Original Research Article

SEROPREVALENCE OF VIRAL HEPATITIS IN A TERTIARY CARE HOSPITAL

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Short running title: Viral Hepatitis

Abstract

Background: Viral hepatitis remains a significant global public health concern, accounting for over one million deaths annually. Acute hepatitis is often caused by the hepatitis A and E viruses, and it can progress to acute liver failure. Chronic hepatitis, primarily due to Hepatitis B and C viruses, often remains asymptomatic until it leads to serious complications such as cirrhosis and hepatocellular carcinoma.

Aim and Objective: This study aims to assess the seroprevalence of viral hepatitis among clinically suspected patients presenting to a tertiary care hospital.

Materials and Methods: A retrospective analysis was carried out on probable viral hepatitis cases, based on blood samples received from RH Patiala and processed at the Virus Research and Diagnostic Laboratory (VRDL), Department of Microbiology, over a period of three months. Serological testing of all the samples was performed, by using rapid card tests and confirmation is done by ELISA for HEV IgM antibodies, HBsAg of HBV and anti HCV IgG antibodies.

Results: The seroprevalence of hepatitis markers observed in our study was as follows: HCV – 7.48%, HBV – 1.69%, HEV – 3.13%, and HAV – 15.6%. Among cases of acute hepatitis, HAV positivity was notably higher than HEV, whereas in chronic hepatitis, HCV positivity exceeded that of HBV. Gender-wise distribution showed a higher proportion of males testing positive across all hepatitis markers: HEV (58.33%), HCV (51.83%), HBV (50.74%), and HAV (56.86%). Age-wise analysis revealed that the majority of positive cases for HCV (69.59%), HBV (63.33%), and HEV (66.66%) occurred in the 20–60-year age group, while HAV positivity was predominantly observed in the 0–20-year age group (60%).

Conclusion: Viral hepatitis poses a substantial public health burden; however, its transmission can be effectively reduced through the implementation of comprehensive control strategies. These include timely laboratory diagnosis, appropriate therapeutic interventions, and widespread vaccination efforts. Strengthening these measures is essential to limit disease spread and reduce associated morbidity and mortality.

Introduction:

The global population has contended with infectious hepatitis for decades, enduring both acute and chronic forms that continue to pose a major public health challenge. Despite significant progress in diagnosis, treatment, and vaccination, viral hepatitis remains a leading cause of morbidity and mortality worldwide [1]. The World Health Organization (WHO) recommends targeted testing in high-risk populations and in regions with a prevalence exceeding 2% [2,3]. However, these evidence-based strategies have yet to be fully implemented in many endemic areas.

Viral hepatitis is often divided into acute and chronic forms, depending on the time interval and development of the infection [4]. Acute hepatitis is primarily caused by Hepatitis A Virus (HAV) and Hepatitis E Virus (HEV), both of which can lead to acute liver failure in severe casesHAV epidemics have caused major clinical, financial, and social costs in India. Notably, an Indian study has explored the association between food handlers and HAV infection among adolescents and adults [5].

Similarly, HEV is responsible for numerous outbreaks and sporadic cases, reportedly accounting for approximately 50% of acute viral hepatitis infections in adults [6]. In pregnant women, particularly during the second and third trimesters, hormonal and immunological changes can exacerbate HEV infection, leading to severe complications. These may include acute liver failure, miscarriage, intrauterine death, preterm labor, neonatal hepatitis, low birth weight, and even maternal death [7].

Chronic hepatitis, predominantly caused by Hepatitis B Virus (HBV), affects an estimated 296 million people globally, with 221 million residing in low- and middle-income countries. In the absence of timely intervention, HBV infection can progress to cirrhosis, hepatocellular carcinoma (HCC), and death, with mortality projected to peak at 1.14 million by 2035 [8]. In India, a meta-analysis estimates the HBV prevalence at 1.4%, with HBV-HIV co-infection rates ranging between 0.2% and 0.8% [9].

Hepatitis C Virus (HCV) infection remains another major contributor to chronic hepatitis, with an estimated global burden of 58 million cases, including 3.2 million adolescents and children. Approximately 1.5 million new HCV infections occur each year, and the disease was responsible for 290,000 deaths in 2019 [10]. In 2015, there were between 4.7 and 10.9 million cases. HCV viremia in India, with a frequency of about 0.5%. This underscores a significant national disease burden and highlights the need for accurate prevalence estimates to guide policy formulation and public health interventions [11].

Aim & objective: To determine the overall prevalence of acute and chronic viral hepatitis, in clinically suspected patients at our hospital.

Material and Methods: A retrospective observational study was conducted, over a period of three months from January 2025 to March 2025. Laboratory records of all the clinically suspected hepatitis samples, received in the Microbiology laboratory at our hospital, were analyzed. Demographic details, such as age and gender, along with serological test results, were analyzed. Blood samples were collected from both inpatients and outpatients who showed clinical signs of acute or chronic viral hepatitis. 5 ml of blood collected from suspected patients, who manifested with clinical features of acute and chronic viral hepatitis, from both IPD and OPD, was received in VRDL for serological testing. The specimens were centrifuged and stored at minus 20 deg C. The required test was performed using commercially available rapid tests and confirmation is done by using solid phase enzyme linked immunosorbent assay kits (ELISA). For each hepatitis cases, each serum sample was tested for IgM antibodies of HEV, HBsAg of HBV and anti HCV IgG antibodies utilizing the ELISA. The laboratory investigations were conducted as per standard guidelines and protocol.

Results:

Acute Hepatitis

HAV Seroprevalence: In the present study, a total of 102 cases were tested for hepatitis A virus (HAV). Of these, 58 (56.86%) were males and 44 (43.13%) were females. IgM anti-HAV antibodies were detected in 16 patients,

indicating a seropositivity rate of 15.68% (Figure 1).

Age-wise distribution revealed that the majority of positive cases (14 out of 16; 87.5%) were within the 0–20 and 20–40-year age groups, while only 2 cases (12.5%) belonged to the 40–60 and >60-year categories (Figure 3 and Table 1).

HEV Seroprevalence: A total of 96 cases were tested for hepatitis E virus (HEV), of which 56 (58.33%) were males and 40 (41.67%) were females. IgM anti-HEV antibodies were detected in 3 patients, yielding a seropositivity rate of 3.13% (Figure 1).

Age-wise distribution showed one positive case in each of the following age groups: 20–40 years, 40–60 years, and >60 years, with each group contributing 33.33% of the total HEV-positive cases (Figure 3 and Table 1). No cross-reactivity was observed between hepatitis A and E infections.

Monthly analysis (Table 3) revealed that all HEV-positive cases occurred during the month of March.

Chronic Hepatitis (Figure 2)

HBV Seroprevalence: A total of 3,599 individuals were tested for hepatitis B virus (HBV), comprising 1,826 males (50.74%) and 1,773 females (49.26%). Hepatitis B surface antigen (HBsAg) was detected in 60 individuals, resulting in an overall positivity rate of 1.69% (Figure 2). Age-wise distribution revealed the highest number of positive cases in the 20–40 year age group (24 cases; 40%), followed by those aged >60 years (18 cases; 30%), 40–60 years (14 cases; 23.33%), and the lowest in the 0–20 year group (4 cases; 6.66%) (Figure 3 and Table 2).

HCV Seroprevalence: A total of 5,931 patients were tested for anti-HCV IgG antibodies, including 3,074 males (51.83%) and 2,857 females (48.17%). Among these, 444 individuals (7.49%) tested positive for anti-HCV IgM antibodies, suggesting recent or ongoing infection (Figure 2).

Age-wise analysis revealed the highest seropositivity in the 20–40 year age group, with 177 cases (39.86%), followed by the 40–60 year group with 132 cases (29.73%). Individuals aged >60 years accounted for 84 cases (18.92%), while the lowest number of positive cases was observed in the 0–20 year age group, comprising 51 cases (11.49%) (Figure 3 and Table 2).

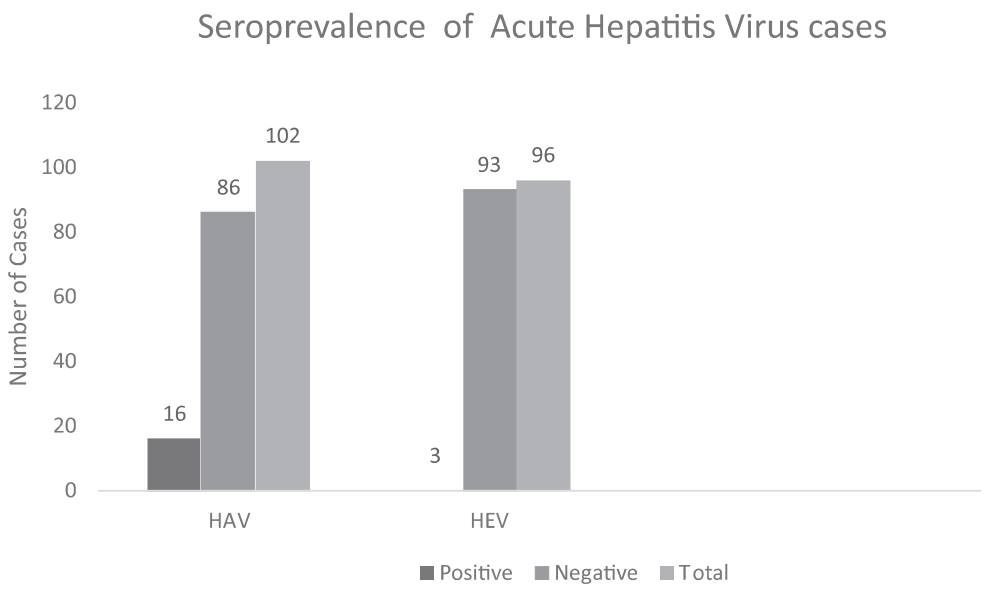

Figure 1: Seroprevalence of Acute Hepatitis Virus cases : HAV and HEV

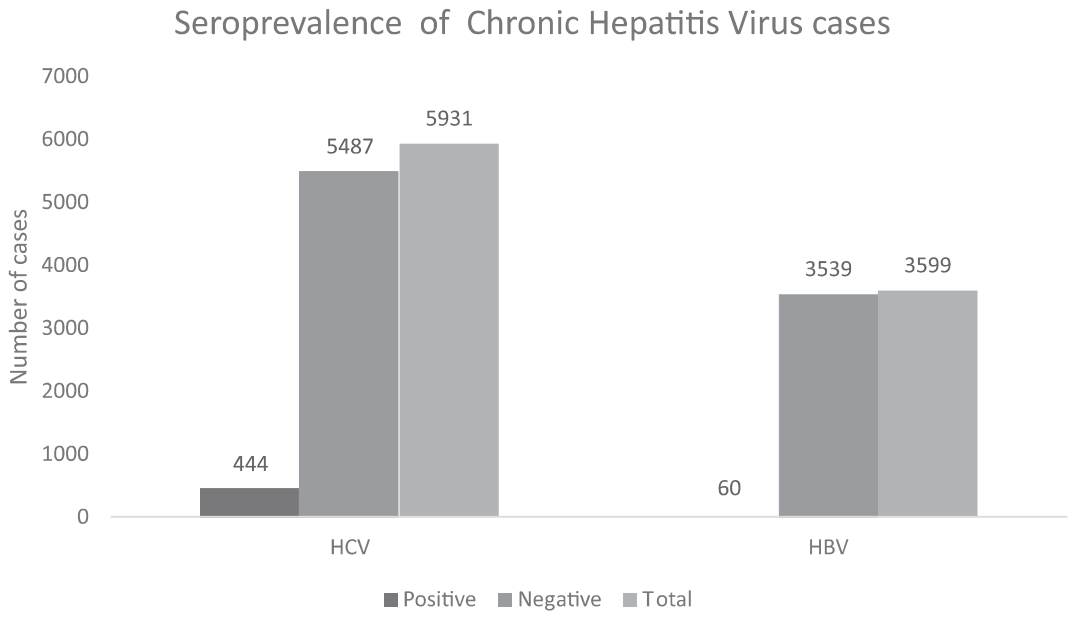

Figure 2: Seroprevalence of Chronic Hepatitis Virus cases: HCV and HBV

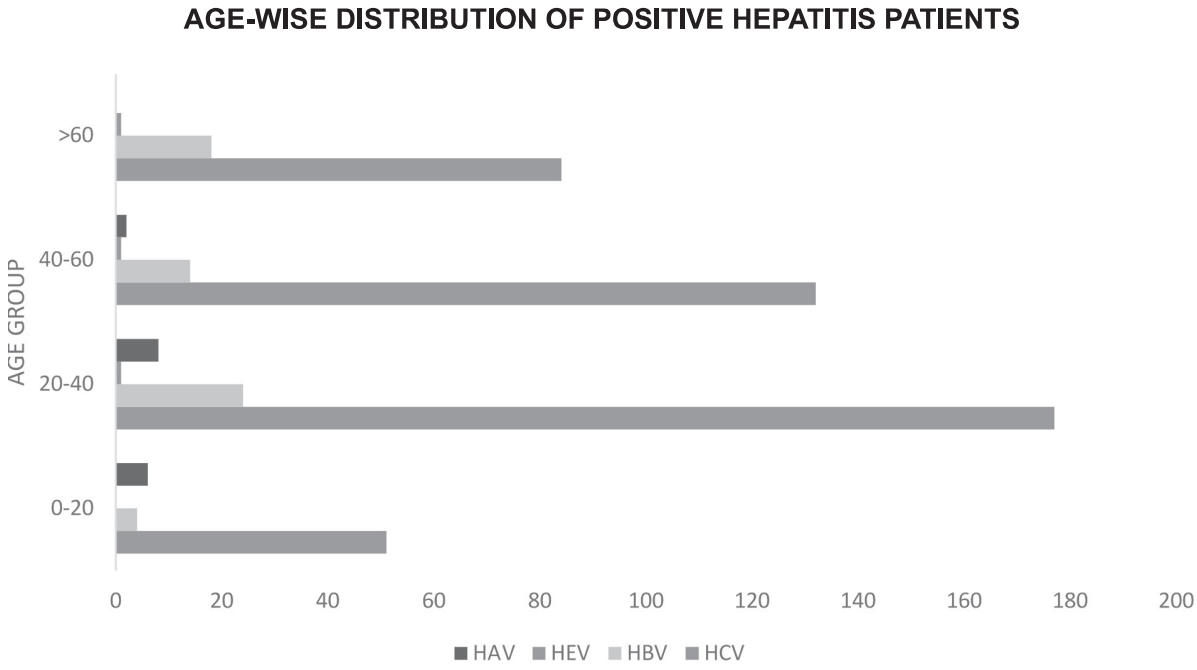

Figure 3:AGE-WISE DISTRIBUTION OF POSITIVE HEPATITIS PATIENTS

Table 1 AGE-WISE DISTRIBUTION OF ACUTE POSITIVE HEPATITIS PATIENTS

Age Group	HAV	HEV
0-20	50%	0 %
20-40	37.5%	33.33%
40-60	12.5%	33.33%
>60	0%	33.33%

Table 2: AGE-WISE DISTRIBUTION OF CHRONIC POSITIVE HEPATITIS PATIENTS

Age Group	HCV	HBV
0-20	11.49%	6.66%
20-40	39.86%	40%
40-60	29.73%	23.33%
>60	18.92%	30%

Table 3:Month wise distribution of Hepatitis Cases

Name of the Hepatitis Virus	January		February		March	
	Total no. patients	Total no. of Positive patients	Total no. patients	Total no. of Positive patients	Total no. patients	Total no. of Positive patients
HCV	2062	195	1645	115	2223	134
HBV	4	1	1440	25	2144	34
HAV	30	13	27	2	45	1
HEV	38	nil	20	Nil	26	3

Residential status of Hepatitis Patients: The residential status of all patients, revealing that the urban population consistently outnumbered the rural population across all cases as shown in table 4. This disparity likely reflects greater accessibility and utilization of testing services in urban areas. Additionally, urban residents exhibited a higher rate of positive diagnoses, which may be attributed to increased population density and greater viral exposure in these settings.

Table 4: Residential Status of Hepatitis Patients

Name of the Hepatitis Virus	Residential Status			
	Rural		Urban	
	Total no. of patients tested	Total number of Positive patients	Total no. of patients tested	Total number of Positive patients
HCV	1755	156	4176	288
HBV	1773	11	2726	49
HAV	Nil	Nil	102	16
HEV	Nil	Nil	96	96

DISCUSSION

The findings of this study present valuable insights into the characteristics of patients undergoing viral testing at a tertiary healthcare center. The predominance of young adults, particularly those in their late twenties, suggests that this age group may either be more susceptible to certain infections or more likely to seek care compared others. This could be attributed to occupational exposure, social mobility, or higher awareness levels in this demographic.

HAV: Our study on the seroprevalence of Hepatitis A Virus (HAV) in 102 patients revealed that 15.68% tested positive for IgM anti-HAV antibodies. The finding of the current study aligns with previous published study conducted by Bansal et al from North India (12). The present study reported the higher prevalence of male over females with a higher prevalence observed in the 0–40 years age group (87.5%). Similar results were observed by study conducted by Palewar et al. (13) and Grover et al. (14).

HEV: In our study, the seroprevalence of hepatitis E virus (HEV) was 1.33% (3/225). This finding is consistent with the low HEV positivity rates reported by Nair et al. (1.2%), Joon et al. (1.8%), and Daniel et al. (9%) [15–17]. However, comparatively higher prevalence rates have been observed in other studies, such as those by Bansal et al. (14.9%), Netra et al. (21.94%), and Kaur et al. (68.4%) [12, 18, 19]. These variations may be attributed to differences in sample size, study populations, socioeconomic status, sanitation conditions, and environmental hygiene.

Gender wise distribution: In the present study, a higher HEV positivity rate was observed among males. This finding is consistent with previous studies by Murhekar et al. (62.55%) [20] and Netra et al. (76.7%) [18], which also reported a male predominance among HEV-positive cases. The higher prevalence in males may be attributed to social and occupational factors that increase their exposure to contaminated water and street food.

Conversely, some studies have reported a higher HEV seropositivity among females, including those by Rawat et al. (69.56%) [21] and Bansal et al. (50.4%) [12].

Regarding age-wise distribution, all HEV-positive cases in our study were among young adult males. This is in line with findings by Bansal et al. [12], who reported a 14.3% HEV positivity rate among young male individuals.

Among Chronic Hepatitis cases, the seroprevalence of hepatitis B virus (HBV) was 1.69% (60/3,599) in present study. This finding is comparable to that of Kaur et al. [23], who reported an HBsAg positivity rate of 1.7% among blood donors in Chandigarh. Similarly, Giri et al. [24] observed a 1.6% prevalence among asymptomatic pregnant women. Mittal et al. [22] reported a slightly higher prevalence of 2.8% in the Uttarakhand region of North India, while Monika Rajani's tertiary-care study documented a 3.5% positivity rate among probable hepatitis cases. In contrast, significantly higher seroprevalence was reported among tribal populations in Himachal Pradesh, with rates reaching 10.6%, highlighting the regional heterogeneity and varying levels of endemicity across different populations [25].

In terms of gender distribution, males slightly outnumbered females in our study, accounting for 50.74% and 49.26% of cases, respectively. The male-to-female ratio (50.7:49.3) and the peak HBV seroprevalence observed in the 20–40 year age group (40%) are consistent with findings reported by Shadaker et al. and Khan et al. [26, 27].Conversely, several studies have documented a female predominance in HBV infection, including those by Sharma et al., Sandhu et al., and Manzoor et al. [28–30].

The age-wise distribution in our study, with the highest seropositivity observed among individuals aged 20–40 years, also aligns with findings from studies conducted in Punjab and Delhi, which report peak HBV prevalence in young adults [31].

The seroprevalence of hepatitis C virus (HCV) in our study was 7.5% (444/5,931), which is relatively high compared to several other studies. This finding is comparable to the 5.18% prevalence reported by Bagga et al. [32]. Kar et al. observed an even higher prevalence of 12% for IgM anti-HCV among acute viral hepatitis patients in Delhi [33].

In contrast, significantly lower rates were reported by Meena et al. (0.57%) [34] and Chaurasia et al. (0.54%) [35]. Mittal et al. documented a 1.8% seroprevalence in a hospital-based community screening [36], while Tandon et al. found an anti-HCV positivity of 1.57% among blood donors in New Delhi [37].

The elevated seroprevalence observed in our study likely reflects the higher proportion of symptomatic individuals in the study population, along with regional risk factors such as unsafe injection practices.

In our study, males comprised 51.83% of HCV-infected individuals, slightly exceeding the proportion of females at 48.17%. This male predominance aligns with findings reported by Kar et al. and Barman et al., who also documented higher rates of HCV infection among men [33, 38]. In contrast, Solomon et al. reported greater HCV seropositivity among women in Northeast India [39].

Urban residents made up the majority of the study population. This could be due to several factors: better healthcare infrastructure in cities, higher awareness, easier access to diagnostic facilities, and increased transmission potential due to dense population clusters. However, the relative underrepresentation of rural patients may mask the actual burden of disease in those communities, especially considering known barriers like transportation, cost, and social stigma in rural health-seeking behaviors.

This study did not investigate specific risk factors for hepatitis transmission, such as contaminated drinking water, blood transfusion history, familial transmission, body tattooing, or exposure among high-risk groups. Key populations including intravenous drug users, blood donors, sex workers, people living with HIV, healthcare workers, migrants from high-prevalence areas, children born to HBV-positive mothers, and close contacts were not assessed. Understanding these factors is essential for a comprehensive epidemiological picture and to inform targeted prevention and management strategies.

CONCLUSION

Despite ongoing awareness campaigns, preventive measures, advanced diagnostic tools, effective treatments, and available vaccines, the burden of hepatitis persists. Moving forward, there is a critical need to develop innovative and strengthened strategies that focus on the rapid identification and timely management of infected individuals. Additionally, bridging the gap between healthcare availability and accessibility—especially among vulnerable populations—is essential to achieve the ultimate goal of hepatitis elimination.

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