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PREVALENCE OF HEPATITIS E IN JAGATPURA & JHALANA SLUM AREAS OF JAIPUR CITY

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Abstract

Background & Objective: Hepatitis E is a viral liver infection that is common in developing countries, including India. Slum areas in India are particularly affected by Hepatitis E due to the lack of clean water, proper sanitation, and poor hygiene conditions. The present study was planned to study the prevalence of Hepatitis E in the Jagatpura and Jhalana slum areas of Jaipur, India.

Material & Method: A total of 145 patients were enrolled in the study from March 2019 to December 2019 and tested for the presence of anti-HEV IgM antibodies with the Bioneovan ELISA kit. The study was conducted in 2 different slum areas and results were analysed using descriptive statistics.

Result: Among the 145 cases enrolled 53.81% were females and 46.21% were males. The most affected age group was 70–80 years age. Total positivity for HEV IgM was found to be 4.14%, positivity in the Jhalana slums was (8.33%) higher than that of the Jagatpura (1.18%) slums. Positivity was higher in males 5 (7.46%) than females 01(1.28%). The condition of sanitation and hygiene was poor.

Conclusion: Overall HEV positivity in slums was found to be 4.14%, and positivity was higher in Jhalana slums. This highlights the need for improvement in sanitation and hygiene in these areas to reduce the burden of this disease and extensive information and education campaigns should be planned for awareness in public.

Keywords: Hepatitis E, Jaipur slums, prevalence, sanitation, hygiene.

INTRODUCTION

In recent times, there has been a notable global public health concern due to the emergence and re-emergence of viral infectious diseases, as discussed by Parvez in 2013. These diseases often have a zoonotic origin, originating from arthropods, wild animals, domestic animals, and poultry.

Unfortunately, a significant proportion of these emerging viral diseases are caused by RNA viruses. One such RNA virus is the hepatitis E virus (HEV), which is responsible for the development of hepatitis E. [1]

Based on seroprevalence studies, it is estimated that hepatitis E has a substantial global burden, affecting approximately 2.3 billion individuals. Hepatitis E virus is classified as the fifth known hepatitis virus, following hepatitis A, B, C, and D, and it is the most prevalent cause of acute viral hepatitis worldwide. [2]

The first recorded outbreak of hepatitis E occurred in Delhi, India, during 1955-1956 [3]. This disease is transmitted through the contamination of drinking water with fecal matter. Acute viral hepatitis poses a significant public health challenge in developing nations that face issues such as inadequate sanitation facilities, lack of safe drinking water, and problems with sewage disposal [4-6]. It occurs both in the form of epidemics and sporadic infections in these countries [7-10]. The World Health Organization's South East Asia Regional office reports that hepatitis E is prevalent in developing countries and accounts for up to 90 percent of all sporadic cases of acute viral hepatitis [11]. Hepatitis E primarily affects individuals in the young to middle-aged adult range and carries a high mortality rate in pregnant women, ranging from 20-30 percent compared to 0.2-1 percent in the general population [12]. Additionally, it has been identified as a significant cause of sporadic fulminant hepatic failure (FHF) in developing countries [13]. The aim of our study was to determine the prevalence of hepatitis E in slum areas of Jaipur city and to identify the demographic factors associated with hepatitis E virus infection.

MATERIAL AND METHODS

This study was done in the State Virus Research and Diagnosis Lab (VRDL) funded by the Department of Health Research (DHR) at the Department of Microbiology, Sawai Man Singh (SMS) Medical College Jaipur. The samples were taken from the patients belonging to Jagatpura and Jhalana slum areas, attending the Jagatpura & Jhalana Primary Health Care Center (PHC) Figure1: Map Showing Sample collection Site of Jhalana doongri & Jagatpura,Jaipur

Inclusion criteria- complaining of fever, nausea, vomiting with or without jaundice. A total of 145 cases were enrolled in the study.

The sample size was determined for finite population

$$N = \frac{Z^2_{\alpha/2} * P * (1\&P)}{d^2},$$

Jagatpura (84204 people) & Jhalana,(17790 person)}
using the formula;

$\alpha/2$

Inverse probability of normal distribution at 95% confidence interval, p = Prevalence of Hepatitis E in India 10%, d= margin of error (5% considered) and 5% of non-response. Therefore, the minimum sample size was estimated to be 138 and rounded off to 145 samples.

The age range of the cases was between 6 and 78 years. Patient information was collected through face-to-face interviews using a structured questionnaire from March 2019 to December 2019. The questionnaire included demographic information, medical history, and information on risk factors for hepatitis E. Blood samples were collected from all participants and tested for the presence of anti-HEV IgM antibodies using an Enzyme-Linked Immunosorbent Assay (ELISA) kit (manufactured by Bioneovan, Beijing China) as per manufacturer's instructions.

Ethical Consideration

The study was approved by the Institutional ethics committee of the SMS Medical College with approval no. 889 /MC/EC/2019. All participants provided informed consent prior to participating in the study.

Statistical Analysis

Age, gender, and area-wise sample collection, data of samples was depicted in tabular form. Descriptive statistics were calculated for a quantitative variable like age. Proportion and percentage were used to present qualitative or categorical data. The level of significance was set as 5%, If P-value was less than 0.05 then the result was considered statistically significant. All statistical analyses were performed in SPSS & Microsoft Excel software.

RESULT

Table No. 1 Age and gender wise distribution of cases enrolled

Age Group	No. of Samples	Positive cases/ Male (In %)	Positive cases/ Female (In %)	Positive cases/ Total no. (In %)
≤ 18	15 (10.34%)	1/10 (10%)	0/5 (0%)	1/15 (6.67%)
18 – 30	55 (37.93%)	1/22 (4.55%)	1/33 (3.03%)	2/55 (3.64%)
30 – 40	18 (12.41%)	0/3 (0%)	0/15 (0%)	0/18 (0%)
40 – 50	12 (8.28%)	0/3 (0%)	0/9 (0%)	0/12 (0%)
50 – 60	18 (12.41%)	1/9 (11.11%)	0/9 (0%)	1/18 (5.56%)
60 – 70	20 (13.79%)	1/15 (6.67%)	0/5 (0%)	1/20 (5%)
70 – 80	7 (4.83%)	1/5 (20%)	0/2 (0%)	1/7 (14.29%)
Total	**145**	**5/67 (7.46%)**	**1/78 (1.28%)**	**6/145 (4.14%)**

According to above table the maximum number of cases enrolled 55 (37.93%) belonged to 18- 30 age group having 2 (3.64 %) positive cases of hepatitis E. The second largest group was the 60-70 age group; 13.79%. However, positivity was highest in 70–80-year age group (14.29%). Female patients 78(53.79%) enrolled were higher than males 67 (46.21%), however positivity was higher in males (5/67;7.46%) than in females (1/78; 1.28%), this was found to be statistically significant (p-value = 0.03677).

Table No. 2: Area-wise distribution of positive cases

Slum	No. of Samples	Hepatitis E Positive
Jagatpura	85 (58.62%)	1 (1.18%)
Jhalana	60 (41.38%)	5 (8.33%)
Total	**145**	**6 (4.14%)**

Table- 2 although a higher number of cases were from Jagatpura than Jhalana but the positivity was higher in cases from Jhalana (5/60; 8.33%) than at Jagatpura (1/85; 1.18%).

Table No. 3: Descriptive statistics of the age of cases enrolle

Variable	Minimum	Maximum	Median	Mean ± SD
Age of positive cases	16	72	43	44 ± 23.51
Age of enrolled cases	6	78	32	38.29 ± 18.81

Table No. 3 shows the patients enrolled belonged to wide age group from 6 years to 78 years age and positivity was found in 16–72-year age group.

DISCUSSION

Many studies have reported that hepatitis E is a significant public health concern in India and other developing countries. The slums are at high risk of HEV infection due to overcrowding and lack of sanitary conditions. In our study we found 4.14% of cases to be positive for Hepatitis E from the two slum areas studied. However, in the study by Khatri PK et al., [17] findings indicated that the seroprevalence rates of Hepatitis A Virus (HAV) and Hepatitis E. Virus (HEV) positive individuals in the Western Thar region were observed to be 13.79% and 4.02%, respectively. In the subgroup analysis of patients with Acute Viral Hepatitis (AVH), the combined seroprevalence of HAV and HEV was reported to be 1.15%. Additionally, a higher prevalence of HAV and HEV infections was noted among males (58.3% and 41.6%) in comparison to females (7.97% and 14.28%). The study conducted by Bansal et al. (2022) provides important insights into the seroprevalence of hepatitis A and hepatitis E in a teaching hospital in northern India over an 8-year period.

While the study does not specifically focus on slum areas of Jaipur, the findings highlight the significant burden of hepatitis E in the region. Considering the poor sanitation, limited access to clean water, and overcrowding often found in slum areas, it can be inferred that the prevalence of hepatitis E in these settings may be even higher. These findings emphasize the urgent need for targeted interventions, including improved sanitation, hygiene practices, and vaccination campaigns, to address the high prevalence of hepatitis E in slum areas of Jaipur and mitigate the associated health risks. [14]

Our study revealed a higher prevalence of Hepatitis E Virus (HEV) infection among males (7.46%) compared to females (1.28%). Additionally, we observed the highest positivity rate in the 70-80 age group (14.29%). These findings are consistent with previous research that has reported a higher proportion of positive cases in males and highlighted the impact of the disease on children [17]. However, it is important to acknowledge that our study had a relatively small sample size, and obtaining a larger sample would provide a more comprehensive understanding of the situation in the area. Furthermore, a separate study conducted in India identified hepatitis E as a significant contributor to cases of acute liver failure, particularly among young adults without prior health issues. [17]

The study conducted by Malhotra et al. (2020) explores a hepatitis E outbreak in Jaipur, India, attributed to genotype IA of the hepatitis E virus (HEV). This outbreak serves as a significant reminder of the public health implications associated with hepatitis E and highlights the importance of understanding specific genotypes involved in outbreaks. The findings underscore the need for improved sanitation infrastructure, proper waste management, and access to clean water to prevent

future outbreaks. Furthermore, the study emphasizes the importance of surveillance and early detection of hepatitis E outbreaks, enabling prompt public health responses and the implementation of control measures. [15]

The study by Verghese and Robinson (2014) on hepatitis E virus infection in children provides valuable insights that can be relevant to our study on the prevalence of Hepatitis E in slum areas of Jaipur, India. While the study specifically focuses on paediatric populations, it highlights the significant burden of HEV infection and its epidemiology. The findings emphasize the importance of considering the sources of HEV transmission, such as contaminated water and inadequate sanitation, which are prevalent challenges in slum areas. [16]

In our study, we observed that the HEV positivity was higher in Jhalana (8.33%) slums than in the Jagatpura (1.18 %) slums. This could be because of poorer sanitation and overcrowding was higher in Jhalana than in Jagatpura.

Studies have shown that the disease is primarily transmitted through contaminated water and is more common in areas with poor sanitation and hygiene. Various studies, along with our observations, show that hepatitis E is a significant public health concern in developing countries, particularly in urban areas with poor sanitation and hygiene.

Limitations of the study

The sample size was small and was collected only for a few months, larger sample size collected over a few years will give a true picture of the situation in the slum areas, moreover, the study should be done in other slum areas too and sequencing should also be done to know the genotype affecting the different slums.

Conclusion

We found a total of 4.14% positivity for HEV in the slums of Jaipur, positivity was higher in Jhalana (8.33%) than in Jagatpura slums and in males (7.46%). It is essential that public health interventions are focused on higher positivity areas to control the spread of the disease and improve the health of the population. This can be achieved through a combination of measures such as improving sanitation and hygiene, providing clean drinking water, increasing awareness and education about the disease, implementing effective vaccination programs, and increasing access to healthcare for proper diagnosis and treatment. However further research on a larger scale is needed to better understand the epidemiology of hepatitis E in slum areas of Jaipur city and in India to help in the development of appropriate control measures.

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