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**Review Article**

# Prevalence of hepatitis B and hepatitis C virus in haemodialysis patients

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## ABSTRACT

Hepatitis B (HBV) and hepatitis C virus (HCV) infections continue to remain a significant global health challenge due to its morbidity and mortality profile. Almost 600,000 annual deaths are associated with the hepatitis B and hepatitis C virus. Patients on haemodialysis are at increased chance of acquiring infections. Infection among haemodialysis patients can lengthen the hospital stay and contribute to further complications. Hepatitis B and hepatitis C virus infection is common among the haemodialysis patients. Cross-contamination to patients through environmental surfaces, supplies, equipment, multiple-dose drug bottles, and staff members are among the modes and causes of transmission of hepatis B and C virus infections in haemodialysis facilities. The purpose of this research is to review the available information about the prevalence of hepatitis B and hepatitis C virus in haemodialysis patients. Global prevalence for hepatitis C virus among haemodialysis units reported in studies ranged from 2.6% to 22.9% and 13.5% on average while for hepatitis B virus the prevalence is less than 10% while some studies report the prevalence ranging from 2-20%. Literature has variable prevalence for hepatitis B and C virus across the different geographical regions. The variation in prevalence is observed due to numerous risk factors contributing to the significant burden of the disease. Epidemiological data in recent times is lacking in literature and conduction of population-based surveys can be beneficial in generalizing the prevalence especially in gulf countries where limited studies are available.

**Keywords:** Hepatitis B, Hepatitis C, Virus, Prevalence, Haemodialysis

## INTRODUCTION

Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections continue to be major global health problems. Despite the fact that both viruses affect the liver directly, their paths are highly different. More than 250 million HBV carriers are thought to exist in the world, and about 600,000 of them pass away each year from liver diseases linked to HBV. In contrast to neonatal HBV infection, which ends in chronic infection in 90% of instances,

acute HBV infection in adults is typically self-limited and subclinical and only results in chronic infection in around 5% of cases. A 2015 World Health Organization study observed that 71 million people worldwide had chronic HCV infection while 100 million have serologic evidence of HCV exposure. About 20% of the patients with chronic HCV infection over a 25-year period develop cirrhosis. It is expected that 60% to 80% of patients with acute HCV infection will also develop chronic infection. Hepatic cellular carcinoma occurs annually in roughly 4% to 5% of people with cirrhosis. Since HCV is an unstable ribonucleic acid virus with strong mutagenesis potential, it frequently undergoes genomic alterations that help it avoid the immune system and develop chronically at a rapid rate.[1]

HCV and HBV exposure is highly likely in patients with end-stage renal disease who are on continuous dialysis treatment. Viral hepatitis C is still the most common viral infection among people receiving chronic haemodialysis, and it continues to pose a serious health risk because of its high incidence and escalating risk of chronicity including the development of cirrhosis or hepatocellular carcinoma. In dialysis units, there is also the possibility of cross-contamination. The effectiveness of hygienic measures in some dialysis units, the low prevalence of peritoneal dialysis compared with haemodialysis, and the recent cases of contamination in patients who were neither toxicomanic nor transfused point to a hand-borne nosocomial transmission, although studies have reported several different modes of transmission.[2]

According to the dialysis outcomes and practice patterns study, there are significant differences in the prevalence of HCV infection amongst various haemodialysis units in different nations. HCV prevalence ranged from 2.6% to 22.9% globally and 13.5% on average across various haemodialysis facilities. The main causes of such a high incidence of infections are a high prevalence of HCV infection in the general population, a lack of effective vaccination and standard infection control measures, insufficient disinfection procedures for dialysis machines and other medical equipment, as well as transmission of infection from patient to patient, particularly in dialysis facilities with a high percentage of infected patients. In haemodialysis units, HBV infection is less common than HCV infection. Although there are still outbreaks of acute HBV infection in developed countries also, rate of hepatitis B surface antigen seropositivity on haemodialysis is relatively low less than 10%. However, according to some research studies the frequency of HBV infection inside dialysis units in developing countries is higher accounting to approximately 2-20%.[3] Purpose of this research is to review available information about the prevalence of HBV and HCV in haemodialysis patients.

## LITERATURE SEARCH

This study is based on a comprehensive literature search conducted on June 27, 2022, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed the information about the prevalence of HBV and HCV in haemodialysis patients. There were no restrictions on date, language, participant age, or type of publication.

## DISCUSSION

HBV and HCV transmission in the haemodialysis environment is mostly caused by cross-contamination to patients through environmental surfaces, supplies, equipment, multiple-dose drug bottles, and staff members. As a result of the isolation approach for hepatitis B surface antigen positive patients, the deployment of infection control measures, and the introduction of the HBV vaccination, the incidence and prevalence of HBV in haemodialysis centres have decreased significantly. Haemodialysis patients continue to have a greater incidence and prevalence of HCV infection than the matching general population. The question of whether isolation of HCV-infected individuals is necessary to reduce high anti-HCV seroconversion rates is still being debated. The present recommendations rely on rigorous adherence to infection control measures for the prevention of HCV transmission in the haemodialysis environment and do not advocate seclusion or the use of specific equipment for HCV-infected patients. Investigations on HCV infection outbreaks linked to dialysis suggest that ineffective infection control procedures are the primary driver of transmission.[4]

### *Evidence from literature*

Winston stated that the first case of viral hepatitis transmission in haemodialysis patient was documented in the 1960s and has persisted to the present. According to the dialysis outcomes and practice patterns study, the mean and median HBV prevalence at haemodialysis units in seven developed nations were 3% and 1.9%, respectively. Numerous surfaces in haemodialysis facilities, including doorknobs, clamps, scissors, and haemodialysis machine control panels, have been found to have hepatitis B surface antigen. Staff members may indirectly spread the virus to patients through contaminated equipment. In the United Sates, the frequency of HCV in haemodialysis units ranges from 5% to 44%, and haemodialysis treatment is thought to increase the risk of HCV transmission.[5]

Results of an African study in 2021 showed that among haemodialysis patients, the combined prevalence of HBV and HCV infection was 9.88% (95% confidence interval (CI) 7.20-12.56). Additionally, the combined prevalence of HBV and HCV co-infection was 7.18% (95% CI: 3.15-

11.20). It was observed that the duration of dialysis was a contributing factor in the development of HBV and HCV in haemodialysis patients (Odds ratio= 1.44; 95% CI: 1.04, 2.01).[6] Study from Botswana in 2021 reported that at the start of haemodialysis, 1.19% of the patients were seropositive for anti-HCV antibodies, whereas 2.98% were seropositive for hepatitis B surface antigen. During haemodialysis, 1.23% were observed to have seroconverted to hepatitis B surface antigen positive. One patient (0.61%) seroconverted to HCV antibody positive during haemodialysis. Seroconversion for both HBV and HCV was not related to the duration of haemodialysis, history of invasive procedures, human immunodeficiency virus status, frequency of hospitalization, or blood transfusion.[7]

An Indonesian study reported that HBV surface antigen was found in two staff members (5.7%) and 11.2% of the patients. While 80.7% of the patients had anti-HCV antibodies found, but no staff members were positive. Infection with HBV and HCV that was not known to be present was found in 12.9% and 14.7% patients, respectively. HBV and HCV infections were prevalent generally in patients at rates of 24.2% and 83.2%, respectively. HCV infection was independently correlated with both the frequency and duration of haemodialysis.[8] Findings of a Chinese study reported that anti-HCV, HCV ribonucleic acid, and hepatitis B surface antigen prevalence in haemodialysis patients were 6.1%, 4.6%, and 7.0%, respectively. The prevalence of hepatitis B surface antigen was 4.2%, 0.2% for HCV ribonucleic acid, and 0.5% for HCV antibodies among spouses. The duration of dialysis, blood transfusions, and attendance at multiple dialysis units were risk factors for HCV infection.[9] Findings of systematic review and meta-analysis in Vietnam concluded that estimates of the frequency of HBV and HCV in the population tested for haemodialysis in Vietnam show high levels of endemicity. While HCV prevalence rates varied by location, the prevalence rates of HBV were comparable in a small number of haemodialysis facilities. The number of patients in Vietnam who require haemodialysis is on the rise.[10]

Results of a Pakistani study in 2022 showed that 11.7% of patients tested positive for hepatitis B surface antigen at the one-year follow-up, while 23% tested positive for anti-HCV. Three individuals were positive for both hepatitis B surface antigen and anti-hepatitis D virus, whereas five patients showed dual seropositivity for hepatitis B surface antigen and anti-HCV. 11 out of 39 patients who tested positive for anti-HCV and 4 out of 20 patients who tested positive for hepatitis B surface antigen had a history of receiving further transfusions, respectively. While a similar link was not seen in the patients who had seropositivity for hepatitis B surface antigen, the correlation between the duration of haemodialysis and viral indicators was significant (p=0.05) for the patients who had been screened positive for anti-HCV.[11] Results of an Indian study in 2022 showed that 11.66% of patients tested positive for hepatitis B surface antigen, while 31.68% of patients had anti-HCV antibodies found. While the majority of HCV-positive patients were between the ages of 41 and 50 (23.07%), the majority of anti-HBV-positive patients were in the >60 age group (11.53%). The majority of HCV-positive patients (54.54%) and HBV-positive patients (23.52%) underwent 50-100 cycles of haemodialysis. Chronic nephritis was one of the main primary diseases leading to end-stage renal disease.[12]

Findings of an Iranian study depicted that overall, 1.2% and 5.2% of the study population were HBV and HCV positive, respectively. In comparison to other haemodialysis patients, HBV and HCV patients' age, sex, and length of time on the treatment were not statistically different (p>0.05). Patients with HBV infection had similar histories of blood transfusion and similar numbers of blood units transfused (p>0.05). The history of blood transfusions and the quantity of blood units transfused were the greatest risk variables in haemodialysis patients with HCV infection (p<0.0001).[13] Alashek reported in his study results conducted in Libya that 34.9% of people tested positive for HBV and HCV (anti-HCV positive 31.1%; hepatitis B surface antigen positive 2.6%; both positive 1.2% ), 4.7% of the sero-positive patients had a history of infection prior to the start of haemodialysis. Between haemodialysis centres, the prevalence of HBV and HCV infection ranged greatly, from 0% to 75.9%. Sero-positive patients were younger, had been receiving dialysis for longer, and had received more blood transfusions in the past. Prospective follow-up demonstrated a 7.7% annual incidence of sero-conversion (7.1% HCV; 0.6% HBV). The prevalence of newly acquired infections varied greatly amongst dialysis facilities.[14] Palestinian study findings depicted that HBV prevalence was found to be 3.8% overall, with a range of 0.0% to 11.8%. The prevalence of the HCV was estimated to be 7.4% overall, with a range of 2.9% to 15.9% among haemodialysis patients.[15]

Results of a Lebanese study showed that in haemodialysis patients in Lebanon, the prevalence of the HBV and the HCV was 1.6% and 4.7%, respectively. HBV and HCV incidence rates were 0.27 and 0.37 per 100 persons per year, respectively. The incidence of HBV was not significantly different between haemodialysis centres in the different governorates (all p>0.1), but the incidence of HCV was significantly different between the southern centres (1.47 per 100 persons per year) and the northern centres (0.19 per 100 persons per year), with p=0.00068 and 0.00374 when compared to Mount Lebanon (0.21 per 100 persons per year) and the northern centres, respectively. In Lebanon's haemodialysis centres, HBV and HCV incidence rates are extremely low, and over the past 20 years, their prevalence has been declining.[16] Ashkani reported in findings of meta-analysis and systematic review from Middle East that Egypt and Syria had the highest reported rates of HCV infection among haemodialysis patients, while Iran and Lebanon had the

lowest rates. The overall HCV infection prevalence among haemodialysis patients in the region was found to be 25.3%. Additional research is still required to create more trustworthy databases, identify key risk factors, and enhance diagnosis and treatment strategies, particularly in nations with higher prevalence.[17] Although there is an increased likelihood of occurrence of HBV and HCV in haemodialysis patients' literature is lacking the epidemiological data in recent times especially in the gulf region. More epidemiological, population-based surveys in current times can aid not only in generalizing the prevalence of HBV and HCV among haemodialysis patients but will also help in assessment of risk factors which can then lead to designing better prevention strategies.

## CONCLUSION

Patients on haemodialysis have increased chance of acquiring HBV and HCV, although variable prevalence is observed throughout different geographical regions. More population-based epidemiological surveys are needed to generalize the prevalence of HBV and HCV among haemodialysis patients and identifications of risk factors.

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