ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at:www.ijmacr.com

Volume – 8, Issue – 4, July - 2025, Page No.: 87 – 93

Prevalence and Risk Factors of Hepatitis B, Hepatitis C Virus and Co-Infection in Hemodialysis Patients at a Tertiary Care Institute of North West Region of Rajasthan, India

[1]Surendra Bijarnia, M.S.C. (MED.) 3rd Year, Department of Microbiology and Immunology, Sardar Patel Medical College, Bikaner

[2]Dr. Bhagirath Ram Bishnoi, Professor, Department of Microbiology and Immunology, Sardar Patel Medical College, Bikaner

[3]Dr. Abhishek Binnani, Professor, Department of Microbiology and Immunology, Sardar Patel Medical College, Bikaner

[4]Dr. Rubina Kochar, Assistant Professor, Department of Microbiology and Immunology, Sardar Patel Medical College, Bikaner

Corresponding Author: Surendra Bijarnia, M.S.C. (MED.) 3rd Year, Department of Microbiology and Immunology, Sardar Patel Medical College, Bikaner.

How to citation this article: Surendra Bijarnia, Dr. Bhagirath Ram Bishnoi, Dr. Abhishek Binnani, Dr. Rubina Kochar, "Prevalence and Risk Factors of Hepatitis B, Hepatitis C Virus and Co-Infection in Hemodialysis Patients at a Tertiary Care Institute of North West Region of Rajasthan, India", IJMACR- July - 2025, Volume – 8, Issue - 4, P. No. 87 – 93.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Hemodialysis (HD) patients are at increased risk of hepatitis B virus (HBV) and hepatitis C virus (HCV) infections due to frequent exposure to blood products and invasive procedures.

Aim and Objective: To estimate the prevalence and study the risk factors of Hepatitis B, Hepatitis C viruses and their co-infection in hemodialysis patients

Methods: A cross-sectional study was conducted from October 2024 to March 2025 on 300 HD patients. Sera were tested for HBsAg and anti-HCV antibodies using fourth-generation ELISA kits. Demographic and clinical data were analyzed to identify associations.

Results: Of 300 patients, HBV positivity was 3.33%, HCV positivity was 11.67%, and co-infection occurred in 0.67%. Longer duration of dialysis (>3 years) was associated with a higher prevalence of HCV (7%) and co-infection.

Conclusion: Routine screening, vaccination, and strict infection control in HD units are essential to minimize HBV and HCV transmission.

Keywords: Hemodialysis, Hepatitis B, Hepatitis C, Co-infection, Rajasthan, ELISA, Risk Factors

Introduction

Hemodialysis (HD) patients are highly susceptible to blood borne infections, particularly hepatitis B virus

(HBV) and hepatitis C virus (HCV), due to repeated vascular access, prolonged hospitalization, and frequent exposure to blood products. These infections can lead to chronic liver disease, cirrhosis, and hepatocellular carcinoma, significantly increasing morbidity and mortality among this population.[1,2] Globally, the prevalence of HBV and HCV in dialysis units varies widely, depending on regional healthcare practices, infection control standards, and public health policies. In India, the burden remains significant. According to recent estimates, India hosts approximately 12–18 million HCV-infected individuals and ranks second globally for HBV burden.[3,4] The significance of understanding the prevalence of HBV, HCV, and co-infections in hemodialysis patients cannot be overstated. Identifying the burden of these infections in this vulnerable population is crucial for developing targeted preventive strategies, improving the management of co-infections, and enhancing patient outcomes. Moreover, addressing these infections has profound implications for healthcare costs and resource allocation in the treatment of ESRD patients.[15] Overlapping patterns of endemicity are observed between HBV and other blood borne viruses because they share common mode of transmission. This can result in HBV coinfection with Hepatitis C virus (HCV), Hepatitis D virus (HDV), and HIV. It can lead to multiple coinfections. Coinfection with HBV and one or more of the other blood-borne viruses is associated with modification of the natural history of liver disease and typically poorer outcomes than are observed in HBV mono-infection. The increased risk of complications, prevention of confection in those living with HBV or with HCV or HIV (through HBV vaccination) is of high priority[16].The lack of an effective HCV vaccine, unlike HBV, compounds the challenge in controlling its spread, especially in high-risk settings like dialysis centers. While HBV prevalence has decreased due to better vaccination strategies, HCV remains a persistent concern.[3,4,5]This study was undertaken to determine the prevalence of HBV, HCV, and co-infection in HD patients attending a tertiary care hospital in northwest Rajasthan, and to assess their association with potential risk factors such as duration of dialysis, comorbid conditions, and demographic variables.

Materials and Methods

A cross-sectional study was conducted between October 2024 and March 2025 in the Department of Microbiology at a tertiary care center in northwest Rajasthan. A total of 300 patients undergoing hemodialysis were selected through random sampling. Inclusion criteria included patients unvaccinated for HBV and willing to give informed consent. Patients previously diagnosed or vaccinated for HBV were excluded. Venous blood samples were collected from each participant before dialysis and tested using fourth-generation ELISA kits for HBsAg and anti-HCV antibodies. The kits used were Erba Lisa Pico HBsAg and Erba Lisa HCV Gen4, following manufacturer protocols. Demographic and clinical information, including comorbidities and dialysis history, were collected. Data were entered into Microsoft Excel and analyzed using SPSS. Chi-square tests were applied to assess associations, and a p-value <0.05 was considered statistically significant.

Results

The present study included 300 hemodialysis patients. Among them, 64.67% were male and 35.33% were female, with the majority of patients (44%) falling in the 41–60 years age group. Urban residents constituted

57.67% of the study population. These findings are summarized in [Table 1]. Regarding comorbidities, diabetes mellitus (30%) was the most common underlying condition, followed by urological diseases (22.67%) and glomerulonephritis (21%). These patterns are detailed in [Table 2]. When tested for hepatitis markers, 3.33% of patients were found positive for HBV, 11.67% for HCV, and 0.67% showed co-infection of both viruses. This distribution is shown in [Table 3]. Furthermore, a statistically significant association was found between the duration of dialysis and infection status. Patients on dialysis for more than 3 years showed the highest prevalence of HCV and all co-infection cases were also in this group. This relationship is outlined in [Table 4].

Table 1: Sociodemographic Profile of Hemodialysis Patients

Variable	Category	Frequency (n=300)	Percentage (%)
Gender	Male	194	64.67
	Female	106	35.33
Age Group (years)	≤20	18	6.00
	21–40	93	31.00
	41–60	132	44.00
	>60	57	19.00
Residence	Urban	173	57.67
	Rural	127	42.33

Table 2: Comorbid Conditions in Study Participants

Comorbidity	Frequency (n=300)	Percentage (%)
Diabetes Mellitus	90	30.00
Urological Disease	68	22.67
Glomerulonephritis	63	21.00
Hypertensive Nephropathy	53	17.67
Unknown etiology	9	3.00
Cystic Renal Disease	17	5.67

Table 3: Prevalence of Hepatitis B, Hepatitis C, and Co-infection

Infection Status	Number of Patients (n=300)	Percentage (%)
Hepatitis B	10	3.33
Hepatitis C	35	11.67
Co-infection	2	0.67
Negative	253	84.33

Table 4: Association of Infection Status with Duration of Dialysis

Duration of Dialysis	HBV Positive	HCV Positive	Co-infection	Total Patients
≤1 year	3	7	0	170
1–3 years	4	7	0	47
>3 years	3	21	2	83

Risk Factor	HBV Positive (n=10)	HCV Positive (n=35)	Co-infection (HBV+HCV) (n=2)	Total Cases (n=300)	p value
Age Group (Years)					
≤20	0	0	0	6	0.942
21-40	2	8	0	93	
41-60	5	15	1	132	
>60	3	12	1	69	
Gender					
Male	7	25	2	194	0.668
Female	3	10	0	106	
Residence					
Rural	4	15	1	127	0.961
Urban	6	20	1	173	
Occupation					
Unemployed	2	6	1	57	0.923
Private Job	3	9	0	66	
Housewife	2	10	0	89	
Labour	1	4	0	18	
Student	0	1	0	14	
Other	2	5	1	56	
Underlying Disease					
Diabetes Mellitus	3	12	1	90	0.723
Chronic Glomerulonephritis	2	8	0	63	
Hypertensive Nephropathy	2	5	1	53	
Urologic Diseases	3	9	0	68	
Unknown Aetiology	0	1	0	9	

Duration of Dialysis (Years)					
≤1	3	7	0	170	0.325
1-3	4	7	0	47	
>3	3	21	2	83	

Discussion

The prevalence of viral hepatitis is greater in patients on haemodialysis than in the general population affecting quality of life and mortality. Patients diagnosed with CRF on maintenance haemodialysis pose a higher risk of acquiring HBV or HCV infections due to frequent use of blood and blood products and multiple invasive procedures performed in these patients [11]. The literature review points to the fact that viral hepatitis is a serious threat for haemodialysis patients as 1.9% of all deaths among this population are related to the consequence of viral hepatitis[12]. The distribution of cases by age group reveals that the highest prevalence (44%) occurs in the 41-60 years age group, followed by 31% in the 21-40 age group. This trend aligns with findings from Malhotra et al. (2016)[1] and Bhaumik et al. (2012)[9], who reported that most hemodialysis patients belong to middle-aged groups, particularly between 40 and 60 years. Additionally, Jamil et al. (2016)[10] found that the 51-60 years age group had the highest proportion of dialysis patients. This suggests that middle-aged individuals are at greater risk due to prolonged exposure to renal diseases requiring hemodialysis. More than half (56.67%) of the patients had been on dialysis for one year or less, while 27.67% had been undergoing dialysis for more than three years. This observation aligns with the findings of Alashek et al. (2012)[13] and Bhaumik et al. (2012)[9], where a significant number of patients initiated hemodialysis treatment within the last year. This trend could be due to late-stage detection of chronic kidney diseases and limited access to early intervention. Our study found that 10 (3.33%) patients were reactive for HBV, indicating a relatively low prevalence of HBV among hemodialysis patients. This finding is similar to the results reported by Malhotra et al. (2016)[1], where only 1.5% of hemodialysis patients tested positive for HBV. In contrast, Bhaumik et al. (2012)[9] reported a slightly higher prevalence of 7.3%, suggesting that variations in infection rates may be influenced by regional awareness for infection control practices. The prevalence of HCV infection in hemodialysis patients in our study was 11.67%. In other studies, like Malhotra et al. (2016)[1] & Khullar et al. (2020)[2] reported higher prevalence that were 33.5% & 19.33% respectively. The difference these prevalence rates that could be due to difference in sample sizes and highlights the need for further studies in this regard. The detection of dual infection (HBV and HCV) in 2 cases in our study highlights the importance of routine screening in hemodialysis patients. This co-infection rate of 0.67% is similar to that found in studies by Malhotra et al. (2016)[1] and Bhaumik et al. (2012)[9], where dual infections were observed in 0.8% and 1.2% of cases, respectively. These findings indicate that while co-infection is not highly prevalent, it poses significant health risks and requires targeted management strategies. The risk of HBV and HCV infections increased with longer dialysis duration, with the highest prevalence observed in patients undergoing dialysis for more than three years. This observation is supported by Alashek et al. (2012)[13] and

Badareen et al. (2016)[14], who found that prolonged hemodialysis increases the risk of viral transmission due to repeated exposure to dialysis equipment, blood transfusions, and invasive procedures.

Conclusion

This study highlights the burden of HBV and HCV infections among hemodialysis patients and identifies key demographic, clinical, and procedural risk factors contributing to the spread of these infections. HCV infection remains a greater concern than HBV**,** with a higher prevalence and a stronger association with longer dialysis duration. Despite improvements in infection control practices, hemodialysis patients remain a high-risk group for viral hepatitis due to frequent blood transfusions and invasive procedures**.** Future research should focus on new preventive strategies**,** including improved vaccination efficacy**,** antiviral treatments**,** and better dialysis unit management to further reduce the prevalence of HBV and HCV infections in this vulnerable population.

References

1. Malhotra R, Soin D, Grover P, et al. Hepatitis B virus and hepatitis C virus co-infection in hemodialysis patients: A retrospective study from a tertiary care hospital of North India. J Nat Sci Biol Med. 2016.
2. Winston A, Wurcel AG, Gordon C, Goyal N. Viral hepatitis in patients on hemodialysis. Semin Dial. 2020.
3. Khullar S, et al. Seroprevalence of hepatitis B virus and hepatitis C virus infection in haemodialysis patients at tertiary care hospital in Western Rajasthan, India. J Acad Clin Microbiol. 2020.
4. Bhaumik P, et al. Seroprevalence of hepatitis B and hepatitis C in dialysis patients. J Clin Diagn Res. 2012.
5. Badareen KZ, et al. Prevalence of hepatitis B and C among hemodialysis patients in Jordan. J Infect Dev Ctries. 2016.
6. Agarwal SK, Dash SC. Spectrum of renal diseases in Indian adults. J Assoc Physicians India. 2000.
7. Jasuja S, Gupta AK, Choudhry R, et al. Prevalence and association of hepatitis C viremia in hemodialysis patients. J Assoc Physicians India. 2007.
8. Fabrizi F, Dixit V, Messa P, Martin P. Hepatitis B and hepatitis C virus and chronic kidney disease. Acta Gastroenterol Belg. 2010.
9. Bhaumik, Pradip & Debnath, Kalyan. (2012). Prevalence of Hepatitis B and C among Hemodialysis Patients of Tripura, India. Euroasian Journal of Hepato-Gastroenterology.
10. Jamil, M., Bhattacharya, P.K., Yunus, M., Lyngdoh, C.J., Roy, A. and Talukdar, K.K., 2016. Prevalence of Hepatitis B and Hepatitis C in haemodialysis population in atertiary care centre in north eastern India. International Journal of Biomedical and Advance Research.
11. Abumwais JQ, Idris OF. Prevalence of hepatitis C, hepatitis B, and HIV infection among haemodialysis patients in Jenin District (Palestine). Iran J Virol. 2010.
12. Aghakhani A, Banifazl M, Eslamifar A, Ahmadi F, Ramezani A. Viral hepatitis and HIV infection in haemodialysis patients. Hepat Mon. 2012.
13. Alashek WA, McIntyre CW, Taal MW. Hepatitis B and C infection in haemodialysis patients in Libya:

prevalence, incidence and risk factors. BMC Infect Dis. 2012.

14. Badareen, Khaled Z. “Prevalence of hepatitis B and C viruses among hemodialysis patients in Southern West Bank, Palestine.” International Journal of Research in Medical Sciences 4 (2016).
15. Alter, MJ (2007-05-07). "Epidemiology of hepatitis C virus infection". World Journal of Gastroenterology.2007.
16. Chemaitelly H, Mahmud S, Rahmani AM, Abu-Raddad LJ. The epidemiology of hepatitis C virus in Afghanistan: systematic review and meta-analysis. Int J Infect Dis. 2015 Nov; 40:54-63. doi: 10.1016/ j.ijid.2015.09.011. Epub 2015 Sep 28. PMID: 26417880.
17. Raina D, Rawat N, Pandita AK. Prevalence of Hepatitis B and Hepatitis C in Patients undergoing hemodialysis at a teaching hospital in Uttarakhand. J Family Med Prim Care. 2022.
18. Zignego, AL; Giannini, C; Gragnani, L; Piluso, A; Fognani, E (2012-08-03). "Hepatitis C virus infection in the immunocompromised host: a complex scenario with variable clinical impact". Journal of Translational Medicine.2012.