

Seroprevalence of Enterically Transmitted Hepatitis in North West India

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ABSTRACT

Introduction: To ascertain the seroprevalence of enterically transmitted Hepatitis A (HAV) and Hepatitis E (HEV) in cases with acute/subacute hepatitis attending a tertiary care hospital in North West India. **Methods:** A total of 2936 cases were examined for the presence of current infection with HAV and HEV, determined by demonstration of HAV-IgM and HEV-IgM antibodies using ELISA. **Results:** Overall seroprevalence for enterically transmitted hepatitis was found to be 24.89%. HAV IgM was present in 7.35% and HEV IgM was present in 17.54% of total cases. HAV infection was predominantly found in pediatric age group while HEV infection was mostly seen among adults. Male preponderance was noted. Enteric hepatitis cases occurred throughout the year. No definitive seasonal pattern was observed. **Conclusion:** Our data demonstrated high seropositivity of enterically transmitted hepatitis indicating the need for improvement in personal and public hygiene, and development of HEV vaccine.

KEYWORDS: Enterically transmitted hepatitis, Hepatitis E virus, Hepatitis A virus, HAV IgM, HEV IgM.

INTRODUCTION

Hepatitis A and E are both enterically transmitted viral infections causing sporadic and epidemic forms of acute hepatitis when food and water has been contaminated by sewage [1, 2]. Hepatitis A and E are also endemic in many tropical countries, including India, where conditions of hygiene and sanitation are poor [3]. Both these viruses do not cause chronic hepatitis [2]. Hepatitis A (HAV) infection is self-limiting and exposure to the virus ensures immunity to re-infection. It has an incubation period of 2-3 weeks; occurs asymptotically in some and mostly affects young children. The prevalence of HAV infection is however changing with improved sanitary conditions, and has shifted more to adults. HAV has been reported to be a more frequent cause of hepatitis in adults than in children in most developed countries.

In general, Hepatitis E (HEV) resembles HAV in having similar routes of transmission and clinical picture. However, HEV has longer incubation period and affects older children and adults [3]. HEV is unique among hepatitis viruses in causing fulminant

hepatitis and has a high mortality during pregnancy. Outcome of pregnancy complicated with HEV infection may be abortion, prematurity, still births and death after delivery [4-6].

The availability of various specific, more sensitive and practical assays for detection of anti-HAV antibody and anti-HEV antibodies have allowed investigators to evaluate the epidemiology of enterically transmitted hepatitis in outbreaks and sporadic cases. Since very few studies have been documented regarding enterically transmitted hepatitis from our region, the present study was undertaken to detect seroprevalence of enterically transmitted hepatitis.

METHODS

Study Location and Duration

This study was carried out in the Clinical Microbiology Laboratory, Sawai Man Singh (SMS) Hospital, Jaipur from January 2009 to December 2009 to detect seroprevalence of HAV and HEV infection.

Study Population

The study population included patients presenting with acute hepatitis, hospitalized or attending outpatient department of SMS hospital and attached hospitals. A total of 2936 cases of all ages and both sexes were included in the study.

Sample Collection

Three to five milliliters of blood were collected following aseptic procedures from each patient. Sera obtained from the patients' blood samples were analysed for IgM antibodies against HAV and HEV viruses using ELISA (HAV-DIASORIN and HEV-Globe diagnostics Italy). Tests were performed as per the manufacturer's instructions. Serum samples were also screened for HBs Ag and HCV antibodies and liver function. Samples positive for either HBs Ag and / or HCV were excluded from the study.

RESULTS

A total of 2936 cases (1981 males and 955 females) were tested for detection of seroprevalence of HAV and HEV infection. Of the 2936 cases, 731 (24.89 %) were positive for either HAV IgM or HEV IgM antibodies. Of these 519 (71 %) were males and 212 (29 %) were females. HAV IgM antibodies were positive in 216 (7.35 %) cases while HEV IgM antibodies were positive in 515 (17.54 %) cases.

Age related distributions of seropositive cases are as shown in Table 1.

Table 1 Distribution of enteric hepatitis cases by age categories

Age group (years)	Total seropositive cases	HAV seropositive cases (%)	HEV seropositive cases (%)
0-10	180	162 (75)	18 (3.49)
11-20	90	40 (18.5)	50 (9.72)
>20	461	14 (6.5)	447 (86.79)
Total	731	216 (100)	517 (100)

There were more seropositive cases for HAV than HEV in the 0-10 years age group. In the 20 years and above group, on the other hand, seropositive cases for HEV were higher than HAV. In the 11-20 years age

group the distribution of seropositive cases between HAV and HEV was somewhat even. There were four seropositive cases who were pregnant and they were all positive for HEV IgM antibodies. The present study was carried out over a period of one year and it was found that infection with HAV and HEV occurred throughout the year.

DISCUSSION

The present study revealed that out of 2936 cases tested for HAV IgM and HEV IgM antibodies in acute hepatitis cases, nearly a quarter (24.89 %) had evidence of enterically transmitted hepatitis. These findings are within the range of prevalences reported in a number of other studies in various parts of India, which had ranged from 10-40 %. Our study recorded seroprevalence of 7.35 % for HAV and 13.5 % for HEV. A study from north India reported a prevalence of 5.5 % for HAV infection and 13.9 % for HEV infection [7]. Another study from south India also reported similar prevalence for HEV (17.3 %), although prevalence for HAV (13.3 %) was little higher than that found in our study [3]. A hospital based study from south India reported a prevalence of 18 % of HEV positive cases among acute hepatitis cases, which is in agreement with our study [8]. A community based retrospective study from Rajasthan reported a prevalence of 32 % for HAV infection and 7 % for HEV infection [5]. Higher prevalence for HEV of 40 % [10] and 42 % [11] has also been reported.

Age related distribution of seropositive cases revealed that 75 % of HAV IgM seropositive cases were in the age group of 0-10 years while HEV IgM positive cases were maximum in the above 20 years age group [86.79 %; Table 1]. These findings seem to suggest that HAV infection is more prevalent among young children while HEV is more prevalent among adult population. Similar observations have also been reported by a number of other investigators [3, 7, 11].

Serological studies done in the past in India have shown that most children by the age of 10-15 years have detectable levels of anti HAV IgG due to subclinical or clinical exposure very early in life. However recent studies seem to suggest that due to urbanization and improvement in general standards of hygiene, the risk of HAV infection in childhood is

diminishing, causing decrease in seroprevalence of anti HAV IgG. Such a phenomenon would leave large numbers of non-immune adults susceptible to these infections, causing an epidemiological shift in HAV-related disease in older age group [12, 14]. We have also reported few cases among adolescents (18.5 %) and young adults (6.4 %).

In contrast to the prevalence of HAV seropositive cases in children aged between 0-10 years, the prevalence of HEV seropositive cases was highest among adults aged 20 years or more. HEV cases were also recorded among children 0-10 years (3.49 %) young adults 11-20 years (9.7 %) indicating that HEV infection can affect all the age groups. Various other workers also reported HEV cases among children and young adults [3, 9]. Highest attack rate among cases with clinically overt HEV infection is observed in adults and young adult aged between 15-40 years, suggesting that infections occur sub-clinically in younger individuals who develop protective antibodies. Consequently, a disproportionate involvement of young to middle aged adults may depend upon waning levels of HEV antibody in the serum, which permits re-infection [13]. Sex wise, the distribution of enterically transmitted Hepatitis cases revealed a greater preponderance in the males (71 %) than females (29 %). Similar findings have been reported in other studies [7, 8].

In our study among the 212 females positive for HEV, four females showed pregnancy complicated with HEV infection. Although a high mortality rate has been reported in pregnant females with HEV infection, of the four females who tested positive for HEV, one had still birth and one developed hepatic encephalopathy. Cases of pregnancy complicated by HEV have been well documented in the literature (4-6).

The present study was carried out over a period of one year. Data on the occurrence of HAV and HEV infection on monthly basis revealed that enteric cases occurred throughout the year (Table 2). No definite seasonal pattern was observed, suggesting that both these viruses are endemic in our region [Table 2] (3, 7). However maximum numbers of positive cases of enterically transmitted hepatitis were seen in the months of June and October. Other studies

have reported most cases during late summer and monsoon months [9].

CONCLUSIONS

Enterically transmitted hepatitis is an important cause of acute / subacute hepatitis in this part of India. This study revealed typical epidemiological characteristics reported in the literature. It was found that both of these viruses are endemic in this region.

Table 2 Distribution of enteric hepatitis cases throughout the year (2009)

Month (Year 2009)	Total Cases	Total Positive Cases (%)	HAV Positive Cases (%)	HEV Positive Cases (%)
January	155	42 (27.00)	23 (14.80)	19 (12.20)
February	126	33 (26.19)	14 (11.11)	19 (15.07)
March	238	56 (23.52)	17 (7.14)	39 (16.30)
April	161	32 (19.87)	20 (12.40)	12 (7.40)
May	238	63 (26.47)	22 (9.24)	41 (17.22)
June	295	102 (34.57)	35 (11.86)	67 (22.71)
July	293	76 (25.93)	20 (6.82)	56 (19.11)
August	351	76 (21.65)	18 (5.12)	58 (16.52)
September	301	67 (22.25)	12 (3.98)	55 (18.27)
October	275	89 (32.36)	13 (4.72)	76 (27.63)
November	295	62 (22.54)	10 (3.38)	52 (17.62)
December	208	33 (15.86)	12 (5.76)	21 (10.09)
Total Cases	2936	731 (24.89)	216 (7.35)	515 (17.54)

HAV infection was seen mostly among young children, and in a smaller number of susceptible adolescents, while HEV infection was predominantly seen in young adults and adults. It has been suggested that local unhygienic conditions and exposure to water contaminated with human waste are clear risk factors, which favor HAV and HEV infection in developing

countries like India. Public health measures such as provision of pure and safe drinking water, improvement of sanitation and mass education in personal and public hygiene are needed to control HAV and HEV infection. Since HEV vaccine is still unavailable commercially, prevention of HEV infection solely rests upon general preventive measures while prevention of HAV infection can also be achieved by specific preventive measures i.e. active and passive immunization, however universal immunization remain too costly in India. Further intensive, well planned, population based epidemiological studies in different parts of India are needed to identify different risk groups and regions that should be targeted for HAV vaccine.

Conflict of Interest

Authors declare none.

REFERENCES

- Melnick JL. Properties and classification of hepatitis A virus. *Vaccine*. 1992; 10 suppl 1: S24-6.
- Mohanavalli B, Dhevahi E, Menon Thangam Malathi S, Thyagrajan SP. Prevalence of antibodies to hepatitis A and hepatitis E Virus in urban school children in Chennai. *Indian Pediatr*. 2003; 40(4): 328-31.
- Radhakrishnan S, Raghuraman S, Abraham P, Kurian G, Chandy G, Sridharan G. *Indian J Pathol Microbiol*. 2000; 43(4): 433-6.
- Borhanmanesh F, Haghghi P, Hekmat K, Rezaizadeh K, Ghavami AG. Viral hepatitis during pregnancy. *Gastroenterology*. 1973; 64: 304-12.
- Beniwal M, Kumar A, Kar P, Jilani N, Sharma JB. Prevalence and severity of acute viral hepatitis and fulminant hepatitis during pregnancy: a prospective study from North India. *Indian J Med Microbi*. 2003; 21(3): 184-5.
- Singh S, Mohanty A, Joshi YK, Dwivedi SN, Deka D. Outcome of hepatitis E virus infection in Indian pregnant women admitted to a tertiary care hospital. *Indian J Med Res*. 2001; 113: 35-9.
- Kaur H, Oberoi A, Chander R, Pawar G, Verma M. Epidemiology of hepatitis E and A in Ludhiana. *Trop Gastroenterol*. 2002; 23(2): 76-8.
- Mishra B, Srinivasa H, Muralidharan S, Charles S, Macaden RS. A hospital based study of Hepatitis E by serology. *Indian J Med Microbiol*. 2003; 21: 115-7.
- Singh J, Prakash C, Gupta RS, Bora D, Jain DC, Datta KK. Epidemiology of endemic viral hepatitis in an urban area of India: a retrospective community study in Alwar. *Bull World Health Organ*. 1997; 75(5): 463-8.
- Rana SS, Rajan A, Kar P. The spectrum of sporadic acute viral hepatitis in North India: Experience of a tertiary care centre. *Indian J Gastroenterol*. 2000; 19: A 31.
- Bansal J, He J, Yarbough PO, Sen S, Constantine NT and Sen D. Hepatitis E virus infection in eastern India. *Am J Trop Med Hyg*. 1998; 59(2): 258-60.
- Jindal M, Rana SS, Gupta RK, Das K and Kar P. Serological study of hepatitis A virus infection amongst the students of a medical college in Delhi & evaluation of the need of vaccination. *Indian J Med Res*. 2002; 115: 1-4.
- Krawczynski K. Hepatitis E, Chapter 111 in *Bockus Gastroenterology 5th ed. Vol. 3 (Saunders) 1995: 2129-40*.
- Mathur P, Arora NK. Epidemiological transition of hepatitis in India: issues for vaccination in developing countries. *Indian J Med Res*. 2008; 128: 699-704.