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Original research article

FREQUENCY OF HEPATITIS B AND C SEROPOSITIVITY AMONGST PATIENTS UNDERGOING HEMODIALYSIS

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Abstract: *Hepatitis is caused by many viruses, but Hepatitis B and C viruses are the most harmful, showing a unique and noteworthy correlation between kidney disorders and hemodialysis in individuals.* ***Objective:*** *This study aimed to determine the frequency of hepatitis B and C seropositivity amongst hemodialysis individuals.* ***Methods:*** *This cross-sectional study was conducted at the Department of Medicine, Hayatabad Medical Complex Peshawar, after obtaining permission from the ethical board of the institute. The study duration was six months from August 2023 to January 2024. Individuals who were going to perform hemodialysis in the hospital during the study period were enrolled. Sixty-four chronic kidney disease patients were tested for anti-HBsAg and anti-HCV antibodies who visited our hospital for dialysis. All samples were tested for HBs antigen and anti-HCV antibodies using a more sensitive chemiluminescence assay (Vitros, Orthoclinical Technologies). Microsoft Excel was used for data entry, analysis, and interpretation.* ***Results:*** *A total of 64 participants who were going for hemodialysis were examined for seropositivity of hepatitis B and C viruses. The anti-HCV antibody was positive in 21 (32.8.0%) and 9 (14.0%) individuals who were positive for hepatitis B surface antigens. A significant portion of the individuals, 28 (43.75%), had dialysis of less than 50 times while 18 (28.1%) patients had dialysis of 50-100 times. On the other hand, the majority of the patients who tested positive for HCV (73.8%) and HBV (56.3%) also got HD 50 to 100 times. For HBV-infected individuals, the average dialysis stay was 27 months, but for HCV-infected ones, it took 30 months. For both HBV and HCV infections, the length of Hemodialysis revealed a vital risk factor ($P < 0.05$).* ***Conclusion:*** *It was concluded from the current study that the frequency of hepatitis B seropositivity was 14.0%, while that of hepatitis C was 32.8.0% among participants undergoing dialysis. Viral hepatitis is a severe health risk for hemodialysis patients, especially in underdeveloped nations.*

Keywords: Hemodialysis: Seropositivity: HVC: HBV.

Introduction

Hepatitis is a fatal viral disease that creates a significant issue for healthcare professionals throughout the world. Different viruses cause it, but hepatitis B and C viruses are the most harmful, showing a unique and noteworthy correlation with kidney disorders and hemodialysis individuals. Those who get several blood transfusions and prolonged vascular exposure during dialysis are at an increased risk of contracting infections and testing positive for HCV and HBV. Contaminated hospital supplies, equipment, electronic devices, general surfaces, and nursing staff are all responsible for nosocomial transmission. Moreover, the immune system being weakened as a result of permanent kidney damage increases the risk of HBV, HCV, and infections in individuals on hemodialysis. (1) Several imperfections in the standard precautions, including sharing a single infusion vial, improper disinfection of medical equipment between people, inadequate sterilization methods, and poor maintenance of dialysis machines, can increase the risk of contracting HBV, HCV, and infection. (2) Dependency on intravenous drugs and organ transplantation have been associated with HCV positivity and infection. (3) Long-term immunosuppression in recipients of transplants to avoid graft rejection increases the risk of reactivation of the Hepatitis B virus. (4) Before blood donors were thoroughly screened, blood transfusions used to treat anemia brought on by kidney failure were associated with HCV, HBV positivity, and infection. When the same machines are used for several patients without being sterilized during hemodialysis, the risk of patient-to-patient transmission of HBV gets higher. (5) The prevalence of HCV and HBV positivity in people receiving hemodialysis varies significantly between countries, with Iran having a shallow frequency. (6) Nearly two billion individuals worldwide are thought to have hepatitis B virus infection, of which 300 have chronic diseases. Around three percent of people have HCV infection, which includes 180 million carriers. (7) According to study findings, the prevalence of HBV is 1.79 percent, and the prevalence of HCV is twenty-one percent among individuals receiving hemodialysis. (8) Iran conducted countrywide studies between 2001 and 2008, and the results showed that the

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seroprevalence of HCV infection was 0.16 percent. The frequency of HCV infection in Iranian patients receiving hemodialysis ranged from thirty percent to 90%. (9) The prevalence of chronic kidney disease in a sample of individuals was estimated to be 8.06% in Lahore research. (10)

Research done at Children's Hospital Lahore found that during hemodialysis, around 25.6% of the participants tested positive for HCV and 10.6% for HBV. (11) According to community and health screening programs, the prevalence of chronic kidney disease in Pakistan is estimated to be between twenty-five percent. (12) Long-term dialysis patients are at a higher risk of nosocomial infections due to their increased exposure to risky drug injection practices, multiple transfusions, contaminated dialysis systems, and improper equipment handling. This is why they test positive for hepatitis B and C. Inadequate preventative actions taken by medical personnel during parent drug administration is a contributing cause. (13) Long-term hemodialysis has been significantly linked to HBV, HCV positivity, and infections due to non-adherence to the universal infection control measures, among other risk factors such as repeated transfusions, immune-compromised patients, contaminated devices, and the attending staff. (13)

Methodology

This cross-sectional study was conducted at the Department of Medicine, Hayatabad Medical Complex Peshawar, after getting permission from the ethical board of the institute. The study duration was six months from August 2023 to January 2024. Individuals who were going to perform hemodialysis in the hospital during the study period were enrolled. Sixty-four chronic kidney disease patients were tested for anti-HBsAg and anti-HCV antibodies who visited our hospital for HD. The institution's research and ethical committee was consulted in preparing the study procedure. Participants who were diagnosed with anti-HCV or anti-HBsAg antibodies for the first time after Hemodialysis were included in this research, as were those who had HD many times. Patients who tested positive for anti-HCV or anti-HBsAg antibodies before HD were excluded from this research, as were those who had hemodialysis for the first time. For data collection, a questionnaire was prepared, which contained Age, sex, history of any co-morbidities in employment, length of HD, amount of blood transfusion, status of HBV vaccination, & history of infection. Following the assay's usual instructions, all samples were tested for HBs antigen and anti-HCV antibodies using a more sensitive chemiluminescence assay (Vitros, Orthoclinical Technologies). Both negative and positive controls were present. They did a positive and negative control every 75 tests or once daily. Individuals who test positive for HBV or HCV can use one of the four machines in the dialysis unit designated for them. These five machines are situated in a separate room from the other equipment to prevent cross-contamination. Patients with blood-borne viral illnesses have their dialyzers reprocessed in a separate area, apart from the other patients.

Microsoft Excel was used for data entry, analysis, and interpretation. Descriptive techniques were used to interpret the data in terms of the distribution of frequencies as percentages, proportions, rates, & ratios. Non-parametric chi-square tests were utilized to determine the significance of the correlation.

Results

A total of 64 participants who were going for hemodialysis were examined for seropositivity of hepatitis B and C viruses. The anti-HCV antibody was positive in 21 (32.8.0%) and 9 (14.0%) individuals who were positive for hepatitis B surface antigens. In individuals undergoing HD, there was no evidence of co-infection between HBV and HCV. Study participant's ages ranged from 15 to 71 years. Most patients getting HD were older than sixty years of age. The age group of >50 years had the highest proportion of HBV-positive patients (16.1%), whereas the age group of 20 to 50 years had the highest percentage of HCV-positive patients (46.66%). The average age of patients with HBV infection was 50, whereas that of patients with HCV infection was 47. A significant portion of the individuals, 28 (43.75%), had dialysis of less than 50 times while 18 (28.1%) patients had dialysis of 50-100 times. On the other hand, the majority of the patients who tested positive for HCV (73.8%) and HBV (56.3%) also got HD 50 to 100 times. (Table 1,2, and Table 3) . Twenty-four individuals (37.5%) reported receiving dialysis once a month, 33 people (35.9%) reported receiving it three times a week, and 11 patients (17.18%) reported receiving it once a week. (table 4.) For HBV-infected individuals, the average dialysis stay was 27 months, but for HCV-infected ones, it took 30 months. For both HBV and HCV infections, the length of Hemodialysis revealed a vital risk factor ($P < 0.05$)(Table 5). The most common illnesses responsible for the majority of cases of end-stage renal disease were diabetes mellitus (15%), hypertension (21%), and chronic nephritis (35%)(Figure 1). A comparison of the demographic features of patients who were infected and those who were not revealed that the length of hemodialysis and the history of blood transfusions constituted significant risk variables ($P < 0.05$) for both individuals with hepatitis B and hepatitis C. In HCV-infected individuals, drug addiction was also significantly present ($P = 0.00005$); In HBV-infected individuals, drug addiction was not considerably present ($p>0.05$). Tattoos and body piercings were discovered in a small number of patients. While this was not significantly different ($P = 0.605841$), it was strongly related to Hepatitis B infection (with a significance = 0.0119), as presented in Table 6.

Table 1. Total number of dialysis (N=64)

No. of dialyzes	Participants N (%)
Greater than 50	28(43.75%)
50 to 100	18(28.1%)
100 to 200	12(18.75%)
More than 200	6(9.37%)
Total	64(100%)

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Table 2. Frequency of Hepatitis C about the total number of participants receiving dialysis

No. of dialyzes	Anti-Hepatitis C Virus screening results		Total
	Positive	Negative	
Greater than 50	6(21.4%)	22(78.5%)	28
50 to 100	7(38.8%)	11(61.1%)	18
100 to 200	4(33.33%)	8(66.6%)	12
More than 200	6	0	6

Table 3. Frequency of Hepatitis B Surface antigen about the total number of participants receiving dialysis

No. of dialyzes	Screening results of Hepatitis B surface antigen		Total
	Positive	Negative	
Greater than 50	4(13.7%)	25(86.20%)	29
50 to 100	5(26.3%)	14(73.6%)	19
100 to 200	0	11	11
More than 200	0	5	5

Table 4. Frequency of dialysis (N=64)

Frequency of dialysis	Participants N(%)
One time in a month	24(37.5%)
Weekly three times	23(35.9%)
Weekly one time	11(17.18%)
Two times weekly	6(9.3%)

Table 5: Duration of dialysis (in months)

Duration of dialysis in months		Value of P
Cases of Hepatitis B virus infections (N=9)	28	P<0.05
None infected cases of Hepatitis B virus (N=55)	21	
Cases of Hepatitis C virus infections (N=21)	31	
None infected cases of Hepatitis C virus (N=43)	15	

Table 6: Comparison of demographic features and risk factors in patients on HD with and without HBV infection (n=64)

	HBV-infected cases n=9 (14.0%)	HBV non-infected cases n=55 (85.93%)	P-value
Male n= 35(54.68%)	3(8.5%)	32(91.42%)	0.134796
Female n=29(45.31%)	6(20.6%)	23(79.31%)	P>0.05
Age in years			
Below 20 years n= 3(4.6%)	0	3	
20 to 50 years n= 30(46.8%)	4(13.33%)	26(86.6%)	
Above 50 years n=31(48.4%)	5(16.1%)	26(83.8%)	
Blood transfusion history n=30(46.8%)	7(23.3%)	23(76.6%)	0.027572
Body piercing/tattooing Positive history n=37 (57.81%)	2(5.4%)	35(94.5%)	0.0119
Drug addiction Positive history of n=24 (37.5%)	3(12.5%)	21(87.5%)	0.636288

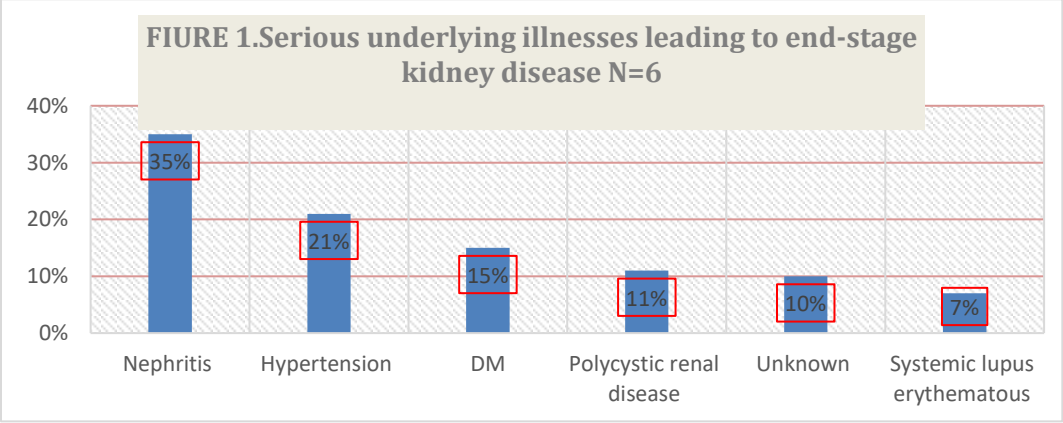

Figure 1. Serious underlying illnesses leading to end-stage kidney disease (N=6)

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This bar chart illustrates the distribution of underlying severe illnesses contributing to end-stage kidney disease among six patients. The illnesses include nephritis (35%), hypertension (21%), diabetes mellitus (DM) (15%), polycystic renal disease (11%), unknown causes (10%), and systemic lupus erythematosus (7%).

Discussion

Individuals with acute and persistent renal failure, permanent kidney damage, and other end-stage renal diseases (ESRD) lack functional kidney processes that eliminate waste from circulation. Because of this, they need an ongoing artificial system to purify their blood and eliminate dangerous nitrogenous wastes that may adversely affect their bodies in various ways.(14) Individuals with renal disorders who get dialysis are very susceptible to contracting infections from their parents due to their weakened immune systems and the large number of blood transfusions and invasive therapies they require. These individuals are more vulnerable to Hepatitis B surface antigen and Hepatitis C infections as a consequence of receiving frequent dialysis sessions.(11) Our study revealed that most positive individuals in the case of hepatitis B virus were females 6(66.6%). On the other hand, 13 (61.9%) of the patients who tested positive for HCV antigens were male. The findings are consistent with Salvatierra's research, which found that women made up 60% of HBsAg-positive patients while men made up 82.35% of cases positive with HCV markers.(8) The age group of >60 years old had the highest proportion of HBV-positive people, whereas the age group of 41 to 50 years old had the highest percentage of HCV-positive individuals. The average age for individuals with HBV infection was 50, whereas that of patients with HCV infection was 47. On the other hand, according to a Bhaumik study, 83.33% of anti-HCV-positive participants and 66.7% of HbsAg-positive patients were aged between 21 and 40.(15) The key factor influencing these variances is compliance with recommended infection control practices. Strict attention to infection control procedures will also lower HCV and HBV prevalence rates in these individuals. According to our research, the most significant number of patients—28, or 43.75 percent—had dialysis less than 50 times, while the lowest number—6 (9.37 percent)—had dialysis more than 200 times. This is consistent with research conducted in Pakistan by Khashia et al.(11) Of the 64 subjects in the present study, 21 (32.8.0%) had positive anti-HCV antibodies, while 9 (14.0%) had positive HBsAg findings. According to Pakistani researchers Khashia et al., 10.6% of individuals with HD tested positive for HBsAg, whereas 25.53% tested positive for HCV.(11)

According to Bhaumik's research, 7.3% of individuals with dialysis tested positive for HBsAg, whereas 12.1% tested positive for HCV.(15) These differences mainly depend on how well regular infection control procedures are followed. Strict attention to infection control procedures will lower these patients' HBV and HCV prevalence rates. Twenty-four people (37.5%) in our evaluation reported receiving dialysis "once a week," while 23 people (35.1%) reported receiving it "thrice a week." According to research by Jamil, most people (69.82%) had dialysis once a week, while 14.40% and 0.79% had it twice or three times a week. The individual's needs determine 18 Dialysis frequency. Participants with many dialysis sessions are more vulnerable to HCV & HBsAg infection. Dialysis took an average of 27 months for HBV-positive patients and 30 months for HCV-infected patients. The two viruses' length difference was statistically significant ($P < 0.05$). In research by Tajbakhsh, the mean dialysis duration for HBV-positive patients was 29 months. Still, it was 95.72 months for HCV-infected patients.(16) Consequently, the length of HD plays a crucial part in developing both HCV and HBV infections. Chronic nephritis accounted for 35% of the significant primary disorders in the current research, with hypertension coming in second at 21.66% and diabetes mellitus at 15%. This is consistent with research by Prakash et al.20, which found that diabetes mellitus (24.7%), hypertension (22.58%), and chronic nephritis (33.33%) were the main primary illnesses causing end-stage kidney disease (ESKD). According to research by Badareen, the three central primary disorders that lead to end-stage renal disease (ESRD) are Type 2 diabetes (33.7%), hypertension (23.8%), and nephritis (6%).(17)

In our study, blood transfusion was revealed to be a significant risk factor (significance = 0.027572) for both HBV and HCV infections ($P = 0.023804$). Most blood transfusion patients (19/63.3%) were positive for HCV, which is consistent with an assessment by Engle et al.(18) Positive HBsAg and anti-HCV antibody levels are also significantly correlated ($P < 0.05$) with the rate of blood transfusions, according to another Prakash research.(19) In his research, Haimik found that every patient who tested positive for HIV had previous experiences with blood transfusions; conversely, none of the individuals who had never undergone blood transfusions tested positive for HBsAg or anti-HCV.(15)

Therefore, among dialysis patients, blood transfusions may be a significant source of HBV/HCV. Thus, even if these techniques are costly, screening by PCR or test for nucleic acids must be considered in blood banks for better outcomes.(20) The current study showed that body piercing & tattooing were significantly associated with HBV infection ($P = 0.0119$) but not significantly associated with HCV infection ($P = 0.605841$). However, body piercings and tattoos were not shown to be substantially linked to HBV and HCV infections in an article by Prakash.(19) Tattoos and body piercings are linked to a two to three times higher risk of contracting hepatitis C, per research by Alkhan.(14) This may be the result of contaminated dyes or inadequately sanitized equipment. The results of our study indicated that previous experience of dependence on drugs was not substantially linked with HBV ($P = 0.63$). Still, it was strongly connected with HCV seropositivity (with a significance = 0.000051).(14) However, according to a study by Alkhan(14), the primary way that HCV spreads in wealthy nations is through intravenous drug use. When treating individuals undergoing dialysis, primary care physicians must focus on identifying potential risk factors and providing necessary guidance to individuals with HBV and HCV infections, as these infections are the primary cause of death and morbidity among these individuals.

Conclusion

The current study concluded that the frequency of hepatitis B seropositivity was 14.0%, while that of hepatitis C was 32.8.0% among participants undergoing dialysis. Viral

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hepatitis is a severe health risk for hemodialysis patients, especially in underdeveloped nations. Controlling Hepatitis B infection within HD units can be achieved by immunization, strict adherence to universal precautions, and segregation of HBV-positive patients. On the other hand, the lack of a particular vaccination and nosocomial viral transmission make Hepatitis C more dangerous.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
It is approved by the department concerned. (IRBEC-923727/22)
Consent for publication
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Conflict of interest

The authors declared an absence of conflict of interest.

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