



HEPATITIS E SEROPREVALENCE AND SOCIODEMOGRAPHIC CHARACTERISTICS AT A TERTIARY CARE HOSPITAL

Dr. Sandeep Wankhede

Assistant Professor Dept. of Microbiology Datta Meghe Medical College, Nagpur

Article Info: Received 09 may 2020; Accepted 26 June 2020

Corresponding author: Dr. Sandeep Wankhede

Conflict of interest statement: No conflict of interest

Abstract

Background: Enterically transmitted hepatitis is frequently caused by the hepatitis E virus, which is spread by tainted food and water. Globally, there are regional, population, and circulating HEV genotype differences in the prevalence rates of antibodies to the hepatitis E virus (anti-HEV), with unexpectedly high seropositivity in some developed settings.

Aims & objectives: The purpose of the current study was to examine the sociodemographic characteristics and seroprevalence of Hepatitis E infection at a tertiary hospital.

Material and Methods: Informed consent was obtained before the current single-center, prospective, observational study was conducted on patients with clinically suspected acute viral hepatitis who were willing to participate. IgM anti-HEV was found using the RecombiLISA test in human serum or plasma.

Results: Anti-HEV testing revealed 72 (10.29%) reactive cases. The age groups of 31-45 years (13.27%) and 15-30 years (12.2%) had the highest rates of anti-HEV test reactivity, whereas the age groups of 41-60 years and 15 years exhibited, respectively, 4.17% and 3.28%. There was no statistically significant relationship between the anti-HEV test and the various age groups. ($P = 0.0187$) Male cases of HEV positivity outnumbered female cases by a larger margin (15.38%). The difference was statistically significant (5.52%). (p value – 0.002). The ratio of men to women was 2.6:1. Among hepatitis E cases, the mean values for total bilirubin, SGOT/AST, SGPT, ALP, and A/G ratio were 3.35 ± 2.45 , 138.28 ± 19.35 , 408 ± 106 , 1516 ± 447 , and 0.32 ± 0.14 , respectively. The months of July and August saw the highest number of hepatitis E cases (42 and 14, respectively), with September, November, and December each seeing two cases. Seropositive cases and months correlated in a statistically significant way.

Conclusion: Adults and older children were found to have higher HEV incidences. Timely diagnosis by serology and PCR, in addition to assistance from clinical diagnosis and biochemical analysis, may help in early management and prevention of complications.

Keywords: HEV infections, acute viral hepatitis, sociodemographic profile, Anti – HEV test

Introduction

A primary liver infection caused by any one of the diverse group of "hepatitis viruses," which includes types A, B, C, D, E, and G, is referred to as "viral hepatitis." Hepatitis virus types are differentiated based on their serological and

molecular markers because they all cause an acute disease that is clinically indistinguishable¹. Enterically transmitted hepatitis is frequently caused by hepatitis A and E, which is transferred by tainted food and water. Hepatitis E Virus (HEV) is a tiny, non-enveloped, single-stranded RNA virus that is a member of the Hepevirus genus and family².

Infection with hepatitis E has been observed less commonly in early children and more frequently in older kids and adults³. If young people's HEV infections are either primarily asymptomatic or simply less common than those in older people, this relative scarcity of HEV infections may be explained. Globally, there are regional, population, and circulating HEV genotype differences in the prevalence rates of antibodies to the hepatitis E virus (anti-HEV), with unexpectedly high seropositivity in some developed settings⁴⁻⁶. Around 20 million cases of hepatitis E are reported annually worldwide, of which 3 million are symptomatic. Hepatitis E is responsible for over 56000 fatalities annually. Since most cases of hepatitis E are mild, subclinical, or unreported, epidemiology of the disease is best assessed by measuring immunoglobulin M (IgM) antibodies to HEV⁷.

Aims & objectives: The purpose of the current study was to examine the sociodemographic characteristics and seroprevalence of Hepatitis E infection at a tertiary hospital.

MATERIAL AND METHODS

The current study was a single-center, prospective, observational investigation carried out in a medical college in Central India's microbiology department. The study lasted a year (January 2020 to December 2020). After receiving approval from the institutional ethics committee, the study was started. All individuals with clinically suspected acute viral hepatitis who are willing to participate in the trial after receiving informed consent must meet the inclusion criteria.

Patients with chronic viral hepatitis and those who are unwilling to participate in the trial are excluded.

A thorough history was obtained, and each patient's LFT reports were entered into the case record form. Clinically suspected patients with acute liver illness who visited the OPD and

were admitted to the wards after receiving informed consent had 5ml of blood drawn in a sterile vacutainer. Centrifuging the separated serum at 2500 rpm for 15 minutes then subjected it to serological testing. IgM anti-HEV was found using the RecombiLISA test in human serum or plasma.

INTERPRETATION OF RESULTS:

- A negative result means that the specimen had no detectable IgM anti-HEV.
- The related specimens were retested in duplicate where the results were barely below the cut-off value.
- The HEV ELISA Kit considers samples with a cut-off > 1.00 to be initially positive and retests them twice before rendering a final interpretation.

The HEV IgM Kit considers a specimen to be negative if, following retesting, the absorbance values of the two duplicates are below the cut-off value. In this case, the first result was not reproducible. Microsoft Excel was used to collect and compile the data, and SPSS 23.0 was used to analyse it. For the continuous variables, frequency, percentage, means, and standard deviations (SD) were calculated. Depending on the situation, either the chi-square test or the Fisher exact test was used to examine differences in proportions between qualitative variables. A statistically significant value was defined as one with a P value less than 0.5.

RESULTS

Most suspected hepatitis cases were found in people between the ages of 15 and 30 (46.8%), followed by those between 31 and 45 (28%) and those under 15 (17.42%). As can be seen in the table above, females (51.71%) were more likely than men (48.29%) to have suspected hepatitis cases. The ratio of men to women was 0.93:1.

Table 1: Age and Gender wise distribution of cases

Characteristic	Suspected hepatitis cases (n=700)	Percentage
Age (in years)		
<15	122	17.43
15-30	328	46.86
31-45	196	28
46-60	48	6.85
>60	6	0.86
Mean age	26.50 + 13.07	
Gender		
Male	338	48.29
Female	362	51.71

Fever (98.28%), malaise (97.42%), abdominal discomfort (88.85%), yellow staining of urine (23.71%), and lack of appetite (14.57%) were the most frequent clinical characteristics among patients with hepatitis.

Table 2: Clinical profile of patients

Clinical features	Total	Percentage
Fever	688	98.28%
Malaise	682	97.42%
Abdominal pain	622	88.85%
Yellow discoloration of urine	166	23.71%
Loss of appetite	102	14.57%
Icterus	114	16.28%
Hepatomegaly	62	8.8%

The anti-HEV test revealed 36 (10.29%) reactive cases.

Table 3: Seroprevalence of Hepatitis E virus (HEV) IgM antibody

No. of cases	Reactive		Non- reactive	
	No.	%	No.	%
700	72	10.29	628	89.71

Anti-HEV testing was reactive most frequently in the age groups of 31-45 years (13.27%), 15-30 years (12.2%), 41-60 years (4.17%), and 15 years (3.28%). There was no statistically significant relationship between the anti-HEV test and the various age groups. (P = 0.0187) Male cases of HEV positivity outnumbered female cases by a larger margin (15.38%). The difference was statistically significant (5.52%). (p value – 0.002). The ratio of men to women was 2.6:1.

Table 4: Seroprevalence of Hepatitis E virus in clinically suspected cases

Characteristic	Anti HEV test (IgM)		Total
	Reactive cases	Non-Reactive cases	
Age group (years)			
<15	4 (3.28%)	118 (96.72%)	122
15-30	40 (12.2%)	288 (87.8%)	328
31-45	26(13.27%)	170 (86.73%)	196
46-60	2 (4.17%)	46 (95.83%)	48
>60	0 (0%)	6 (100%)	6
Total	72 (10.29%)	628 (89.71%)	700
Gender			
Male	52 (15.38 %)	286 (84.62%)	338
Female	20 (5.52%)	342 (94.48%)	362

Lower middle class households (41.7%) had the highest prevalence of seropositive HEV cases, followed by upper lower (30.55%) and lower class (25%). The correlation between various socioeconomic statuses and HEV cases was statistically significant.

Table 5: Socioeconomic status of seropositive HEV cases (Kuppuswamy classification)

Class	No. of cases		Total
	Positive	Negative	
Upper	0 (0%)	2 (0.3%)	2 (0.28 %)
Upper middle	2 (2.78%)	384 (61.5%)	386 (55.43 %)
Lower middle	30 (41.67%)	158 (25.2%)	188 (6.86 %)
Upper lower	22 (30.55%)	8 (1.3%)	30 (4.29 %)
Lower	18 (25%)	76 (12.1%)	94 (13.43%)
Total	72 (100%)	618 (100%)	700 (100 %)

Among hepatitis E cases, the mean values for total bilirubin, SGOT/AST, SGPT, ALP, and A/G ratio were 3.35 2.45, 138.28 19.35, 408 106, 1516 447, and 0.32 0.14, respectively.

Table 6: LFT of Hepatitis E

HEV	Mean	SD
Total Bilirubin	3.35	2.89
Direct Bilirubin	2.06	1.73
Indirect Bilirubin	1.26	1.33
SGOT/AST	138.28	19.69
SGPT	408.00	112
ALP	1516.00	493
Ser. Albumin	2.46	0.42
Ser. Globulin	3.30	0.68
A/G ratio	0.32	0.27

The months of July (21 cases), August (7 cases), and then September, November, and December each saw one case of hepatitis E. Seropositive cases and months showed a statistically significant correlation (p value 0.05).

Table 7: Seasonal variation of seropositive cases of Hepatitis E virus

Month	HAV		Total
	Positive	Negative	
January	0	14	14
February	0	20	20
March	0	18	18
April	0	18	18
May	0	80	80
June	10	44	54
July	42	138	180
August	14	84	98
September	2	22	24
October	0	38	38
November	2	96	98
December	2	64	66

DISCUSSION

Acute viral hepatitis may go away on its own or develop into liver cancer, cirrhosis, or fibrosis. Because of the severity of the sickness, the mortality that goes along with it, and the possibility of outbreaks, these viruses pose a major threat to public health⁸⁻¹⁰. The enterically transmitted hepatitis E virus (HEV) is most common in Asia, Africa, and Central America. Anti-HEV IgM and anti-HEV IgG antibodies of the IgM and IgG classes (which can be detected) decline quickly after acute infection, reaching low levels within six months. However, the seroprevalence rates of prior HEV exposure are typically between 10% and 40%¹¹. In our study, it was shown that the age group of 15 to 30 years (46.8%), followed by 31 to 45 years (28%) and less than 15 years (17.42%), had the highest prevalence of probable hepatitis cases. The mean age was 26.45 + 13.07. Similar to this, a study by Sharma P.K. et al. showed that the age group of 15–35 years had the highest percentage of cases (52.22%), with a mean age of 37.4 + 15.9 years. Additionally, Antony J et al. show 54.64% and 29.82% in the 20–39 year olds and 19 year olds age groups. When gender distribution in clinically suspected hepatitis cases was taken into account, it was found that women (51.71%) were more likely to have the disease than men (48.29%)¹². In a study by Sharma PK et al., 52.22% of female

participants and 47.78% of male participants showed similar results. In the current study, fever (98.28%), malaise (97.42%), stomach discomfort (88.85%), yellow colouring of urine (23.71%), icterus (16.28%), and appetite loss (14.57%) were the most frequent clinical characteristics among patients of hepatitis¹³. Fever was the most frequent symptom in the study done by Kamath SR et al., followed by jaundice, nausea, and vomiting. While Baskir K et al. identified malaise as the main symptom, it was followed by arthralgia and stomach pain. While Jaundice was identified as a frequent presenting complaint by Modi TN et al. and Chandra NS et al. In underdeveloped nations, the hepatitis E virus is one of the main causes of acute and fulminant hepatitis¹⁴⁻¹⁶. The target demographic for HEVs is young to middle-aged persons between the ages of 15 and 40. Clinical signs of acute viral hepatitis include hepatomegaly, jaundice, malaise, stomach discomfort, and anorexia. HEV has a secondary attack rate of just approximately 2%, making it relatively low infective¹⁷. In the current investigation, 72 (10.28%) instances of clinically suspected acute viral hepatitis tested positive for anti-HEV antibodies. A study conducted in Bolivia by Bartolini A et al. and Mishra B et al. found prevalence of anti-HEV IgM of 7.3% and 18.8%, respectively. Joon A et al. found seroprevalence of anti-HEV of 10.54%, which is similar to our study. HEV

and their prevalence might serve as an epidemiological marker for how frequently a population is exposed to HEV¹⁸. Anti-HEV antibody prevalence rates are higher in high-endemicity countries than they are in low-endemicity ones, which may indicate that there are many potential for water contamination. Out of 72 seropositive cases of hepatitis E in our investigation, the age groups with the highest seroprevalence were 31-45 years (13.27%) and 15-30 years (12.2%). Therefore, the age range of patients who were most prevalent was 15 to 45. Similar to Keramettin Y et al., Chakrabarti K et al. reported seroprevalence of 19% in 31-40 years, and Vitral CL et al. reported 17.8% in the age group of 31-50 years. Similar results were found by Sarwat F et al. (12.5% in 26-30 years), Kermettin Y et al. (13.2% in 19-29 years), and Rajani M (10.7% in 21-30 years). The male to female ratio in the current study was 2.6:1. Male to female ratios of 1.9:1 and 3.4:1, respectively, were found by Mishra B et al. and Modi TN et al., which are consistent with our results. While Upadhay K et al. found a 1.59:1 ratio, which is on the lower side, higher seroprevalence of hepatitis E in males may be due to behavioural differences between the sexes. Males are more exposed than females because of their outdoor and social activities. Additionally, there can be a distinction in how the male and female populations of the civilizations approach seeking health. Hepatitis E seroprevalence rates are claimed to be negatively related to a person's economic situation, the availability of clean water, and personal and environmental cleanliness¹⁹⁻²¹. Similar to this, Sarwat F et al. found in their study that 25% of the patients were in the higher lower socioeconomic group and 75% of the patients were in the lower middle socioeconomic group. Similar results were seen in the current investigation. Increased levels of bilirubin, SGOT, SGPT, and alkaline phosphate were also reported in other investigations by Sarwat F et al. and Bashir K et al., which are consistent with our results. When liver function tests were compared between HEV seropositive and seronegative patients, it became clear that

patients with hepatitis E had elevated liver enzyme levels, a sign of a dysfunctional liver. The first enzymes to show anomalies over the course of a disease and the last to return to normal are SGPT and SGOT²²⁻²⁴. The majority of management should be preventive, focusing on pure drinking water, excellent sanitation, and appropriate personal hygiene. Visitors to endemic regions should refrain from consuming undercooked shellfish and drinking water that may be polluted. Clinicians should find the understanding of regional hepatitis E seroepidemiology useful for differential diagnosis.

CONCLUSION

Clinically suspected patients with acute viral hepatitis frequently have HEV infections, which continue to be a serious health concern in developing nations. Adults and older children were shown to have greater HEV occurrences. Timely diagnosis by serology and PCR, in addition to assistance from clinical diagnosis and biochemical analysis, may help in early therapy and prevention of problems. A greater proportion of cases have been found in people from lower socioeconomic classes, so spreading knowledge about sanitation and hygienic practises will aid in lowering the infection rate.

REFERENCES

1. Kapil A. Ananthnarayan and Paniker's Textbook of Microbiology. 9th ed. Hyderabad : UNIVERSITIES PRESS (INDIA) PRIVATE LIMITED; 2013. P.540.
2. Rajani M. Contribution of hepatitis viral markers in clinical cases of Jaundice at a tertiary care centre. *Int J Curr Adv Res.* 2016;5(4):860-64.
3. Arankalle V a., Tsarev S a., Chadha MS, Alling DW, Emerson SU, Banerjee K, et al. Age-Specific Prevalence of Antibodies to Hepatitis A and E Viruses in Pune, India, 1982 and 1992. *J Infect Dis.* 1995 Feb 1;171(2):447-50.
4. Arora D, Jindal N, Shukla RK, Bansal R. Water Borne Hepatitis A and Hepatitis E in Malwa Region of Punjab, India. *J Clin Diagn Res.* 2013 Oct;7(10):2163-6.

5. Kuniholm MH, Purcell RH, McQuillan GM, Engle RE, Wasley A, Nelson KE. Epidemiology of Hepatitis E Virus in the United States: Results from the Third National Health and Nutrition Examination Survey, 1988-1994. *J Infect Dis.* 2009 Jul 1;200(1):48-56.
6. Hepatitis E fact sheet WHO, available at <http://www.who.int/mediacentre/factsheets/fs280/en/> accessed on 10/09/2016
7. Pandya N, Chaudhary A. Prevalence of hepatitis a virus (HAV) and hepatitis e virus(HEV) in the patients presenting with acute viral hepatitis. *Int. J App Res.* 2015; 1(9): 369-71.
8. Joon A, Rao P, Shenoy SM, Baliga S. Prevalence of Hepatitis A virus (HAV) and Hepatitis E virus (HEV) in the patients presenting with acute viral hepatitis. *Indian journal of medical microbiology.* 2015 Feb 1;33(5):102.
9. World Health Organisation, The Global Prevalence of Hepatitis E Virus Infection and Susceptibility: A Systematic Review; 2010
10. Sharma PK, Tripathi N. A clinico-epidemiological profile of acute viral hepatitis in Northern india: *Int J Med Res* 2016;1(1):33-6
11. Antony J, celine TM. A Hospital-based Retrospective Study on Frequency and Distribution of Viral Hepatitis. *J Glob Infect Dis.* 2014 Jul-Sep; 6(3): 99-104.
12. Kamath SR, Sathiyasekaran M, Raja TE, Sudha L. Profile of viral hepatitis A in Chennai. *Indian Pediatr.* 2009 Jul;46 (7):642-3.
13. Bashir K, Hussain N, Hasnain S, Elahi S. Seroprevalence of hepatitis E virus immunoglobulin G and M antibodies in adults: A hospital based study. *Indian Journal of Medical Microbiology:* 2009; 27(2), 139141
14. Modi TN, Patel SA, Mirani KM, Vaghasiya DR, Makadia GS et al. A study of clinical profile and outcome in acute viral hepatitis E. *Indian Journal of Clinical Practice,* March 2013, Vol. 23, No. 10
15. Chandra NS, Ojha D, Chatterjee S, Chattopadhyay D. Prevalence of hepatitis E virus infection in West Bengal, India: a hospital-based study. *Journal of medical microbiology.* 2014 Jul 1;63(7):975-80.
16. Keramettin Y, Yeliz TC, Adil K, Ugur A, Eser Y, Murat G. Seroprevalence of Hepatitis E in A Tertiary care hospital. *J Microbiol Exp* 2015, 2(2): 00043
17. Joon A, Rao P, Shenoy SM, Baliga S. Prevalence of Hepatitis A virus (HAV) and Hepatitis E virus (HEV) in the patients presenting with acute viral hepatitis. *Indian journal of medical microbiology.* 2015 Feb 1;33(5):102.
18. Bartoloni A , Bartalesi F, Roselli M, Mantella A, Arce CC et al. Prevalence of antibodies against hepatitis A and E viruses among rural populations of the Chaco region, southeastern Bolivia. *Trop Med Int Health.* 1999 Sep;4(9):596601
19. Mishra B, Srinivasa H, Muralidharan S, Charles S, Macaden RS. A hospital based study of Hepatitis E by Serology. *Indian Journal of Med Microbiol,* 2003; 21 (2):115-117
20. Aggarwal R. Hepatitis E : Epidemiology and natural history. *J clin exp hepatol* 2013;3:125-133
21. Chakrabarti K, Ballala K, Rao K, Patil N, Avinash A, Ahmed T, Varghese G, Kunder SK. A study to assess the clinical and biochemical profile of patients diagnosed with hepatitis e in a large teaching hospital of Southern India. *Asian Journal of Pharmaceutical and Clinical Research.* 2016 Mar 5;9(2):84-9.
22. Vitral CL, da Silva-Nunes M, Pinto MA, de Oliveira JM, Gaspar AM, Pereira RC, Ferreira MU. Hepatitis A and E seroprevalence and associated risk factors: a community-based cross-sectional survey in rural Amazonia. *BMC infectious diseases.* 2014 Aug 23;14(1):1.
23. Sarwat F, Anees S, Ayesha A. Seroprevalence of Hepatitis A and E Virus Infections in Patients with Acute Viral Hepatitis in Hyderabad, India-A One Year

Study. British Journal of Medicine and Medical Research. 2016 Jan 1;11(10):1.
24. Upadhyay KJ. Study of “Clinical study of cases of Hepatitis E”. Ijsr-International

Journal of Scientific Research :2016; vol 5; issue 8,2277- 8179.IF:3.508, IC value: 69.48.