

Prevalence of Hepatitis A Virus (HAV) and Hepatitis E Virus (HEV) in the Patients Presenting with Acute Viral Hepatitis (AVH) in a Tertiary Care Hospital

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ABSTRACT

Background: AVH is a major public health problem in developing countries. Hepatitis A virus (HAV) and Hepatitis E virus (HEV) are both transmitted through faecal-oral route, causing acute viral hepatitis (AVH).

Aims and Objectives: The purpose of this study was to know the prevalence of HAV and HEV in the patients with AVH and their co-infection.

Materials and Methods: This prospective study was conducted during January 2015 to December 2015 in ICMR, department of Microbiology, RIMS, Ranchi. Samples of 409 patients presenting with AVH were considered in the study. On the basis of history, serum samples were analysed for IgM anti-HAV and IgM anti-HEV for the detection of HAV and HEV, respectively using commercially available ELISA kits. Data was collected in excel sheets and analysed by SPSS software.

Results: The prevalence of HAV and HEV among AVH patients of all age groups was 11.49% and 11.73% respectively and co-infection with both HAV and HEV was found in 0.48% only. The prevalence of HAV was predominant in children (40%) whereas prevalence of HEV was more among adults (14.33%). Both HAV and HEV cases were seen throughout the year with peaks of HAV cases in the months of May, July and August and peaks of HEV cases in the month from January to May.

Conclusion: The prevalence of HEV is more in adults whereas prevalence of HAV is more in children. Presence of co-infection with both HAV and HEV in AVH patients necessitates the screening for HEV along with HAV in all AVH patients. The data of the present study may be useful for planning of better sanitation programme and for other preventive strategies in this region of our country.

Key words: Acute Viral Hepatitis, Hepatitis A Virus, Hepatitis E Virus, Prevalence.

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INTRODUCTION

Acute viral hepatitis is a global health problem that affects hundreds of millions of children and adults. It is also a major public health problem in India and other developing countries having inadequate sanitary condition and lack of awareness.¹ Both Hepatitis A virus (HAV) and hepatitis E virus (HEV) are the leading causes of acute viral hepatitis in the world.² Hepatitis E is the commonest cause of acute hepatitis in adults and hepatitis A is the commonest cause in paediatric age group.³⁻⁵

Hepatitis E virus (HEV) causes a self-limiting viral infection that is transmitted by the faeco-oral route, primarily through the consumption of contaminated food and water. It can occur as both epidemic⁶ and sporadic cases⁷ in developing countries, with sporadic HEV infection occurring with increased frequency in both developing and developed countries.⁸ Interestingly, this virus results in 20–30% mortality among pregnant women⁹ and has

been implicated as an important aetiological agent for sporadic fulminant hepatic failure in developing countries.¹⁰

The hepatitis A virus (HAV) is also an enterically transmitted hepatotropic virus and is the major cause of acute viral hepatitis (AVH) in children.¹¹ Hepatitis A virus (HAV) infection in early childhood is mostly asymptomatic or mildly symptomatic and it requires only supportive management.¹² In areas of high endemicity most children are exposed to the virus and the consequent acquisition of antibodies against the virus confers lifelong immunity.¹³

In India, the seroprevalence of HAV antibodies exceeds 90% in adults.¹⁴ However, there have been recent reports of a decreasing prevalence of HAV in this country, suggesting that the seroprevalence of HAV antibodies is becoming similar to that in the industrialized world.^{15,16}

MATERIALS AND METHODS

A prospective study was conducted from January 2015 and December 2015 in ICMR, Grade-II Viral Research and Diagnostic Laboratory, Department of Microbiology, RIMS, Ranchi. Serum samples of 409 patients presenting with acute viral hepatitis (AVH) were considered in the study. Known alcoholics and patients on hepatotoxic drugs were excluded from the study.

On the basis of history, four hundred and nine (409) blood samples were taken from clinically suspected cases of acute viral hepatitis (AVH) reporting at our hospital all around one year. An AVH case is defined as a person having an acute illness typically presenting with acute jaundice, dark urine, anorexia, malaise, extreme fatigue and right upper quadrant tenderness. Biochemical markers include increased urine urobilinogen and >2.5 times the upper limit of serum alanine aminotransferase.¹⁷

Blood samples were centrifuged at 3000 rpm (rotation per minute) and serum samples were separated. All serum samples were tested for anti-HAV immunoglobulin M (anti-HAV IgM) and anti-HEV immunoglobulin M (anti-HEV IgM) by the Enzyme Linked Immunosorbent Assay (ELISA) commercial kit, {DIA.PRO SESTO SAN GIOVANI (MILANO) – ITALY} according to the manufacturer's instruction.

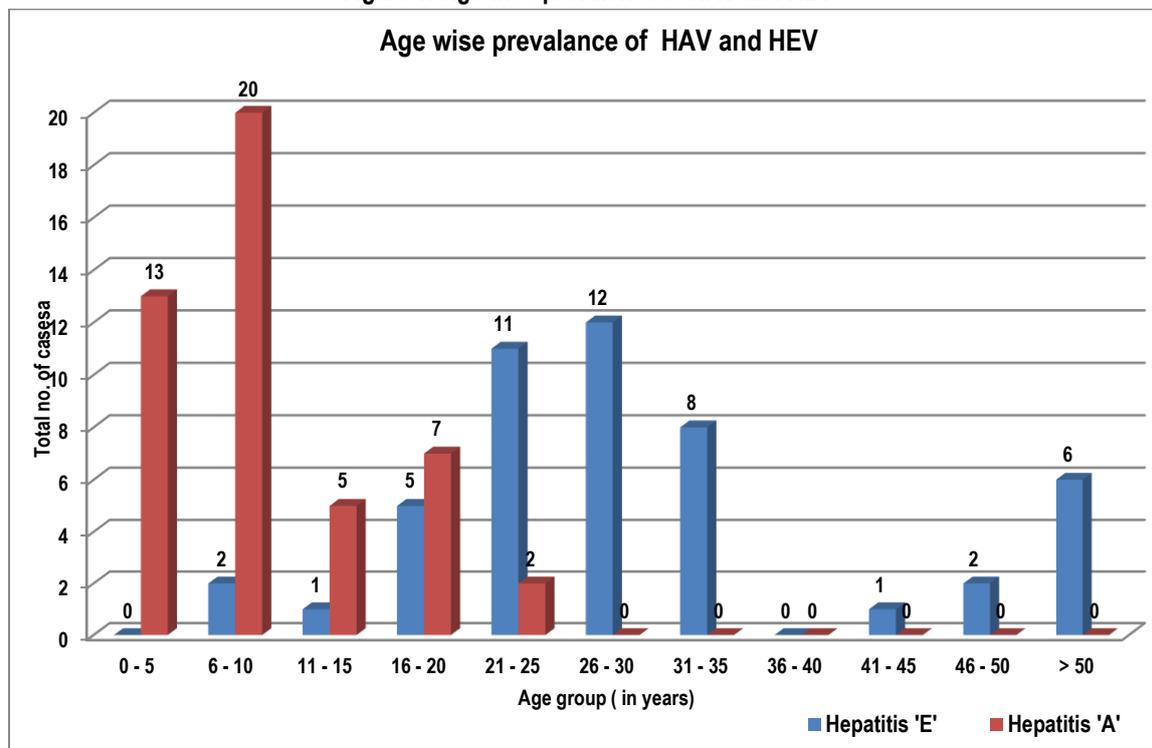
Relevant clinical informations were collected from clinical case sheets and laboratory report sheet that included history of jaundice, physical signs and symptoms and biochemical results (aspartate aminotransferase [AST], ALT, serum bilirubin and alkaline phosphatase [ALP]).

Data collected was fed in Microsoft Excel and analysis was done using SPSS version 24. *P* < 0.05 was taken as statistically significant.

Table 1: Prevalence of HAV and HEV among AVH patients

Elisa test	Total AVH cases (409)		Children (95)		Adults (314)	
	Positive	%	Positive	%	Positive	%
IgM anti-HAV	47	11.49	38	40.0	9	2.86
IgM anti-HEV	48	11.73	03	3.15	45	14.33
Both IgM anti-HAV and IgM anti-HEV i.e Co-infection of both HAV and HEV	02	0.48	02	2.10	0	-

Figure 1: Age wise prevalence of HAV and HEV



RESULTS

Out of 409 cases 95 were children and 314 were adults. The prevalence of HAV and HEV among total AVH patients of all ages was 11.49% (47/409) and 11.73 % (48/409) respectively. The prevalence of both HAV and HEV co-infection among AVH patients was 0.48% (2/409). HAV was the most common cause of AVH in children (40%) whereas HEV was the most common cause of AVH in adults (14.33%). (*p* < 0.001). (Table 1)

HAV infection was more prevalent in paediatric and adolescent age group whereas HEV infection was more prevalent in adults with maximum positivity in 21 to 35 years age group.(Figure 1) In the present study, prevalence of both HAV and HEV were higher in males than females. (Figure 2) Both HAV and HEV cases were seen throughout the year with peaks of HAV cases in the months of May, July and August and peaks of HEV cases in the month from January to May. (Figure 3)

Figure 2: Sex wise prevalence of HAV and HEV

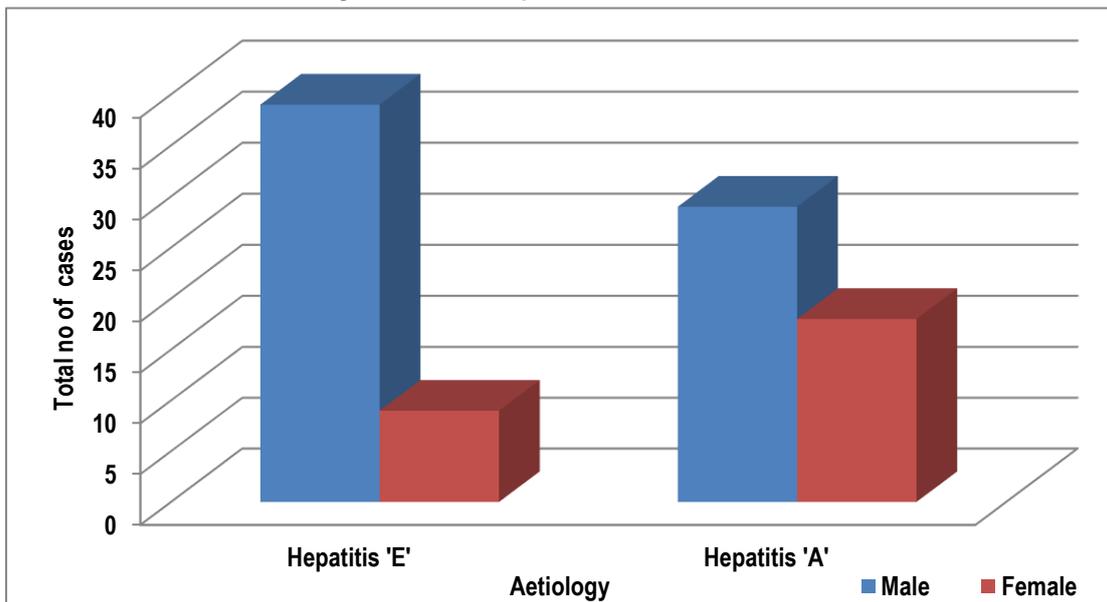
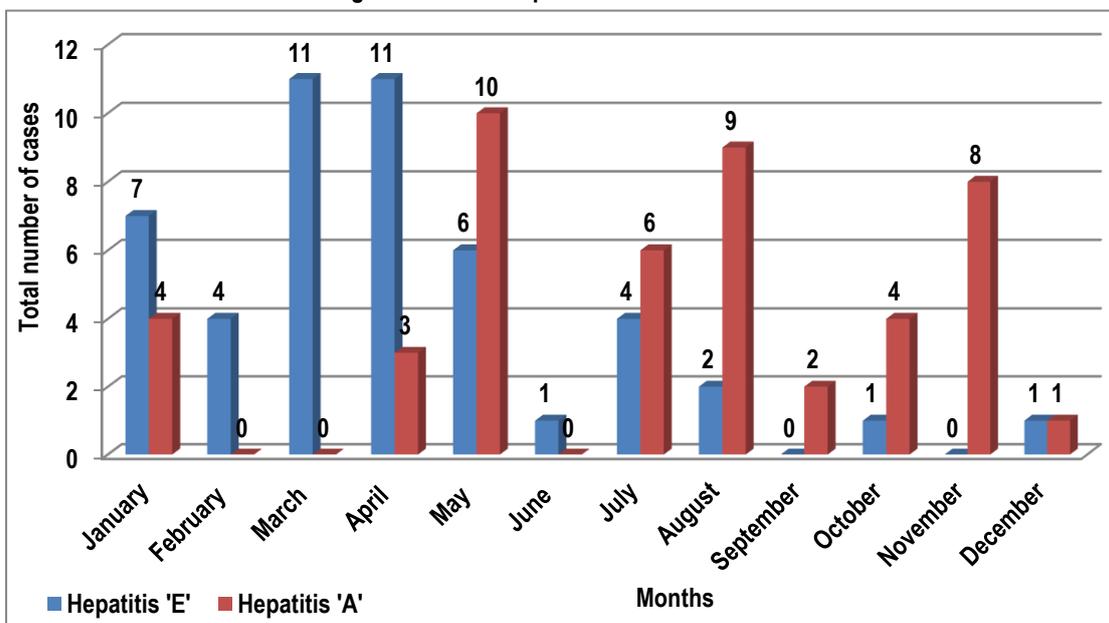


Figure 3: Seasonal pattern of o HAV and HEV



DISCUSSION

Our study was focussed mainly to determine the prevalence of HAV and HEV and their co-infection in AVH patients. We also observed the age dependent prevalence, sex wise prevalence and seasonal variations of HAV and HEV.

Table 2, shows the comparison of several studies on AVH from India highlighting varying prevalence of hepatitis viruses: HAV (1.7-67%), and HEV (16.3-66.3%).

In the present study, prevalence of HAV (11.49 %) and HEV (11.73 %) was almost equal in all age group population. Among adults, HEV (14.33%) was more prevalent as the cause of AVH, whereas HAV (40 %) was more prevalent among children. The result of the present study correlates with the finding of other studies (Table 2). Most of the studies have shown hepatitis E as the commonest cause of sporadic acute viral hepatitis in India except in children from Lucknow and Chandigarh {Table 02}. HAV is the most common cause of acute viral hepatitis in children.²⁷ Most studies have shown low prevalence of hepatitis A virus in

adults.^{19,28,29} Nandi et. al³⁰ implies that hepatitis A continues to be an important cause of acute viral hepatitis in adults in south India which is in contrast with the present study.

In the present study, prevalence of HEV and HAV is almost similar in all age group which slightly differ from the above statement that HEV is the most common cause acute sporadic hepatitis in India, although some studies (P. Jain et al²⁴ and Das A K et al²⁶) have found HAV as the most common cause of AVH in all ages. On the basis of the present study data, it cannot be concluded that which hepatotropic virus, HAV or HEV is the most common cause of AVH in all ages whereas it was clearly concluded that HEV was the most common among adults and HAV was the most common among children and adolescents. In our population, many adult patients of acute jaundice do not seek investigation for the cause of acute jaundice because hepatitis A and hepatitis E, the two most common cause of acute jaundice are self-limiting. So, hepatitis E, the one of the common cause of acute jaundice in adults may have under detected. The other possibility is that the

hepatotropic viruses are reported to show a cyclic pattern of dominance.²⁵ Chandra et al²⁵ also noted that the cases that are ELISA negative for anti-HEV antibody may be positive for HEV viremia by PCR. This can be due to variations that occur with manufacturer lot and antibodies to different epitopes may differ in persistence. Therefore, more studies are needed to conclude that which hepatotropic virus, HAV or HEV is the most common cause of AVH in all age group of our population.

A study of Acharya S K et al³¹ on school children in Delhi had found that all children by age of 16 years had antibodies against

hepatitis A. Indian seroprevalence studies also revealed that 90-100% of population acquires anti-HAV antibody and becomes immune by adolescence and hence HEV is found to be the most common cause of acute sporadic hepatitis. The present study also shows the same type of trends. In the present study, prevalence of HAV is high in children as compared to adults; also suggest that the adults become immune due to infection in childhood. It will be interesting to know the seroprevalence of protective antibody (anti-HAV IgG) in our population to know the immune status against HAV in our population.

Table 2: Comparison of different studies on prevalence of HAV and HEV as causes of acute viral hepatitis in India.

S. No.	Author (Year)	Place	Number of cases	HAV%	HEV %	Study population
1	Tendon et al ⁽¹⁷⁾ 1984	New Delhi	100	14	0	Adults
			78	67	0	children
2	Radhakrisnan et al ⁽¹⁸⁾ 2000	Vellore	404	13.3	17.3	All ages
3	Kaur et al ⁽¹⁹⁾ 2002	New Delhi	177	1.7	51.4	Adults
			129	3.1	66.3	Children
4	Poddar et al ⁽²⁰⁾ 2002	Chandigarh	172	64.5	16.3	<14 yrs
5.	Hussain et al ⁽²¹⁾ 2006	New Delhi	1932	11.4	26.2	Adults
6.	Kumar ⁽²²⁾ 2007	Chandigarh	685	17.5	38.6	10-70 yrs
7.	Irshad ⁽²³⁾ 2010	New Delhi	74	8.1	25.3	Adults
8.	Jain ⁽²⁴⁾ 2013	Lucknow	124	26.61	27.4	Adults
			143	27.27	6.99	Children
9.	Chandra et al ⁽²⁵⁾ 2012	Jaipur	736	4.3	48.3	10-65 yrs
10.	Das A K et al ⁽²⁶⁾ 2013	Dibrugarh	591	33.0	20.47	> 13 yrs
11.	Present study 2015	Ranchi	409	11.49	11.73	All ages
			314	2.86	14.33	Adults
			95	40	3.15	Children

Recently some studies from India have reported an increase in symptomatic cases of HAV among older populations, so as to substantiate epidemiological shift.^{21,32} The present study (involved mainly low and middle socio-economic group) shows very less percentage of adults (only 2.86%) were infected with HAV as compared to children (40%). Prevalence of HAV is still very high in children as compared to adults, suggests, HAV is not showing any epidemiological shifts in our population.

In the present study, 2 cases out of 409 cases of AVH (0.48%) were positive for co-infection with both HAV and HEV. This findings is near to one study (2%) (Das A K et al²⁶) and less than the other (Jain P et al²⁴). Prevalence of both HAV and HEV were higher in males than in females which is similar with other studies.^{33,34} It could be explained by the facts that the males get more exposure in their professional and social activities.

HAV and HEV infections are endemic in North India and infections occur throughout the year.²⁴ In the present study also both HAV and HEV were seen throughout the year with peaks of HAV cases in the months of May, July and August and peaks of HEV cases in the month from January to May. Previous studies have found either no seasonal peaks³⁵ or peak in summer and monsoon months of the year.³⁶

CONCLUSION

Both HAV and HEV are prevalent in this region. HEV is more prevalent in adults whereas HAV is more prevalent in children and adolescents. Presence of co-infection of both HAV and HEV in

AVH patients mandates the screening for HEV along with HAV in patients presenting with AVH.

High prevalence of HAV among children and low in adults indicates immunity in adults. So, vaccination against HAV may not be required in this part of our country. Both HAV and HEV are the leading causes of acute viral hepatitis in this part of our country. So, addressing the public health problems associated with the enteric transmission of viral hepatitis will require implementing stronger measures to prevent fecal contamination of food and water.

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Conflict of Interest: None Declared.

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