ORIGINAL ARTICLE

PREVALENCE OF HEPATITIS A VIRUS AND HEPATITIS E VIRUS IN A TERTIARY CARE HOSPITAL, EAST DELHI, INDIA

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ABSTRACT

Background & Aim: Acute viral hepatitis (AVH) is a condition that is known to be caused by enterically transmitting Hepatitis A virus (HAV) and Hepatitis E virus (HEV). Usually, they result in self-limiting disease but can be seriously threatening if complications arise. This study was done to determine the prevalence rate of HAV and HEV in a tertiary care hospital in East Delhi, India.

Material & Methods: The retrospective and observational study of 2-year duration was conducted in the Department of Microbiology at UCMS and GTBH Delhi, India. A total of 410 samples from patients presenting with a clinical diagnosis of acute hepatitis were considered in the study. The serum samples were analysed for IgM anti-HAV and IgM anti-HEV, respectively, using commercially available ELISA kits.

Results: The seroprevalence of HAV and HEV were 2.19% and 0.24%, respectively. No case was found to be reactive for both parameters, indicating no case of co-infection. The majority of clinical samples were from female patients.

Conclusion: The incidence of HEV and HAV illnesses suggests that East Delhi has a lower prevalence rate of the reported viral illnesses. This finding suggests one of the following: limited circulation of the agents, good sanitary conditions, and/or protective immunity among the population tested. Nonetheless, we should continue to assess the ongoing conditions and take measures to improve them.

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INTRODUCTION

Hepatitis is an infection of the liver caused by several pathogenic viruses and non-pathogenic substances. It can cause a variety of health problems, some of which can be fatal. Hepatitis A, B, C, D, and E are the five main viruses that cause hepatitis [1]. Hepatitis A virus (HAV) and Hepatitis E virus (HEV) are both transmitted by water and produce acute infections that are often self-limiting. They may also lead to fulminant hepatitis. The most common method of transmission is feco-oral, and cases typically manifest as outbreaks in which the patients excrete huge quantities of infectious viruses into the surrounding area.

The enterically transmitted HEV is most common in Asia, Africa, and Central America. HEV is a non-enveloped herpesvirus belonging to the family Herpesviridae with a single-stranded positive-sense

RNA. Anti-HEV IgM and anti-HEV IgG antibodies (which may be identified) decline quickly after acute infection, reaching low levels within 6 months. Serologic testing for HEV infection is not routinely available in many diagnostic set ups.[2].

HAV is a 27-nm, non-enveloped RNA virus in the genus Hepatovirus of the family Picornaviridae that is resistant to heat, acid, and ether. When serum aminotransferase activity is high and faecal HAV shedding is still occurring, HAV antibodies (anti-HAV) might be found during the acute phase. The IgM class predominates during early immune response, which may lasts for six to twelve months. However, after convalescence, the IgG class of anti-HAV antibody becomes the dominant antibody. Hepatitis A continues to be self-limiting and does not develop into a chronic liver condition [2].

In developing countries like India, HAV and HEV have a considerable impact on public health [3]. Both of these viruses may infect humans to varying degrees, from asymptomatic infection to severe viral hepatitis, and are mostly transmitted enterically via the feco-oral route. The National Viral Hepatitis Control Program (NVHCP), which was introduced in July 2018 and seeks to drastically lower the risk, morbidity, and mortality linked to HAV and HEV by 2030 [3]. There is scanty of data on long-term study from India about the severity of the disease and clinical manifestations brought on by these two viruses [3]. Scientific understanding is lacking since laboratory aetiological diagnosis in such self-limiting hepatitis cases is underreported. To understand the frequency of HAV and HEV infections in the population, it is essential to study the epidemiological patterns of these illnesses. Due to the socioeconomic and demographic complexity that exists in India, this is important. The developments in the sanitation system as a result of the Clean India Mission 2014 will benefit from this knowledge [3]. The study we report here examines the prevalence of AVH caused by HAV and HEV among patients utilising a tertiary care facility in East Delhi, India.

MATERIAL AND METHODS

This retrospective and observational study was carried out in the Department of Microbiology at University College of Medical Sciences and Guru Teg Bahadur Hospital, Delhi, India. The research included all patients with clinical suspicion of acute viral hepatitis-like symptoms. The blood samples were sent for standard serological testing against HAV and HEV in the Virology section of the Department of Microbiology. The serum was separated using the prescribed procedure for laboratory testing [4]. Demographic and important clinical data were collected using information from the patient's record.

The aliquoted serum was stored at 4 °C (up to 7 days). According to the manufacturer's instructions, tests were run on serum samples using ELISA-based kits (OnSite R0095C, Hannover, Germany; and OnSite R0090C, Hannover, Germany). Along with test samples, kit controls and internal quality controls were used for quality assurance.

STATISTICAL ANALYSIS

Microsoft Excel was used to import the data, while SPSS version 11 was used for analysis.

RESULT

A total of 410 clinically suspected cases of acute hepatitis were included in the study from June 2019 to August 2021. Among the tested samples, 276 samples were from females and 134 were from

males. Approximately 41% (n = 171) were young adults aged 21 to 30, with the remaining 1.21 percent (n = 05) being people aged 71 to 80 (Figure 1).

Out of tested, 2.19 percent (n = 9) were reactive to anti-HEV IgM and 0.24 percent (n = 01) were reactive to anti-HAV IgM. The remaining samples tested negative for anti-HEV and anti-HAV IgM in 97.8 percent (n = 401) and 99.75 percent (n = 409) of the samples, respectively. No case was found to be reactive for both parameters, indicating no case of co-infection.

Among males**,** the patients belonging to age group of 31 to 40 (19.40%, n = 26) were higher in number as compared to elderly age group (61-80 years age) which had the lowest percentage of samples tested (2.98%, n = 4 in each group). Moreover, among 276 **females**, most samples were screened from the age groups of 21 to 30 (58.33%, n = 161) and the least from the age group of 60-70 (0.36%, n = 01), respectively. (Figure 1).

It was observed that no samples belonged to the antenatal care group or from pregnant females.

HEV POSITIVE: Out of the 410 tested samples, 09 came out as HEV positive. Male patients accounted for 73 percent (n = 05) of anti-HEV IgM positive samples, while female patients accounted for only 1.4% (n = 04) of positives. The majority of those who tested positive for HEV antibodies belonged to the age group of 21 to 30 amongst both genders (Table. 1). The seasonal distribution reveals that the positive HEV cases—66.66% (n = 6)—clustered between April and June, followed by 22.22% (n = 02) from the months of October to December (Table 2).

HAV POSITIVE: Out of the 410 tested samples, only 1 was found to be HAV positive**.** It was from a male patient of the age **group of** 11 to 20. The case was from tested in July to September quarter (Table 2).

Figure 1: Distribution of patients according to age group and gender.

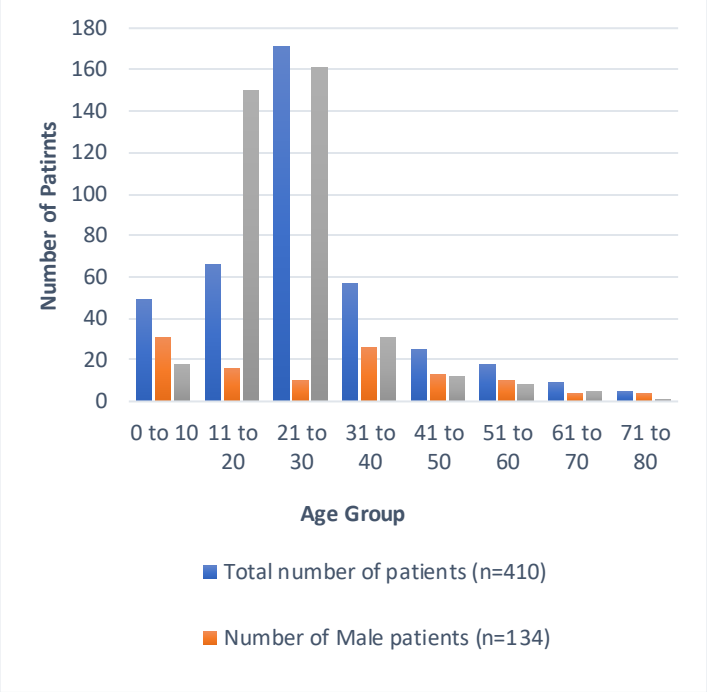

Table 1: Age and Gender wise distribution of HEV positive cases

Age Groups	Males (n=05)	Females (n=04)
0 to 10	01	00
11 to 20	00	00
21 to 30	03	03
31 to 40	00	01
41 to 50	00	00
51 to 60	01	00

61 to 70	00	00
71 to 80	00	00

Table 2: Seasonal distribution of Positive HAV and Positive HEV cases.

Months	**HEV Positive (n=09)**	**HAV Positive (n=01)**
January – March	01	00
April – June	06	00
July – September	00	01
October – December	02	00

DISCUSSION

The current study was conducted from June 2019 to August 2021. The observed HEV and HAV positive rates were 2.19% and 0.244%, respectively. Literature shows that HEV positivity rates in India ranged from 10.5% to 78.6% [2,5,6], while HAV positivity rates ranged around 8.3% to 18.3% [7]. The number of HEV cases was higher compared to HAV, which was also reported in studies by *Radhakrishnan S, Raghuraman S, et al* and *Netra S, Bithu R, et al* [8,9]. A contrasting result was reported by *Joon et al* and *Bansal et al,* which documented a higher HAV number [2,3]. The survival capability of Hepatitis E Virus (HEV) is better as compared to Hepatitis A Virus (HAV) [10,11]. This could also be a contributing factor to the higher prevalence of HEV in our study. The reason for the higher HEV prevalence could also be attributed to the circulation of specific genotypes that have zoonotic potential [12,13]. Various studies have shown that HEV has a higher predisposition to cause outbreaks in communities as compared to HEV [14, 15].

In a study done by *A Joon P Rao et al*., 11.5% of tested groups were found to have HAV & HEV coinfection [2]. Similarly, a study done by *Samaddar A et al.,* also found the HAV-HEV coinfection rate of about 2.07% [16]. Other studies of Mongolia and Cuba have also reported the presence of dual infections [17]. Such data was not observed in our study. This finding is significant as it indicates that the study population was probably not exposed to two different water-borne circulating viruses at the same time (i.e., HAV & HEV). It is usually reported that co-infection does not affect the prognosis as most cases improve by symptomatic therapy, but there are case reports highlighting complications like hepatic encephalopathy in co-infection [18].

Compared to other studies, gender-wise positivity did not differ significantly in HEV [19,20]. The predominance of disease in a particular gender often implies one's exposure and also susceptibility. Despite clinical suspicious & testing, our study did not find any prepondance of HEV.

In this investigation, we discovered a low incidence of HEV in younger patients (>10 years of age). A lack of exposure was cited as the cause of this in research *by Takahashi M et al*. [21]. The majority of infection cases were found in patients between the ages of 21 and 50. Clinical presentation in a particular age group for an agent that is common in the environment suggests that the particular host is susceptible to developing symptoms. Although an

infection may be present, it is possible that such illness signs go unnoticed in younger age groups due to the absence of disease manifestation. Similar findings were also recorded by *Kamal SM, Mahmoud S et al and by Pelosi E, Clarke I.* [20,22].

There were no cases of pregnant women among the tested group. This is significant since HEV is known to create a complex course in these patient populations [23, 24]. In addition, Joon *A et al.* and *Radhakrishnan S, Raghuraman S, et al.* reported fulminant hepatitis in such cases [2, 8].

According to the seasonal patterns, cases tend to cluster in the months of April through June. This result is clearly apparent in other research from India that has been reported, which indicates a greater transmission of HEV during the start of the rainy season [25,26].

The one HAV IgM positive patient belongs to the 11–20 age range. This result contrasted markedly with those of *Joon et al.,* who discovered that young adults made up 13.25% of the maximum cases [2]. In other investigations by *Aggarwal R et al., Murhekar MV et al., Agrawal A et al., and Arankalle V et al., they* discovered that the majority of cases—90%, 74.6%, 70.8%, and 57.1%—belong to young adults, respectively [27,7,28,29].

A lesser number of cases of HAV may be because of the introduction of the vaccine. Even though it is not part of the universal immunisation program, the vaccine is being sought after by parents of children who can bear the cost. Shifting patterns among the affected age group of HAV could be brought on by the Hepatitis A vaccine [30,7,28,31,32]. According to *Murhekar et al.* [7], HAV is a disease that may be prevented by vaccination even if it is not included in the universal immunisation programme. Most children have antibodies by the age of 10 as a result of a mild natural sickness.

The efforts of the government, in the form of the National Viral Hepatitis Control Program (NVHCP), launched in July 2018, aim to address such viral infections to combat the mortality and morbidity caused by the hepatitis virus. These findings suggest a low level of viral circulation among the people in East Delhi. Testing on a large number of samples is required to further corroborate this conclusion. Such data helps authorities concentrate on outbreak prevention strategies during a particular season based on the forecast. The main goal of control measures should be to stop feco-oral transmission of HEV and HAV. It is clear from our study that both enteric hepatic virus (HEV) and HAV) infections are common. When considering the significance of the trends for public health, the availability of diagnostic kits for these illnesses is a crucial need.

One of the limitations of the study was that it was based on hospitals. Therefore, the prevalence in asymptomatic groups in the community could not be determined. Such prevalence data needs to be reported to find the circulating states of the virus.

CONCLUSION

The incidence of HEV and HAV illnesses suggests that East Delhi has a lower prevalence rate of the reported viral illnesses. This finding suggests one of the following: limited circulation of the agents, good sanitary conditions, and/or protective immunity among the population tested. Nonetheless, we should continue to assess the ongoing conditions and take measures to improve them.

CONFLICT OF INTEREST

The author started there is no conflict of interest.

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