

SEROPREVALENCE OF VIRAL HEPATITIS IN A SUBURBAN TERTIARY CARE HOSPITAL IN WESTERN INDIA

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Abstract

Background: Viral hepatitis is recognized as a major public health challenge, resulting in over one million deaths worldwide. Acute hepatitis occurs due to Hepatitis A and E viruses and if untreated can result in acute liver failure. Chronic infection primarily caused by Hepatitis B and C viruses, if undiagnosed can lead to cirrhosis and hepatocellular carcinoma. **Aim and Objective:** To determine the overall prevalence of hepatitis, among clinically suspected patients, at our hospital. **Materials and Methods:** A retrospective analysis of suspected viral hepatitis cases, whose blood samples were received in the Microbiology laboratory, was conducted at our hospital, over a one year period. Serological testing of all the samples was performed, using the appropriate ELISA kits, for detection of: HAV and HEV IgM antibodies, HBsAg of HBV and anti HCV IgG antibodies. **Result:** The seroprevalence of the various types of hepatitis markers observed in our study was: HAV:11.1%; HBV: 1.11%; HCV:0.24% and HEV :1.3%. Thus in acute hepatitis cases HAV positivity was higher than HEV, whereas in chronic hepatitis HBV positivity was greater than HCV. Overall genderwise distribution revealed increased number of males 118/201(58.7%) compared to females (41.3%) and groupwise, adults constituted the majority 174/201 (86.5%) followed by children 26/201 (12.9%) and pregnant women 1/201 (0.49%). Coinfection of HBV and HCV occurred in one patient 1/441 (0.2%). **Conclusion:** Although viral hepatitis is a significant societal health concern, its transmission can be curtailed by optimization of appropriate control strategies, laboratory diagnosis, therapy and vaccination.

INTRODUCTION

The global population has endured infectious hepatitis for several decades. It has been compared to the big three communicable diseases: tuberculosis, HIV/AIDS and malaria.¹In spite of the innovative diagnostic, therapeutic and preventive options that are available, the situation prevails. The lack of accessibility as well as referral to testing and treatment facilities, are implicated as crucial entities. They act as a hindrance, to attaining the WHO goal for global eradication of hepatitis by 2030. WHO recommends focused testing for the most affected clusters within populations and in locales where the prevalence exceeds 2%. Unfortunately, these programmatic policies have not been implemented in many endemic regions.^{1,2} In India, the National Viral Hepatitis Control Program (NVHCP) was launched by the Ministry Of Health And Family Welfare, Government of India in 2018, as an integrated initiative for prevention and treatment of

viral hepatitis. A systemic review and meta-analysis, has reported the overall prevalence of viral hepatitis in India from 2000-2021,as follows:HAV:2.1%-52%; HBV:0.87-21.4%;HCV:0.19-53% and HEV :10.5-68%.¹

Viral hepatitis is categorised as acute and chronic, based on the timeline of the infection.³ Acute hepatitis is predominantly caused by Hepatitis A and E viruses and may culminate in acute liver failure. HAV outbreaks have occurred in India impacting clinical, economical, and social burden. Interestingly, the relationship between food handlers and hepatitis A infection among adolescents and adults, has been explored in an Indian study.⁴ Similarly, Hepatitis E virus is implicated in several outbreaks and sporadic cases reportedly accounting for approximately 50% of adult infection.⁵ Furthermore, hormonal and immunological changes in infected pregnant women in the second and third trimester has been linked to numerous serious sequelae, such as acute liver failure, miscarriage,

intra-uterine death, preterm labor, neonatal-hepatitis, death and low birth weight.⁶

Chronic hepatitis due to Hepatitis B virus affects an estimated 296 million people worldwide, of which 221 million live in low and middle-income countries. Without intervention, it may progress to cirrhosis, hepatocellular carcinoma and deaths, expected to peak at 1.14 million by 2035.² In India, according to a meta-analysis, the prevalence of HBV is 1.4%.⁷ and co-infection rate of HBV with HIV ranges between 0.2 to 0.8 %.⁸ Chronic hepatitis C infection facts reveal the global estimate to be 58 million cases with 3.2 million adolescents and children, 1.5 million new infections emerging annually and 2,90,000 deaths recorded in 2019.⁹ The prevalence of HCV viremia in India in 2015 was 0.5%, affecting about 4.7 to 10.9 million people, which suggests a huge countrywide burden of the disease. Precise estimate of the prevalence is needed to formulate policy decisions and plan communal health interventions.¹⁰

Aim & objective:

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

MATERIALS AND METHODS

A retrospective observational study was conducted, over a period of one year from November 2021 to October 2022. Laboratory records of all the clinically suspected hepatitis samples, received in the Microbiology laboratory at our hospital, were analyzed based on: demographic details including age / gender and the ELISA test results. The ELISA testing done for acute cases constituted identification of IgM anti HAV and anti HEV IgM and for chronic cases comprised of detection of HBsAg for HBV and anti- HCV IgG. *Study procedure:* 5 ml of blood collected from suspected patients, who manifested with clinical features of acute and chronic viral hepatitis, from both wards and OPD, was sent to the laboratory for serological testing. The specimens were centrifuged and stored at minus 20 deg C. The required test was performed using commercially available solid phase enzyme linked immunosorbent assay kits (ELISA). For acute hepatitis cases, each serum sample was tested for IgM antibodies of HAV and HEV, utilizing the kits manufactured by RecombiLISA HAV IgM ELISA

and RecombiLISA HEV IgM ELISA respectively. For chronic hepatitis cases, the sera were tested for detection of HBsAg of HBV and IgG anti HCV antibodies, using Merilisa HBsAg and Merilisa HCV ELISA kits, manufactured by Meryl Diagnostics Pvt. Ltd. The laboratory investigations were conducted as per standard guidelines and protocol. Statistical analysis was performed by Excel and SPSS software. The Institutional Ethics Committee approval was obtained, prior to conducting the study.

RESULTS

Acute Hepatitis

Hepatitis A Infection Seroprevalence: In our study 24/216 (11.1%) tested positive for Anti HAV IgM antibodies. Gender wise distribution (n=24) showed highest seropositivity in males 15/24(62.5%) compared to females 9/24(37.5%). [Figure 1] Groupwise distribution revealed that majority were adults 13/24 (58.33%) followed by children 10/24 (41.7%) and were pregnant women 1/24 (4.16%) [Figure 2]. Monthwise data analysis depicted a peak of positive cases during monsoon season (June - September). [Figure 3]

Hepatitis E Infection Seroprevalence: 3/225(1.33%) tested positive for IgM HEV antibodies. Gender wise (n=3) revealed 3/3 i.e. 100% seropositivity in males. [Figure 1] Groupwise distribution showed that 2/3(66.66%) were adults and 1/3 (33.33%) was a child. [Figure 2] There was no cross reactivity found among Hepatitis A and Hepatitis E viral infection.

Chronic Hepatitis

HBV Seroprevalence: 142/12694 (1.11%) tested positive for hepatitis surface B antigen. Genderwise distribution revealed higher positivity in males 81/142(57.04%) compared to females 61/142 (43.95%) [Figure 1]. Groupwise distribution indicated that all 100% patients were adults of which 16/142 (11.26%) were pregnant women [Figure 2].

HCV Seroprevalence: 32/13258 (0.24%) patients tested positive for IgG anti-HCV antibodies. Genderwise distribution among seropositive patients revealed higher positivity in males 19/32 (59.37%) compared to females 13/32(40.62%) [Figure 1]. Groupwise distribution (n=32) indicated all patients to be adults (100%). There was no positivity noted in children or pregnant women [Figure 2].

Table 1: Comparative prevalence of HAV and HEV cases

Author	Year	City	HAV %	HEV%
Palewar et al	2022	Pune	06.07%	08.5%
Sravanthi et al	2021	Kurnool	71%	29%
Desai et al	2020	Ahmedabad	12.8%	70 %
Kalita et al	2020	Uttarakhand	14.7%	28.4%
Khan et al	2020	Bangladesh	19%	10
Sammandar et al	2020	Mumbai	06.9%	09.63%
Bansal et al	2018	Srinagar	16.9%	14.9%
Netra et al	2018	Rajasthan	08.03%	21.94%
Murhekar et al	2018	Different cities of India	12.6%	16.1%

Present study		Mumbai	
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Table 2: Comparative prevalence of HBV & HCV

Authors	Place	Year	HBV %
Our study	Mumbai		1.11%
Sharma et al	Himachal Pradesh	2019	10.6%
Manjiyil et al	Kerala	2021	10.4%
Barall et al	Himachal Pradesh	2018	21.9%
Dinesh et al	Tamil Nadu	2017	5.1%
Parveen et al	Haryana	2020	5.2%
Authors	Place	Year	HCV %
Our Study	Mumbai		0.24%
Kar et al	Orissa	2019	7.1%
Patil et al	Maharashtra	2014	0.38%
Mathur et al	Rajasthan	2016	0.05%
Parveen et al	Haryana	2020	5.1%

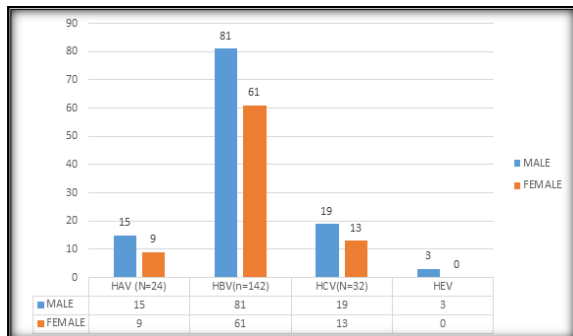


Figure 1: Genderbased Distribution of Cases

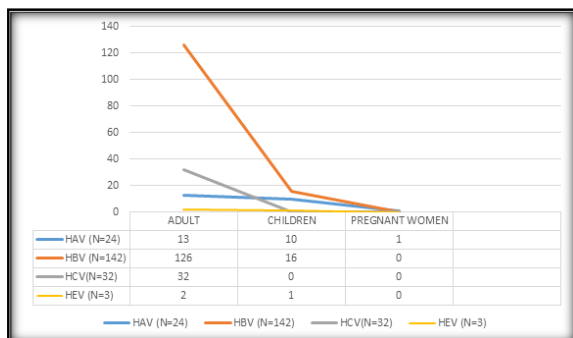


Figure 2: Groupwise Distribution

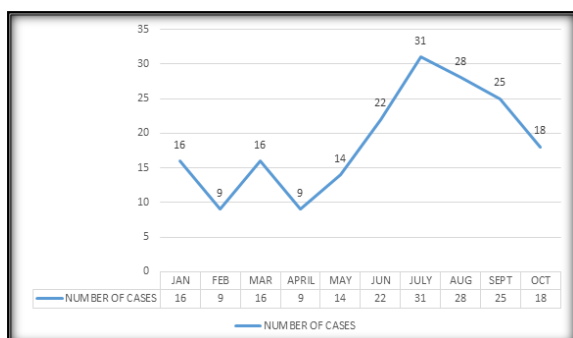


Figure 3: Monthwise Distribution Of Hepatitis A Cases

DISCUSSION

Acute Hepatitis: HAV: In the present study, the seroprevalence of HAV was (24/216) 11.11%. This was similar to (12.8%) by Desai et al in Ahmedabad and (12.6%) by Murhekar et al which was based on surveillance data from various laboratories across India.^[11,12] Higher positivity was reported by Kalita

et al (14.7%) in Uttarakhand, Bansal et al (16.9%) in Srinagar, Sravanthi et al (71%) in Kurnool, and Khan et al in Bangladesh (19%).^[13-16] Lower prevalence was noted by Palewar et al (6.07%), Netra et al (8.03%) and Samaddar et al (6.09%) from Pune, Rajasthan and Mumbai respectively [Table 1].^[17-19]

HEV: In our study, the seroprevalence of HEV was (3/225) 1.33%. Comparatively higher positivity was noted by Sravanthi et al (29%), Desai et al (70%), Kalita et al (28.45%), Khan et al (70%), Bansal et al (14.9%) and Netra et al (21.94%).^[11,13-16,18] In contrast, Palewar et al and Samaddar et al reported low HEV positivity of 6.7% and 9.63% respectively, but still more than our finding [Table 1].^[17,19]

HAV and HEV: Our study showed more HAV positivity (11.11%) compared to HEV (1.33%) [Table 1] which was similar to Sravanthi et al, Khan et al and Bansal et al.^[14-16] On the contrary, lower HAV prevalence compared to HEV was observed by Desai et al, Kalita et al, Netra et al and Murhekar et al.^[11-13,18] Variations in prevalence can be due to difference in sample size, study groups, living standards, sanitation and environmental hygiene.

Genderwise distribution: Higher HAV positivity in the present study was noted in *males*: 62.5% [Figure 1]. Male preponderance was also observed in HAV positive patients, by Bansal et al (57.8%), Netra et al (71.2%) and Murhekar et al (61.1%).^[12,14,18] On the contrary, Palewar et al found increased *female* majority (52.5%).^[17]

HEV positivity in *males* in our study was 100% [Figure 1]. Higher HEV positivity in *males* was also reported by Netra et al (76.7%), Murhekar et al (62.55%), which was comparable to our study.^[12,18]

Male preponderance could be explained because of social and professional reasons, which subject men more often to intake of street food and contaminated water. In contrast, higher *female* HEV positivity was reported by Bansal et al and Palewar et al (50.4% and 53.89% respectively).^[14,17]

Groupwise distribution: HAV: In the present study, among IgM HAV positive patients, 58.33% were *adults*, 41.7% were *children* and 4.16% *pregnant women* [Figure 2]. Agewise, contrary to our findings higher number of *children* than *adults* were reported by Bansal et al (*children* 59.1% > *adults* 37.2%) and Netra et al (*children* 57.53% >

adults 42.70%).^[14,18] In our study *pregnant women* infected with HAV constituted 4.16% which was slightly higher than 3.7% reported by Bansal et al.^[14]

All **HEV** infected cases were young male adults in our study. Bansal et al reported 14.3% HEV positivity in *pregnant women*.^[14] Based on the above, it is imperative to include HEV and HAV testing in antenatal screening, particularly as they may lead to pregnancy related complications.^[6]

Seasonal peak of HAV infection was observed during *monsoon season*, in the present study which is also reported by Murhekar et al.^[12] This increase in acute viral hepatitis in monsoon could be due to contaminated soil polluting other water bodies during rainfall [Figure 3].

Chronic Hepatitis: HBV prevalence in our study was (142/12694)1.11%. Comparatively, higher rate was reported by others: Sharma et al (10.6%), Manjiyil et al (10.4%), Barall et al (21.9%) Dinesh et al (5.1%) and 5.23% from Rohtak, Haryana by Parveen et al [Table 2].^[20-24]

Genderwise, men outnumbered women (57% and 43% respectively) [Figure 1]. In contrast other studies have reported female preponderance Sharma et al, Manjiyil et al, Barall et al and Dinesh et al.^[20-23]

Agewise, majority were adults (88.7%) [Figure 2], which was also the predominant age group found by others (Manjiyil, Barall, Dinesh).^[21-23]

HCV prevalence in our study was (32/13258) 0.24%. This was similar to the finding noted by Patil et al (0.38%).²⁵ Comparatively, lower rate was observed by Mathur et al (0.05%), whereas higher rate was noted by Kar et al(7.1%)by Parveen et al (5.18%) and by Anand et al(0.5%)[Table 2].^[24,26-28]

Genderwise, in our study HCV infected men accounted for 59% which exceeded the number of women (41%)[Figure 1]. Higher infection in males, was also reported by Kar et al and Patil et al. Mathur et al on the other hand observed higher HCV positivity in women. In addition, the latter observed 0.02% positivity in pregnant women.^[25-27] We did not detect any child or pregnant woman to be HCV positive [Figure 2].

Comparison of HBV/HCV cases: In our study, the HBV infected cases (1.11%) were higher as compared to HCV (0.24%). Similar findings where HBV infection surpassed HCV cases, has been observed in various studies conducted across the northern and southern parts of India, as depicted in a systematic review report.^[2]

Coinfection with HCV and HBV: The present study noted that in chronic hepatitis cases, coinfection with HCV and HBV occurred in 1/441 i.e.0.2%. This was concurrent with findings of an Indian meta-analysis study which reported values ranging from 0.1% to 0.5%.²A systematic review revealed the pooled HBV/HCV co-infection prevalence rate across the thirty studies, in India, to be 1.89% which was higher compared to our finding.^[10]

Limitations of our study: This study did not explore the associated risk factors pertaining to transmission of hepatitis, such as faecal contamination of drinking water, transfusion, family history, tattooing and high risk vulnerable population such as drug users, blood donors, sex workers, HIV infected individuals, health care workers, migrants from regions where hepatitis B is endemic, children of HBV-positive mothers and family members or sexual partners of infected persons. A detailed data of the underlying drivers is essential to enhance better understanding of the dynamics of infection to enable the formulation of effective strategies and focused management.

CONCLUSION

The burden of hepatitis continues to exist inspite of awareness campaigns, preventive strategies, availability of laboratory diagnostic techniques, therapy and vaccines. The future demands reinvention of innovative and augmentative strategies, directed towards enhancing rapid identification and management of infected individuals. A comprehensive effort to bridge the obvious gap between availability and accessibility of health facilities is mandated, particularly within the vulnerable population, to ensure that we attain the ultimate goal of hepatitis elimination.

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