable to lack of exposure to HEV in children [10]. HEV infection is less common in young children as anicteric hepatitis or subclinical cases are common in children. The lower HEV prevalence indicates that there is improvement in the living standards in population. The present study shows that there is high incidence of Hepatitis A infection among children <18 years of age (81.9%) this finding is constant with other Indian studies and shows that exposure to HAV occurs early in life [12].

Seasonal distribution of HAV and hepatitis E virus was studied. Although cases are seen throughout the year, maximum number of cases was seen from June, April & May in our study. Earlier studies have found either no seasonal peaks [13] or a peak in summer and monsoon months of the year [14].

CONCLUSION

Present study, showed that acute viral hepatitis due to enteric hepatitis virus is common. It can take weeks to month from people recovering from the illness to return to work. The disease can lead to significant economic and social consequences in communities.

In such situation, it is necessary to keep water supply free from faecal contamination to prevent outbreak of water borne diseases.

The best means of reducing the spread of infection is by promoting simple measures of personal and community hygiene. Almost all HAV and HEV infections are spread by faeco-oral route. The best means of reducing the spread of infection is by promoting simple measures of personal and community hygiene as hand washing before eating and after toilet; the sanitary disposal of excreta which will prevent contamination of water, food and milk; during epidemics, boiled water should be advocated for drinking purposes.

However, these data will be useful for planning of future vaccination strategies and for better sanitation program in country.

Although there is no commercially available HEV vaccine, improving sanitation conditions and careful procedure in preparing food and chlorination or even boiling the water has been shown to decrease HEV infection.

These two infections cannot be eradicated as these viruses have animal reservoir. However, these

data will be useful for planning of future vaccination strategies and for better sanitation program in country.

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