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Original Research Article

Seroprevalence of Hepatitis A virus and Hepatitis E virus in patients presenting with acute viral hepatitis: A retrospective study of 2-years at tertiary care Hospital, Himachal Pradesh in Northern India

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ABSTRACT

Background: Hepatitis-A virus and Hepatitis-E virus are spread enterically, resulting in acute viral hepatitis (AVH) in developing countries. Fecal-oral transmitted hepatitis cause major health problems in our country. The aim of present study is to determine the seroprevalence of HAV and HEV in AVH patients attending the tertiary care hospital at Dr. Rajendra Prasad Govt. Medical College Kangra at Tanda, Himachal Pradesh (DRPGMC). Insufficient data makes it difficult to determine an accurate prevalence of illness in this region of India.

Materials and Methods: The Viral Research and Diagnostic Laboratory (VRDL), in the Department of Microbiology at DRPGMC Tanda, Himachal Pradesh, consolidated retrospective data of 2-years duration. The study population included 784 serum samples received from outdoor and indoor patients were considered in the study.

Results: Of the 784 serum samples that were chosen for our study, HAV and HEV reactive patients showed a seroprevalence of 11.20% and 1.80% respectively. During two years of the study, the co-infection rate of HAV and HEV in patients with acute viral hepatitis was 0.5%. Compared to females (31.80% and 42%), males reported higher seroprevalence of HAV (68.10%) and HEV (57.10%). Further data shows that HAV infection was observed in all age groups and the highest prevalence was reported in the age range from 11 to 20 years. The HEV infection was not observed in the pediatric age groups, it was only observed in adults. Maximum prevalence of HEV was reported in the age group of 21-30 years. The highest number of reactive cases was recorded in the month of August and September.

Conclusion: We found that the prevalence of HAV is significantly higher than that of HEV during two years of study period. In this study, we observed that HAV is more predominant in males as compare to females.HEV infections were only observed in adults.

1. Introduction

Globally, viral hepatitis is acknowledged as a public health issue. In 2015, viral hepatitis caused 1.34 million deaths worldwide, more than HIV and tuberculosis, according to the World Health Organization's (WHO) 2017 Global Hepatitis Report. Acute liver failure (ALF) and acute viral hepatitis (AVH) are serious illnesses caused by the hepatitis A and hepatitis E viruses.[1] Compared to high-income countries, developing nations have a higher incidence of acute hepatitis caused by HEV and HAV infection. In India, HAV is the cause of 5–15% of instances of acute liver failure and 10–30% of cases of acute hepatitis. Additional data state that HEV is the cause of 15–45% of acute liver failure and 10–40% of acute hepatitis.[2] An estimated 20 million HEV infections occur annually in the world, which

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results in an estimated 3.3 million cases of acute hepatitis E with symptoms. Despite being found throughout the world, hepatitis E is more prevalent in East and South Asia.[3] A high prevalence of viral hepatitis is recognized in India. The National Center for Disease Control (NCDC) in India launched the IDSP in 2009, and it is now operational in every state in the country. The district monitoring units also look into possible hepatitis outbreaks (two or more instances of severe jaundice with an epidemiological relationship).[4]

Viral diseases such as HAV and HEV are spread by consuming food and water that have been contaminated with an infected person's feces.[5] HAV is a non-enveloped RNA virus that is spread orally and through feces. It is a member of the picornaviridae family and genus Hepatovirus. For HAV, the incubation period lasts between 15 to 45 days. During infection, initially IgM antibody levels are detected in blood for up to 4 weeks in serology testing and IgM antibodies persist at an elevated level for 2 months after that start declining and rarely, persist beyond 12 Months.[6] HEV is a member of the hepeviridae family of non-enveloped single-stranded RNA viruses. With an incubation period of 2 to10 weeks, the fecal oral route is responsible for the transmission of this agent.[7]

Fecal orally transmitted hepatitis remains one of the most prevalent infectious diseases in India, which is a sign of poor sanitation, particularly in rural and semi-urban regions.[8] The national viral hepatitis control program was started by the Ministry of Health and Family Welfare, Government of India, with the goal of reducing morbidity and death from viral hepatitis caused by the hepatitis A, B, C, and E viruses.[1,2] Although there is a high incidence of viral hepatitis in India, there are insufficient national surveillance statistics. The Government of India has affirmed the commitment to combating the disease with sustainable Development goals (SDG) in the 69^{th} World health assembly.[9] As a result of improvement in socio-economic conditions there is noticeable shift in the disease pattern from children to adults. Additionally, from 2014, India has prioritized the development of improved sanitary infrastructure as part of the Swachh Bharat (Clean India) mission.[10]

The exact prevalence of the illness in this northern Indian state is unknown due to a lack of statistics. Determining the infection rate, epidemiology of HAV and HEV, and their co-infections in AVH cases at tertiary care hospitals was the goal of the current study. This will help to make a proper strategy for taking preventive measures by planning vaccine strategies for HAV, better sanitation programs, and timely diagnosis or management of AVH cases.

2. Materials and Methods

The Department of Microbiology at Dr. Rajendra Prasad Government Medical College Tanda in Himachal Pradesh carried out this retrospective observational study over two years, from January 2021 to December 2022. The study population included all patients (indoor and outdoor) presenting to the hospital with features of AVH whose samples were received for serological testing against hepatitis- A and hepatitis-E IgM Elisa. The study included 784 patients during two years period presenting with acute viral hepatitis was considered. Serum samples from all age groups were included in these studies that were suspected of acute viral hepatitis (AVH).

2.1. Serology testing

Blood samples of the patients were collected in blood collection vials aseptically at Center Clinical Laboratory (CCL) unit of the hospital. After receiving samples from CCL, blood samples were centrifuged. After centrifugation, serum samples of the patients were properly labeled and store at -20°C until testing. ELISA testing was performed using commercially available ELISA kits (RecombiLisa kit). All the tests were performed as per the manufacturer guidelines provided with in the ELISA kits (kit inserts).

3. Results

3.1. Total tests v/s total positives

Total 784 serum samples were tested for anti-HAV IgM Elisa and 761 serum samples were tested for anti-HEV IgM Elisa during 2-years of study period. We observed out of 784 serum samples, 88 (11.20%) were reactive by HAV IgM Elisa. For HEV, out of 761 serum samples tested only 14 (1.80%) were reactive for HEV IgM Elisa. This depicts that HAV infection was more prevalent than HEV during this study period. (Figure 1)

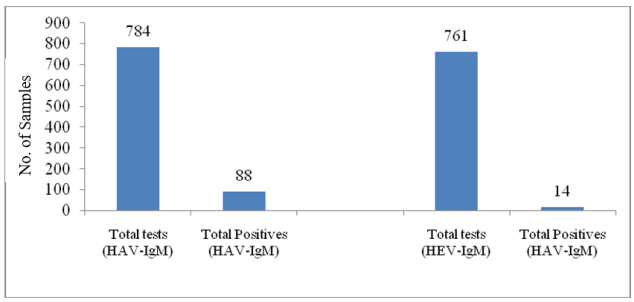

Figure 1: Total number of samples tested for HAV and HEV vs positivity rate

3.2. Age wise distribution analysis of positives

All age groups were affected by HAV infections; however, the youngest age group between11 to 20 years showed the highest prevalence (38.6%), followed by the age group of 21 to 30 years (Figure 2).

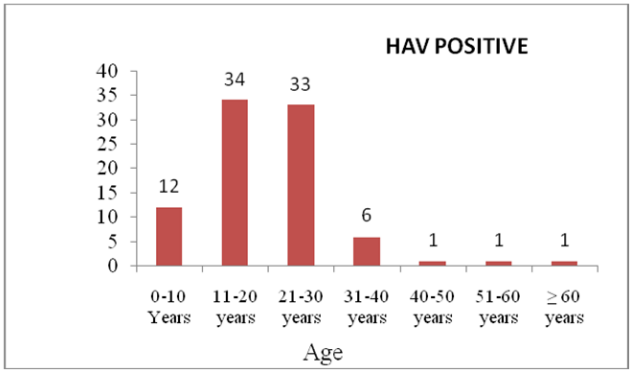

Figure 2: Age wise distribution of HAV positive patients

Further, data from this study showed that HEV infection was observed among adults not in pediatric age groups. HEV was not prevalent in all age groups. Maximum positive cases of HEV are in the age group of 21-30 years (42.8%) (Figure 3).

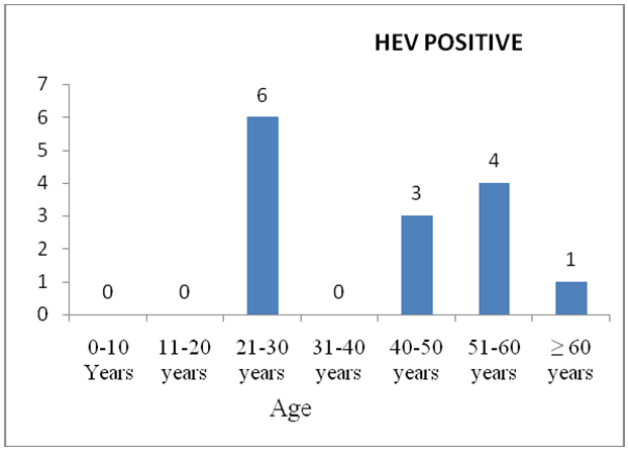

Figure 3: Age wise distribution of HEV positive patients

3.3. Gender specific positivity and co-infection

Among gender specific positivity of HAV, male (68.18%) were significantly more positive than females (31.8%) (Figure 4). While similar trends were also observed in HEV positivity but due to very small overall positivity in HEV the significant difference could not be seen. Another data predicted in this study was the co-infection cases of HAV and HEV, all the co-infected samples were from male population between the age group of 21-30 years (0.5%) (Figure 4).

3.4. Month wise trends in positivity

HAV and HEV positive cases were recorded throughout the year, with a peak season observed during the monsoon

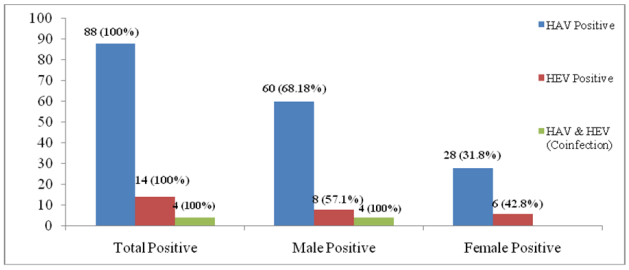

Figure 4: Gender specific positivity pattern and co-infection of HAV & HEV

and the start of the winter in Himachal Pradesh. Maximum positive cases were observed in the months of August and September (Figure 5).

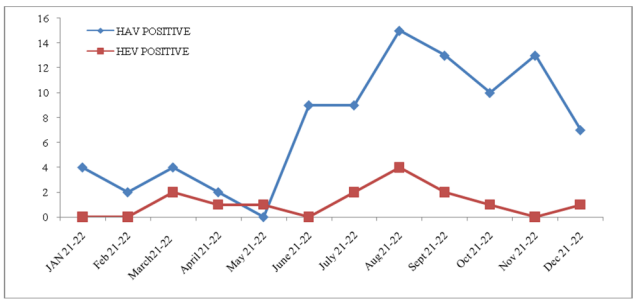

Figure 5: Seasonal distribution of HAV and HEV infection month wise

4. Discussion

Numerous international and Indian investigations have documented variable prevalences, ranging from 12.6 to 78.6% for HEV and from 1.7 to 67% for HAV.[1,5,9,11,12] In this study 13.5% reactive viral markers were observed (HAV 11.20%, HEV 1.80%, Confection 0.5%).

Both HAV and HEV are transmitted from one host to other through contaminated water bodies and frequency of HAV infection found to be more prevalent than HEV during this study in Himachal Pradesh. A study from Karnataka, India revealed a similar kind of observation; the prevalence of HAV was 19.31%, while that of HEV was 10.54%.[3] On the other hand similar type of study conducted in northern hilly state of Uttrakhand have shown the reverse trends where more positivity was observed in case of HEV (HEV 28.0%, HAV 14.7%, Combined 5.2%).[6]

Another aspect about sero positivity of HAV and HEV is also lies in the differences among the routine testing in the laboratory and outbreak study. Outbreaks generally give more positivity of one of the etiological agent at a time. For example a study conducted by (Tripathy AS et al.,2019) from Shimla, Himachal Pradesh showed 84.12% HEV infections among the sample volume of 57 patients drinking

municipal water, detected by serology and RT-PCR.[13] Acute HAV and HEV infection rates are comparatively high in India, where outbreaks are recognized as epidemics.[5]

The data collected from the viral research and diagnostic laboratory (VRDL) network throughout India indicates that the northern region of the country has a higher prevalence of HAV, whereas the western, central, and eastern regions of the country have a higher prevalence of HEV.[14] Higher HAV or HEV positivity during monsoons and the starting of winter seasons observed during this study is consistent with the data from other studies in India.[15] The predominance of males among both HAV and HEV cases has been observed in this study and a similar trend was reported previously.[11] Data from this study highlights the need of safe drinking water and improvements in sanitation in this part of country.

In this study HAV seroprevalence (11.20%) is higher than HEV (1.80%). Further, HAV was observed in all age groups with predominating in age group 11–20 years. HEV reactive cases were observed only in adults. The co-infection rate was 0.50%. Overall, this emphasizes the importance of routine HAV and HEV testing in AVH patients, particularly in situations like HAV and HEV co-infections, high-risk populations including pregnant women and patients with chronic liver disorders. Throughout two years of study period, we saw that periodic surveillance is essential for early detection of outbreaks and epidemics in Himachal Pradesh, particularly during the monsoon and starting of winter seasons.

5. Conclusion

The results obtained from this study will contribute to a better understanding of the hepatitis-A epidemiology in and around the tertiary care hospital, Himachal Pradesh where the prevalence of HAV is higher. The hepatitis A vaccine can be included in the routine immunization program with the help of this data. To prevent similar fecal-orally transmitted outbreaks in the future, the state's surveillance system should periodically check the quality of the water. The current study focuses on the necessity of improving the surveillance system, particularly HEV surveillance in antenatal cases from future prospective where there is a data deficit in Himachal Pradesh.

6. Source of Funding

None.

7. Conflict of Interest

None.

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