

# Prevalence of Hepatitis B Virus and Hepatitis-C Virus among Chronic Liver Disease Patients in Northern Haryana Region of India

Anirban Kundu, Sonia Mehta, B.K. Agrawal\*

## Abstract

Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are common among patients with chronic liver disease (CLD). Co-infection with the two viruses is not uncommon, especially among people at high risk for parenteral infection and in areas with a high prevalence of HBV infection. To determine the seroprevalence of Hepatitis B Virus and Hepatitis C virus among chronic liver disease patients and to know the co-infection of Hepatitis B Virus and Hepatitis C Virus in chronic liver disease patients. The study was conducted on 50 clinically diagnosed chronic liver disease patients. Serum was screened for the presence of hepatitis B surface antigen and anti-hepatitis C virus antibodies using qualitative immune chromatographic method. Hepatitis B surface antigen was detected in 13 (26%) and anti-HCV antibody 9 (18%) patients clinically diagnosed to have chronic liver diseases. Hepatitis B virus infection was higher in males 10/37 (27.03%) compared to 3/13 (23.08%) females, whereas, anti-hepatitis C virus antibody was higher in males 7/37 (18.92%) compared to 2/13 (15.39%) females. Of the study participants, no dual hepatitis B and C virus co-infection was found. To prevent the spread of HBV and HCV, people must be educated about these infections and their mode of transmission. All clinically diagnosed patients should be tested for HBV and HCV serostatus to prevent the mortality and morbidity.

## Key Words

Chronic Liver Disease, Hepatitis, HBsAg, HBV, HCV, Antibody

## Introduction

Liver disease has a worldwide distribution.(1,2) Hepatitis C virus (HCV) infection is a leading cause of chronic hepatitis and primary hepatocellular carcinoma in most parts of the world. In the developing countries of Asia and Africa, though hepatitis B virus (HBV) infection is the commonest cause of chronic liver disease, HCV is fast evolving as an equally important infection among these populations. (3) Chronic liver disease (CLD) results from an inflammatory injury to the liver, which has persisted for six or more months without complete resolution. CLD comprises of a spectrum of disease such as chronic hepatitis, liver cirrhosis, and HCC. (4) About 1-2 million people die annually from HBV-related acute and chronic liver diseases worldwide. (5) The estimated

hepatitis B surface antigen (HBsAg) seroprevalence ranges between 0.1%-20% in different parts of the world. (6) The prevalence of HCV infection worldwide has been estimated to be about 3% with 170 million people affected by HCV.(7) Approximately 7% of the world's population (350 million people) are infected with HBV and 3% (170 million people) with HCV.(8) The majority of those with chronic HBV and/or HCV infection will develop complications i.e. 15%-40% may develop cirrhosis, liver failure and or hepatocellular carcinoma.(9) The exact number of patients infected with both HCV and HBV worldwide is unknown. (10) It has been estimated that over the next 20 years, the proportion of HBV/HCV infected patients with cirrhosis will increase from 16%

From the Department of \*Internal Medicine and Microbiology, MM Institute of Medical Sciences & Research, Mullana, Ambala  
Correspondence to : Dr B.K. Agrawal, Professor & Head (General Medicine) MM Institute of Medical Sciences & Research, Mullana, Ambala

to 32% and that other complications will also increase dramatically including hepatic decompensation (increasing by 106%), HCC (increasing by 81%) and liver related deaths (increasing by 180%).(11)

Frequent co-infection of hepatitis B surface antigen (HBsAg)-negative HBV (silent HBV) in HCV-associated CLD has also been reported.(12) Co-infected patients represent a diverse group with various viral replication and immunity profiles that could lead to more aggressive liver disease.(13)

In India, the prevalence of HBV and HCV co-infection among patients has been reported to range from 3% to 56%.(13-15) India has over 40 million HBV carriers and accounts for 10-15% of the entire pool of HBV carriers of the world. Of the 25 million infants born every year in India, it is estimated that over 1 million run the lifetime risk of developing chronic HBV infection. Every year over 100,000 Indians die due to illnesses related to HBV infection.(16,17)

#### Material & Methods

A cross sectional study was conducted in the Department of Microbiology in our institution. The study duration was of one year. 50 clinically diagnosed cases of chronic liver disease attending Medicine OPD/IPD was included in present study. The diagnostic criteria for grouping patients as chronic liver disease were based on history, clinical, ultrasound, and impaired liver function tests (increased levels of Alanine aminotransferases and bilirubin). Alcoholic and drug abuser, intravenous drug user were excluded. Ethical clearance was taken from the Institutional Ethics committee.

Five milliliter of blood sample was collected from the patient and stored at  $-20^{\circ}\text{C}$  until used. Serum was separated from the blood by using the centrifuge machine. The blood samples were screened for markers of various hepatitis B and C viruses by using rapid visual test kits. Hepatitis B antigen (HBsAg) was detected by HEPACARD and Hepatitis C Virus (anti HCV antibody) was detected by HCV TRI-DOT, manufactured by Diagnostic Enterprises, Himachal Pradesh (India).

#### Results

**Age:** Out of 50 patients that were studied, the commonest age group was and 41-50 years with 13 patients (26%). The second commonest group was 31-

40 years age group. The third commonest and the least common age group was 61 and above (18%) and 0-10 years (0%) respectively. Majority, 68% were  $>50$  age group. (Table 1)

The prevalence of HBsAg in chronic liver disease was 13 (26%). The highest HBV prevalence was 5/13 (38.46%) in the age group of 41-50 years. The prevalence of anti HCV in chronic liver disease was 9 (18%). The highest HCV prevalence was 3/7 (42.86%). (Table 1) No case of co-infection with two viruses was reported in the present study.

**Gender:** Female patients were lesser than male patients; male being 37 (74%) and females 13 (26%). The prevalence of HBsAg is higher in males 10/37 (27.03%) than females 3/13 (23.08%). Of the male patients 7 (18.92%) were anti HCV Ab positive and 2 (15.39%) were anti HCV Ab positive from 13 female CLD patients. (Table 2) HBV had higher prevalence in males (27.03%) than females (23.08%).

**Residence:** In relation to residence area, 37 (74%) of the patients were from rural area and 13 (26%) were from urban area. Out of those patients 4 (30.77%) and 9 (24.32%) were HBsAg positive from urban and rural area respectively. The prevalence of anti HCV Ab was higher in rural area patients 7/37 (18.92%) than urban area patients 2/13 (15.38%). In the present study, among total chronic liver disease patients the prevalence of anti HCV Ab was higher in rural area patients 7/37 (18.92%) than urban area patients 2/13 (15.38%).

**Marital status:** Of the chronic liver disease patients, 33 (66%) were married, 14 (28%) unmarried and 3 (6%) widow. Out of those patients, 11 (33.33%) married, 1 (7.14%) unmarried and 1 (33.33%) widow were HBV positive. The prevalence of anti HCV Ab was also higher in married patients 7 (21.21%), followed by unmarried patients 2 (14.29%). (Table 3) In the present study the Hepatitis B prevalence in married patients 11 (33.33%) was found higher than unmarried patients 1 (7.14%). It also observed that in case of Hepatitis C married (21.21%) were more prevalent than unmarried patients (14.29%).

**Occupation:** Maximum CLD patients were farmer (30%) in occupation, followed by daily laborer (28%), student (14%), Govt. employee (12%), house wife (8%), driver (6%) and lab technician (2%). The farmers (40%)

**Table 1. Age Wise Distribution of Chronic Liver Disease Patients with Seroprevalence of Positive HBsAg & anti HCV Ab**

Age (years)	No. of Chronic Liver Disease Patients (%)	No. of HBV positive Patients (%)	No. of HCV positive Patients (%)
0-10	0 (0%)	0 (0%)	0 (0%)
11-20	2 (4%)	0 (0%)	0 (0%)
21-30	8 (16%)	1 (12.5%)	1 (12.5%)
31-40	11 (22%)	3 (27.27%)	0 (0%)
41-50	13 (26%)	5 (38.46%)	2 (15.38%)
51-60	7 (14%)	1 (14.29%)	3 (42.86%)
61-80	9 (18%)	3 (33.33%)	3 (33.33%)
Total	50 (100%)	13 (26%)	9 (18%)

**Table 2. Sex Wise Distribution of Chronic Liver Disease Patients, HBV Positive Patients and HCV Positive Patients**

Sex	No. of patients (%)	HBV positive patients (%)	HCV positive patients (%)
Male	37 (74%)	10 (27.03%)	7 (18.92%)
Female	13 (26%)	3 (23.08%)	2 (15.39%)

**Table 3. Marital Status of Chronic Liver Disease, Positive HBV Patients and Positive HCV Patients**

Marital status	No. of patients (%)	HBV positive patients (%)	HCV positive patients (%)
Married	33 (66%)	11 (33.33%)	7 (21.21%)
Unmarried	14 (28%)	1 (7.14%)	2 (14.29%)
Widow	3 (6%)	1(33.33%)	0 (0%)

**Table 4. Occupational Distribution of Chronic Liver Disease, Positive HBV Patients and Positive HCV Patients.**

Occupation	No. of patients (%)	HBV positive patients (%)	HCV positive patients (%)
Driver	3 (6%)	0 (0%)	0 (0%)
Daily laborer	14 (28%)	4 (28.57%)	1 (7.14%)
Student	7 (14%)	1 (14.29%)	0 (0%)
Farmer	15 (30%)	6 (40%)	4 (26.67%)
Govt. employee	6 (12%)	1 (16.67%)	2 (33.33%)
House wife	4 (8%)	1 (25%)	1 (25%)
Lab. technician	1 (2%)	0 (0%)	1 (100%)

had the highest seroprevalence for HBsAg, followed by daily laborer (28.57%). Lab technician was HCV positive. (Table 4) No significant relationship was found between occupation and HBV infection ( $p > 0.05$ ).

### Discussion

HBV and HCV infections are among the most prevalent infectious diseases in humans worldwide. Both infections are associated with a broad range of clinical presentations ranging from acute or fulminant hepatitis to chronic infection that may be clinically asymptomatic or may progress to chronic hepatitis and liver cirrhosis. HBV infection has several modes of transmission of which perinatal transmission and transfusion of infected

blood and blood products are most important. Other important modes include sexual transmission, tattooing, needle stick exposure etc. (18,19)

A study from neighboring Pakistan also reported that 42% of CLD <50 years. (20) In a study from Ethiopia, 75.8% of CLD cases were below 50 years.(21) Among 50 CLD patient 13 patients shown HBsAg positivity and 9 patients were anti HCV Ab positive. But no co-infection had shown for HBsAg and anti HCV Ab.

Similar results like our study regarding prevalence of the disease were observed in Amritsar, Punjab.(22) Another study showed 24.7% were positive for HBsAg in Delhi.(15) A study from southern India showed HCV

prevalence of 26%.<sup>(23)</sup> Furthermore according to a study from West Bengal none of the HBsAg positive subjects were anti HCV positive.<sup>(24)</sup> The available evidence demonstrates that both viruses can inhibit each other simultaneously; either virus can play a dominant role; both viruses have the ability to induce seroconversion of the other; the chronology of the infection has a role in determining the dominant virus; and HBV and HCV can alternate their dominance.<sup>(25-27)</sup>

A high prevalence of HBV was recorded in the age group 41-50 with a prevalence of 38.46% (5/13) and for HCV majority was in the age group 51-60 (42.86%). The age-related prevalence of HBsAg showed a significant progressive decrease after 50 years, so that among participants who were older than 60 years, the prevalence of anti-HCV was higher than that of HBsAg. The reason could be an early childhood infection with the hepatitis viruses. The chronic infection with hepatitis viruses leads to slow progressive liver disease. It may end up in cirrhosis, chronic liver failure and hepatocellular carcinoma over a period of up to 30 years.<sup>(28)</sup> The low prevalence of hepatitis virus infection in the older age group may reflect loss of carrier status due to seroconversion with age.<sup>(21)</sup>

The gender wise distribution showed similar results as were reported in Pakistan, that HBV infection happened 72% in males and 28% in females.<sup>(29)</sup> Another study showed 4.9% in males and 3.3% in females in Ethiopia.<sup>(30)</sup> It was observed that males (18.92%) were more susceptible to HCV than female (15.39%) among the study population. This concurs with a previous report from Tamil Nadu, that male subjects were at a higher risk of HCV infection than females.<sup>31</sup> High prevalence of Hepatitis in males might be due to fact that males make more common visits to barber and they may be more probably to get wounded and may share equipment. Moreover, men also are more likely to have many sex partners and follow unprotected sex. However, not any known risk exposure that could be an explanation for the difference observed by gender was inferred from this data. Regarding urban v s rural distribution of the subject,

a comparable study from Sindh, Pakistan also reported higher prevalence of HCV in rural area than urban area.<sup>(32)</sup> Because it may be the mode of transmission of these viruses, a very important mode would be the unsafe injection practice prevailing in the vast rural areas of the country. It needs to be mentioned that the rural poor population are still dependent upon the untrained paramedics for their treatment needs. Unfortunately, the sterilization of syringes, needles and minor surgical instruments are often improperly done in rural areas.<sup>(33)</sup>

The result of the present study was in agreement with the results from Ethiopia, reporting the prevalence of Hepatitis B and C higher in married patients.<sup>(21)</sup> Similarly a Nigerian study also reported the higher prevalence of Hepatitis B and C in married patients compared to unmarried.<sup>(34)</sup> It might be due to lack of awareness or education in people that has pre-exposure prior to marriage which is then transmitted to her or his spouse.

In the present study a higher prevalence of HBV was observed in daily laborer servant followed by farmer however, because of their small numbers statistically conclusive inferences may be difficult to make. Yet, this higher rate of HBV infection in daily laborer/house servant and office workers might raise concern regarding need for implementation of more effective public education. For HCV the higher sero-positivity was recorded among lab technician even though it was not significantly associated with none of the occupational groups.

### **Conclusions**

Seroprevalence of HBV and HCV among CLD patients in our study was 26% and 18% respectively. To prevent the spread of HBV and HCV, people must be educated about these infections and their mode of transmission. Especially awareness should be created regarding the proper sterilization of the instruments even in the routine activity like the shaving at barber shop, tattooing on the body.

All the hospitals should implement proper infection control strategies. Furthermore all clinically diagnosed patients should be tested for HBV and HCV serostatus to prevent the mortality and morbidity.

**References**

1. Maddrey WC. Update in hepatology. *Ann Intern Med* 2001 ;134(3):216-23.
2. Davis GL, Roberts WL. The healthcare burden imposed by liver disease in aging Baby Boomers. *Curr Gastroenterol Rep* 2010;12(1):1-6.
3. Poovorawan Y, Chatchatee P, Chongsrisawat V. Epidemiology and prophylaxis of viral hepatitis: a global perspective. *J Gastroenterol Hepatol* 2002 ;17 Suppl:S155-66.
4. Laraba A, Wadzali G, Sunday B, *et al.* Hepatitis C Virus Infection In Nigerians With Chronic Liver Disease. *Internet J Gastroenterol* 2009;9(1):1-3.
5. World Health Organization. Prevention of Hepatitis B in India: An Overview. New Delhi: Regional Office for South-East Asia, World Health Organization; 2002 .pp. 69. Report No.: SEA-EPI-141.
6. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. *J Viral Hepat* 2004 ;11(2):97-107.
7. Sy T, Jamal MM. Epidemiology of hepatitis C virus (HCV) infection. *Int J Med Sci* 2006;3(2):41-6.
8. Shaw-Stiffel T, Mandell G, Bennett J, Dolin R. Chronic Hepatitis. In: Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 5<sup>th</sup> ed. New York: Churchill Livingstone; 2000. p. 1297-331.
9. Lok ASF, McMahon BJ. Chronic hepatitis B. *Hepatology* 2007 ;45(2):507-39.
10. Liu Z, Hou J. Hepatitis B virus (HBV) and hepatitis C virus (HCV) dual infection. *Int J Med Sci* 2006;3(2):57-62.
11. Davis GL, Albright JE, Cook SF, Rosenberg DM. Projecting future complications of chronic hepatitis C in the United States. *Liver Transpl.* 2003 Apr;9(4):331-8.
12. Centers for Disease Control and Prevention. Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV-related chronic disease. *MMWR Recomm Rep* 1998;47(RR-19):1-39.
13. Devi KS, Singh NB, Mara J, *et al.* Seroprevalence of hepatitis B virus and hepatitis C virus among hepatic disorders and injecting drug users in Manipur - a preliminary report. *Indian J Med Microbiol* 2004 ;22(2):136-7.
14. Xess A, Kumar M, Minz S, *et al.* Prevalence of hepatitis B and hepatitis C virus coinfection in chronic liver disease. *Indian J Pathol Microbiol* 2001;44(3):253-5.
15. Chakravarti A, Verma V, Jain M, *et al.* Characteristics of dual infection of hepatitis B and C viruses among patients with chronic liver disease: a study from tertiary care hospital. *Trop Gastroenterol* 2005;26(4):183-7.
16. Datta S. An overview of molecular epidemiology of hepatitis B virus (HBV) in India. *Viral J* 2008;5:156.
17. World Health Organization. Operational guidelines for Hepatitis B vaccine introduction in the Universal Immunization Programme. New Delhi: Ministry of Health & Family Welfare, Government of India; 2011. 94 p.
18. Sebastian M, Ichhpujani RL, Kumari S. Incidence of different types of viral hepatitis in Delhi, Uttar Pradesh and Rajasthan areas. *J Commun Dis* 1990;22(2):129-33.
19. Arora DR, Sehgal R, Gupta N, *et al.* Prevalence of parenterally transmitted hepatitis viruses in clinically diagnosed cases of hepatitis. *Indian J Med Microbiol* 2005 ;23(1):44-7.
20. Bukhtiar N, Hussain T, Iqbal M, *et al.* Hepatitis B and C single and co-infection in chronic liver disease and their effect on the disease pattern. *J Pak Med Assoc* 2003 ;53(4):136-40.
21. Ayele AG, Gebre-Selassie S. Prevalence and Risk Factors of Hepatitis B and Hepatitis C Virus Infections among Patients with Chronic Liver Diseases in Public Hospitals in Addis Ababa, Ethiopia. *ISRN Trop Med* 2013; e56: 3821.
22. Arora U, Mann A. Prevalence of Hepatitis B Virus, Hepatitis C Virus, and HIV in Patients of Chronic Liver Disease in Amritsar. *J Ind Acad Clin Med* 2007;8(1):29-31.
23. Issar SK, Ramakrishna BS, Ramakrishna B, *et al.* Prevalence and presentation of hepatitis C related chronic liver disease in southern India. *J Trop Med Hyg* 1995;98(3):161-5.
24. Chowdhury A, Santra A, Chaudhuri S, *et al.* Hepatitis C virus infection in the general population: a community-based study in West Bengal, India. *Hepatology* 2003 Apr;37(4):802-9.
25. Liaw YF. Concurrent hepatitis B and C virus infection: Is hepatitis C virus stronger? *J Gastroenterol Hepatol* 2001 ;16(6):597-8.
26. Jardi R, Rodriguez F, Buti M, *et al.* Role of hepatitis B, C, and D viruses in dual and triple infection: influence of viral genotypes and hepatitis B precore and basal core promoter mutations on viral replicative interference. *Hepatology* 2001 ;34(2):404-10.
27. Liaw Y-F. Hepatitis C virus superinfection in patients with chronic hepatitis B virus infection. *J Gastroenterol* 2002;37 Suppl 13:65-8.
28. Shimotohno K. Hepatitis C virus and its pathogenesis. *Semin Cancer Biol* 2000 ;10(3):233-40.
29. Ahmad I, Khan SB, Rehman H ur, *et al.* Frequency of Hepatitis B and Hepatitis C among Cataract Patients. *Gomal J Med Sci* 2004 ;4(2):61-4.
30. Tessema B, Yismaw G, Kassu A, *et al.* Seroprevalence of HIV, HBV, HCV and syphilis infections among blood donors at Gondar University Teaching Hospital, Northwest Ethiopia: declining trends over a period of five years. *BMC Infectious Diseases* 2010;10(1):111.
31. Anbazhagan GK, Krishnamoorthy S, Thiyagarajan T. Seroprevalence of HCV and its co-infection with HBV and HIV among liver disease patients of South Tamil Nadu. *World J Hepatol.* 2010 Jan 27;2(1):42-8.
32. Aziz S, Khanani R, Noorulain W, *et al.* Frequency of hepatitis B and C in rural and periurban Sindh. *J Pak Med Assoc* 2010;60(10):853-7.
33. Chu C-J, Hussain M, Lok ASF. Hepatitis B virus genotype B is associated with earlier HBeAg seroconversion compared with hepatitis B virus genotype C. *Gastroenterology* 2002 ;122(7):1756-62.
34. Adekeye A, Chukwuedo A, Zhakom P, *et al.* Prevalence of Hepatitis B and C among Blood Donors in Jos South LGA, Plateau State, Nigeria. *Asian J Med Sci* 2013;5(5):101-4.