



SEROPREVALENCE OF HEPATITIS C VIRUS INFECTION AMONG PATIENTS WITH LIVER DISEASES ATTENDING A TERTIARY CARE CENTRE

Dr. Roshni Agarwal¹, Dr. Fareya Haider², Dr. Sukanta Bandyopadhyay³, Dr. Nashra Afaq⁴, Neetu Kushwaha⁵, Dr. Ekta Arpita Andriyas⁶, Dr. Raees Ahmed^{7*}

Associate Professor¹, Department of Microbiology, Autonomous State Medical College, Kanpur Dehat, Uttar Pradesh, India.

Professor², Department of Microbiology, Career Institute of Medical Sciences and Hospital, Uttar Pradesh, India.

Professor³, Department of Biochemistry, Rama Medical College Hospital and Research Centre, Uttar Pradesh, India.

Assistant professor⁴, Department of Microbiology, Rama Medical College Hospital and Research Centre, Uttar Pradesh, India.

Lecturer⁵, Department of MLT, Era University, Lucknow, Uttar Pradesh, India.

Assistant Professor⁶, Department of MLT, Era University, Lucknow, Uttar Pradesh, India.

Assistant Professor*, Department of Microbiology, Sudha Medical College and Hospital, Jagpura, Kota, Raj, India.

***Corresponding author:** Dr. Raees Ahmad

*Email ID: dr-raeesahmed52@gmail.com

ABSTRACT

Introduction: Hepatitis C virus (HCV) infection is a major global health concern, causing asymptomatic to chronic infections, which can lead to liver cirrhosis and hepatocellular carcinoma. Hepatitis C remains a pressing health issue worldwide, with an estimated 180 million affected globally and significant numbers in India. The virus has varied geographical prevalence, reflecting differing transmission patterns and risk factors.

Aim and Objective: This study aims to determine the seroprevalence of HCV among individuals attending a tertiary care center, providing essential data to guide prevention and control measures.

Material and Methods: This cross-sectional study was conducted over one year at a tertiary care hospital with collaboration with the Department of Microbiology and Department of Biochemistry. Three hundred patients attending outpatient and inpatient services were included after obtaining informed consent. Blood samples were collected, processed promptly, and stored appropriately. Serum samples were tested for anti-HCV antibodies using a validated third-generation ELISA kit, performed per the manufacturer's instructions with appropriate controls.

Results: Among the 300 individuals tested, the overall seroprevalence of HCV was found to be 2.6%. Male patients demonstrated a slightly higher prevalence (2.8%) compared to females (2.5%), though the difference was not statistically significant. The highest seropositivity was observed in the 40-49 years age group, consistent with cumulative exposure risks. No cases were detected in the youngest age (below 20 years).

Conclusion: This study highlights a moderate seroprevalence of HCV among the hospital-attending population, emphasizing the need for continued surveillance, public education on infection risks,

and stringent infection control measures in healthcare settings. Large-scale community studies are warranted to further elucidate the epidemiology of HCV and strengthen preventive strategies.

Keywords: Hepatitis C virus, Seroprevalence, ELISA, Hospital-based study, India

INTRODUCTION

Hepatitis C virus (HCV) remains one of the leading causes of morbidity and mortality worldwide, especially in resource-limited countries. Hepatitis C is a major cause of cirrhosis, liver cancer, and death [1,2].

Hepatitis C virus (HCV) is a significant cause of chronic liver disease globally, including liver cirrhosis and hepatocellular carcinoma [3]. It is estimated that worldwide around 180 million people are infected with HCV, with a considerable burden in India, where about 12.5 million carriers are reported. The virus is transmitted primarily through blood and blood products, unsafe injections, and other medical or surgical procedures with insufficient sterilization. The majority of infections remain asymptomatic in early stages, leading to underdiagnosis and late development of severe liver disease [4,5].

It is an enveloped virus with a genome that is a single-stranded, linear RNA of positive polarity. It belongs to the Flaviviridae family and the genus Hepacivirus [6]. The risk of HCV transmission is highest following contamination during transfusion, followed by drug use through injection or inhalation using shared equipment, exposure to non-sterile medical or non-medical instruments (e.g., during tattooing or piercing), pregnancy or childbirth, and sexual transmission [7]. The introduction of direct-acting antivirals (DAAs) has significantly reduced HCV incidence, prevalence, and mortality, especially in high-endemicity areas [3, 8].

The global prevalence of HCV varies widely by region, with higher rates generally found in developing countries due to differences in healthcare infrastructure and socio-economic conditions. According to the World Health Organization, the global prevalence is approximately 3%. In India, epidemiological data show regional variations with hospital-based studies reporting between 1.8% to 3.0% seroprevalence [6,7]. Understanding the local HCV prevalence and age-sex distribution is crucial to framing prevention efforts, guiding screening policies, and improving patient outcomes.

This study aims to determine the seroprevalence and demographic pattern of HCV infection among individuals accessing healthcare in a tertiary care setting

MATERIALS AND METHODS

This cross-sectional study was conducted over a period of one year at the Department of Microbiology and Department of Biochemistry in a tertiary care hospital.

The study population included 300 consecutive patients attending outpatient and inpatient services, representing diverse clinical backgrounds.

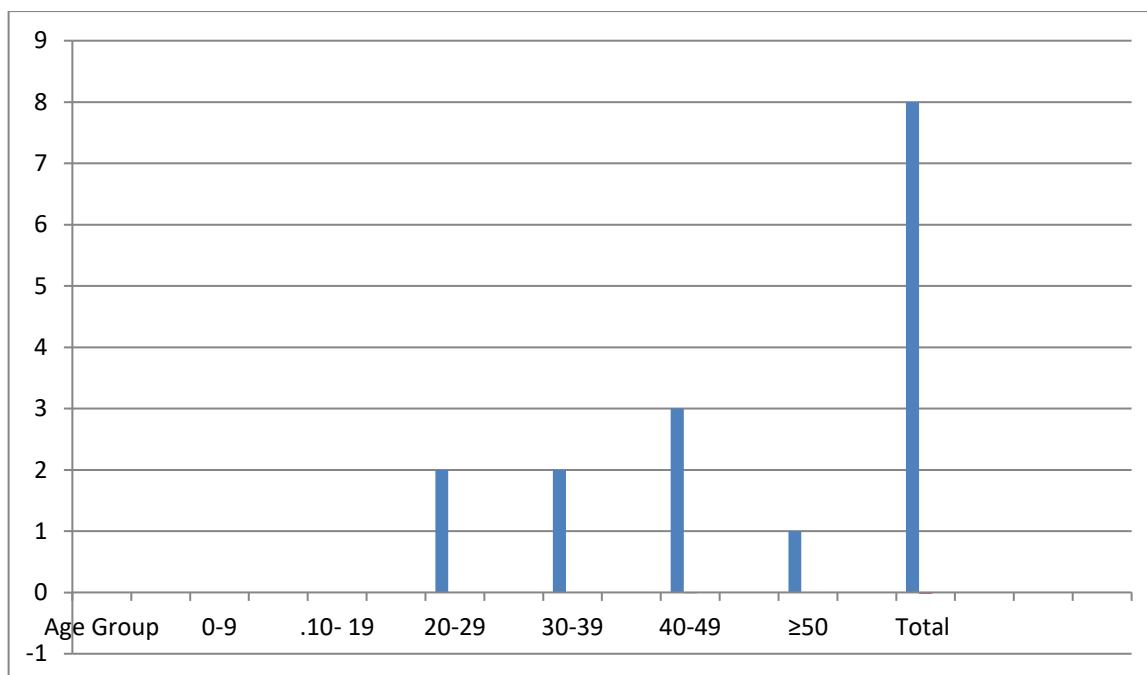
Blood samples (5 ml) were collected aseptically from each participant. Serum was separated within two hours of collection and stored at -20°C until analysis. The samples were grouped into six age categories: 0–9, 10–19, 20–29, 30–39, 40–49, and 50 years and above to observe age-wise prevalence patterns. The presence of anti-HCV antibodies was tested by a third-generation enzyme-linked immunosorbent assay (ELISA) following the manufacturer's protocol. The test's quality was ensured via positive and negative controls included in each run. Data on age, sex, and clinical background were recorded and analyzed for seroprevalence trends.

RESULTS

Among the 300 individuals tested, the overall seroprevalence of HCV was found to be 2.6%. Male patients demonstrated a slightly higher prevalence (2.8%) compared to females (2.5%), though the difference was not statistically significant. The highest seropositivity was observed in the 40-49 years age group, consistent with cumulative exposure risks. No cases were detected in the youngest age (below 20 years).

Table 1: Agewise prevalence of HCV in hospital based general population

Age Group	Total anti-HCV positive (No.)	Total anti-HCV positive (%)
0-9	0	(0.0%)
10-19	0	(0.0%)
20-29	2	(0.5%)
30-39	2	(0.66%)
40-49	3	(1.16 %)
≥50	1	(0.33%)
Total	8	(2.6%)

**Graph No. 1: Agewise prevalence of HCV in hospital based general population****Table 2: Sex –wise distribution prevalence of HCV**

Males (No.)	Anti-HCV positive (%)	Females (No.)	Females Anti – HCV positive (%)	Total anti-HCV positive (%)
26	0 (0.0%)	22	0 (0.0%)	0 (0.0%)
24	0 (0.0%)	25	0 (0.0%)	0 (0.0%)
28	1 (3.6%)	23	1 (2.2%)	2 (3.0%)
27	1 (3.6%)	24	1 (4.2%)	2 (3.9%)
29	2(6.9%)	22	2 (6.7%)	4 (6.8%)
28	0 (1.8%)	22	0 (2.3)	0 (2.0%)
162	4 (2.8%)	138	4 (2.5%)	8 (2.6%)

Overall anti-HCV prevalence is slightly higher in Males (2.8%) than in Females (2.5%). While the overall difference is small, this pattern of higher prevalence among males is commonly observed in HCV epidemiology, often attributed to a higher incidence of historically male-dominated risk behaviors, particularly injection drug use.

DISCUSSION

The observed seroprevalence aligns with other regional hospital-based studies reporting HCV rates between 1.8% and 3.0% [8-10]. The age-wise trend suggests increased exposure over time, possibly due to lifestyle or healthcare-associated factors such as unsterilized medical procedures. While males showed marginally higher positivity, this may reflect behavioral risk factors. Limitations

include the hospital-based sample, which might not fully represent the general population. However, this methodology is advantageous for logistical reasons and offers insights into a segment of the population potentially at higher risk [11-15]. The seroprevalence observed in this study is consistent with hospital-based studies in India that report rates generally ranging from 1.8% to 3.0%. Mishra et al.[16] reported seroprevalence of about 2.6% in a tertiary hospital setting, similar to our findings. Other regional studies show variation with areas like Madurai reporting higher prevalence up to 5.5% among blood donors, potentially reflecting localized risk factors such as unsafe medical practices and higher alcohol use leading to liver disease. The older age group's higher seroprevalence suggests ongoing exposure risk, possibly from invasive procedures, transfusions, or community practices [17-18]. Compared to population-based screenings where prevalence may be lower, hospital-based studies tend to have higher seropositivity due to the nature of patient presentations. The slightly higher prevalence in males may be attributable to behavioral or occupational exposures but was not statistically significant. Public health measures are urgently needed to decrease the disease burden and transmission, especially through systematic screening of all HCV cases, with confirmation of high-risk cases using PCR. Governments should also launch health education campaigns to inform the population about the dangers of HCV infection, aiming to achieve the WHO's global goal of eliminating HCV by 2030 [19].

CONCLUSION

This study demonstrates a significant seroprevalence of HCV infection among hospital attendees, especially in the middle-aged group. It underscores the need for enhanced public awareness, routine screening protocols in at-risk populations, and rigorous sterilization practices in medical settings to curb transmission. Further larger-scale community studies are needed to deepen the understanding of HCV epidemiology and support targeted prevention strategies in the region.

REFERENCES

1. Belete D, Fekadie E, Kassaw M, Fenta M, Jegnie A, Mulu T, et al. Seroprevalence of hepatitis B and hepatitis C virus among clinically suspected cases of viral hepatitis visiting Guhalla Primary Hospital, Northwest Ethiopia. *Sci Rep*. 2024;20(1):21956
2. WHO. World Health Organization, Hepatitis C, Fact S. 2024. Available online: <https://www.who.int/news-room/fact-sheets/detail/hepatitis-c>. Cité 29 avr 2024.
3. Cui F, Blach S, ManzengoMingiedi C, Gonzalez MA, Sabry Alaama A, Mozalevskis A, et al. Global reporting of progress towards elimination of hepatitis B and hepatitis C. *Lancet Gastroenterol Hepatol* Avr. 2023;8(4):332–42.
4. Alessio L, Onorato L, Sangiovanni V, Borrelli F, Manzillo E, Esposito V, et al. DAA-based treatment for HIV-HCV-coinfected patients: analysis of factors of sustained virological response in a real-life study. *Antivir Ther*. 2020;25(4):193–201
5. Kim HN, Nance RM, Williams-Nguyen JS, Chris Delaney JA, Crane HM, Cachay ER, et al. Effectiveness of Direct-Acting antiviral therapy in patients with human immunodeficiency virus-Hepatitis C virus coinfection in routine clinical care: A multicenter study. *Open Forum Infect Dis* Avr. 2019;6(4):ofz100.
6. Zarębska-Michaluk D, Jaroszewicz J, Parfieniuk-Kowerda A, Pawłowska M, Janczewska E, Berak H, et al. Pangenotypic and genotype-specific antivirals in the treatment of HCV Genotype 4 infected patients with HCV monoinfection and HIV/HCV coinfection. *J Clin Med*. 2022;11(2):389.
7. Zoratti MJ, Siddiqua A, Morassut RE, Zeraatkar D, Chou R, van Holten J, et al. Pangenotypic direct acting antivirals for the treatment of chronic hepatitis C virus infection: A systematic literature review and meta-analysis. *EClinicalMedicine* Janv. 2020;18:100237. [DOI] [PMC free article] [PubMed] [Google Scholar]
8. Polaris Observatory HCV, Collaborators. Global change in hepatitis C virus prevalence and cascade of care between 2015 and 2020: a modelling study. *Lancet Gastroenterol Hepatol* Mai. 2022;7(5):396–415.

9. Chakravarti A, Ashraf A, Malik S. A study of changing trends of prevalence and genotypic distribution of hepatitis C virus among high risk groups in North India. *Indian J Med Microbiol.* 2013;31(4):354–9.
10. Hepatitis C. Initiative for Vaccine Research. World Health Organization. 2009. Available from: http://www.who.int/vaccine_research/diseases/viral_cancers/en/index2.html.
11. Chandrasekharan S, Palaniappan N, Krishnan V, Mohan G, Chandrasekharan N. Hepatitis B viral markers and hepatitis C virus antibodies (anti HCV) in Madurai, South India. *Indian J Med Sci.* 2000;54(6):270–3.
12. Chattopadhyay S. Hepatitis C. A major health problem of India. *Curr Sci.* 2002;83(1):9.
13. Chandra M, Khaja MN, Farees N, Poduri CD, Hussain MM, Aejaz H, et al. Prevalence, risk factors, and genotype distribution of HCV and HBV infection in the tribal population: A community based study in South India. *Trop Gastroenterol.* 2003;24(4):193–4.
14. Manjunath P, Salmani MP, Peerapur BV. Seroprevalence of hepatitis C virus among hospital based general population in Bijapur. *Int J Biopharm Res.* 2014;3(3):204
15. Matsumura T, Hu Z, Kato T, Dreux M, Zhang YY, Imamura M, Hiraga N, Juteau JM, Cosset FL, Chayama K, et al. Amphipathic DNA polymers inhibit hepatitis C virus infection by blocking viral entry. *Gastroenterology.* 2009;137:673–681. doi: 10.1053/j.gastro.2009.04.048
16. Mishra S, Chayani N, Sarangi G, Mallick B, Patil SB. Seroprevalence of anti HCV antibody in and around Cuttack, Orissa. *Indian J Med Microbiol.* 2002;20:40–1.
17. Mukhopadhyaya A. Hepatitis C in India. *J Biosci.* 2008;33(3):465–73.
18. Salmani MP, Peerapur BV. Seroprevalence of hepatitis C virus in hospital based general population. *Int J Biopharm Res.* 2014;3(3):204–6.
19. Kassa GM, Walker JG, Alamneh TS, Tamiru MT, Bivegete S, Adane A, et al. Prevalence, trends, and distribution of hepatitis C virus among the general population in sub-Saharan africa: A systematic review and meta-analysis. *Liver Int Déc.* 2024;44(12):3238–49