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VIRAL HEPATITIS C AMONG HEMODIALYSIS PATIENTS PRESENTING AT DR. AKBAR NIAZI TEACHING HOSPITAL ISLAMABAD



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Abstract

Background: Hemodialysis (HD) is the primary treatment modality for patients with end-stage renal disease (ESRD) worldwide. Among HD patients, bloodborne infections—particularly hepatitis C virus (HCV)—are a major cause of morbidity and mortality. This study aimed to determine the prevalence of HCV among individuals undergoing HD and to identify the key associated risk factors.

Methodology: A total of 109 patients undergoing hemodialysis were included in this study, with an equal distribution of male and female participants. HCV infection status was assessed for each individual. Data analysis was conducted using SPSS version 21. Analysis of Variance (ANOVA) was used to interpret the results. Quantitative variables were summarized using means and standard deviations, while qualitative variables were presented as percentages.

Results: Among the 109 participants, 42 were female and 67 were male. HCV testing revealed that 18 males and 8 females were positive for active HCV infection, whereas 49 males and 34 females tested negative. The majority of the patients were from Bharakahu ($n = 35$), Abbottabad ($n = 23$), and Islamabad ($n = 18$). Other patients were from Fatehjang ($n = 1$), Khushab ($n = 1$), and Mardan ($n = 2$).

Conclusion: The study categorized populations based on their regional risk of acquiring HCV infection. The findings indicate that the overall prevalence of HCV infection among the study group was not significantly high. However, risk factors commonly associated with medical interventions were frequently observed, highlighting their relevance in the transmission of HCV among HD patients.

Keywords: Chronic diseases, Epidemiology, Hepatitis, Hemodialysis, High Risk, Probability, Viral markers

INTRODUCTION

Hepatitis C is caused by a single-stranded RNA virus from the Flaviviridae family. The virus, comprising approximately 9600 ribonucleotides, is associated with various human malignancies, including liver cancer and lymphoma (1). It is widely recognized that the prevalence of HCV infection is significantly higher among patients with end-stage renal disease (ESRD) compared to the general population (2). The hepatitis C virus was first isolated and cloned in 1989 (3).

HCV primarily causes liver inflammation, which can lead to severe liver damage (4). The incubation period of HCV ranges from two weeks to six months. Approximately 80% of infected individuals remain asymptomatic after the initial infection. Acute symptoms, when present, may include fever, fatigue, anorexia, nausea, vomiting, abdominal discomfort, dark urine, joint pain, and jaundice (5). In cases of chronic HCV, symptoms vary significantly between individuals. Some experience intermittent

symptoms, while others may suffer from persistent issues such as depression, anorexia, malaise, weight loss, and liver-related discomfort (6).

HCV is primarily transmitted through exposure to infected blood (7). Common modes of transmission include sharing needles or syringes, transfusion of unscreened blood, reuse of medical equipment without proper sterilization, and improper hygiene in surgical or hospital settings. Although less common, the virus can also be transmitted from mother to child during childbirth, or through saliva and sexual contact (8).

Several risk factors contribute to HCV infection, including blood transfusions, being born to an HCV-positive mother, intravenous drug use, hemodialysis, incarceration, and receiving unauthorized tattoos (9). The use of non-sterile medical instruments during surgical or dental procedures and reusing injection equipment previously exposed to HCV are among the most cited contributors (10).

Chronic fatigue syndrome is frequently diagnosed in individuals with hepatitis C. Because the liver lacks nerve endings, organ-specific symptoms often remain unnoticed until cirrhosis becomes severe. Despite the absence of symptoms, infected individuals can still transmit the virus. HCV-associated cryoglobulinemic vasculitis increases B-cell activation and proliferation, decreases B-cell apoptosis, enhances autoreactive T1 cell activity, and reduces regulatory T cell function (11). The infection is also associated with direct cytopathic effects, persistent inflammation, immune complex deposition, and chronic kidney disease. Furthermore, HCV can impair insulin signaling pathways such as the p13-AKT pathway, reduce Glut2-mediated hepatic glucose uptake, increase levels of TNF, G6P, and resistin, and lead to imbalances in adipocytokine profiles, liver steatosis, and pancreatic β -cell dysfunction (12).

Diagnosis of HCV involves multiple steps. Initial screening is conducted through serological testing for anti-HCV antibodies to determine prior exposure (13). If the result is positive, a nucleic acid test (NAT) for HCV RNA is required to confirm chronic infection and assess the need for treatment (14). This is crucial, as nearly 30% of HCV-infected individuals recover without medication, although anti-HCV antibodies remain detectable post-recovery (15). Point-of-care NAT tools can also detect HCV RNA in clinical or laboratory settings. Evaluating liver damage—via biopsy or non-invasive methods—is essential to determine the extent of fibrosis or cirrhosis. The degree of liver damage guides treatment decisions and disease management. Early diagnosis is critical for limiting complications and controlling viral transmission. The World Health Organization (WHO) recommends routine HCV testing, especially in high-prevalence areas, along with access to prevention, care, and treatment services (16).

HCV infection is frequently observed in dialysis patients and is linked to elevated morbidity and mortality rates (17). Studies using the Dialysis Outcomes and Practice Patterns Study (DOPPS) data have shown consistent trends in the incidence, prevalence, and associated risk factors of HCV among hemodialysis patients. Between 2012 and 2015, HCV prevalence among dialysis patients was estimated at around 10%. Countries such as China, Japan, Italy, Spain, and Russia showed moderate prevalence, ranging from 4% in Belgium to 20% in Middle Eastern regions. Over time, HCV rates declined in most countries that participated in multiple DOPPS phases, with an estimated 5% prevalence in newly initiated dialysis patients. Meta-analyses indicate that HCV prevalence is 6.2% in the general population, 34.5% in high-risk clinical groups, 12.8% in intermediate-risk groups, 16.9% in condition-specific clinical populations, 55.9% among liver disease patients, and 53.6% in drug users (18, 19). Among the most commonly observed risk factors in epidemiological analyses are those linked to medical procedures. In Pakistan, an alarming statistic reveals that approximately one in every twenty individuals is affected by HCV, highlighting a critical public health concern (20).

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted at Dr. Akbar Niazi Teaching Hospital, Islamabad, to assess the prevalence of hepatitis C virus (HCV) among patients undergoing dialysis. Ethical approval for the study was granted by the Institutional Review Board (IRB) of Islamabad Medical & Dental College (IMDC), under IRB letter No.101/IMDC/IBR-2023, prior to the commencement of the research. The study was carried out specifically in the Dialysis Ward of Dr. Akbar Niazi Teaching Hospital.



The sample size was determined using the WHO sample size calculator, based on the average prevalence data from relevant studies conducted over the previous five years. The parameters set included a 95% confidence level, a 5% margin of error, and an assumed population proportion of 60%. A total of 109 dialysis patients from various cities and districts receiving treatment at the hospital provided blood samples for the study. All participants gave informed consent prior to inclusion.

INCLUSION AND EXCLUSION CRITERIA

Patients aged 18 to 65 years with normal hemoglobin levels, a pulse rate between 59 to 100 beats per minute, body weight ≥ 50 kg, normal blood pressure readings, elevated levels of ALT and AST, history of dental procedures, needle-stick injuries, or blood transfusion were included in the study. Exclusion criteria involved patients with a recent history of vaccination or those currently undergoing antiviral therapy.

For sample collection, 2–3 ml of venous blood was drawn from each participant with consent. The blood was collected into test tubes containing either EDTA or heparin as anticoagulants. The samples were centrifuged at 2000 RPM for 3 minutes to obtain clear plasma or serum. Only non-hemolyzed samples were processed further. These were stored at refrigeration temperatures (2–6°C), while hemolyzed samples were first brought to room temperature before handling.

STATISTICAL ANALYSIS

Data analysis was conducted using SPSS version 21. The Analysis of Variance (ANOVA) test was employed to evaluate the dataset. Quantitative variables were expressed as means with standard deviations, whereas qualitative variables were summarized using percentages. The findings were illustrated using bar charts, pie charts, and tabulated data.

RESULTS

A total of 109 patients undergoing dialysis were included in this study. Among them, the majority were male ($n = 67$), while female patients accounted for 42 ($n = 42$). Participants were recruited from various geographic regions to evaluate the prevalence of HCV among hemodialysis patients. The highest number of participants were from Bhara Kahu ($n = 35$), followed by Abbottabad ($n = 23$) and Islamabad ($n = 18$). The lowest representation was from Fateh Jang ($n = 1$), Khushab ($n = 1$), and Mardan ($n = 2$), with the complete regional distribution detailed in Table I.

Table I. Regional distribution of the participants of the study

City/District	Frequency (n)	Percent %
Islamabad	18	16.5
Mardan	2	1.80
Abbottabad	23	21.1
Rawalpindi	4	3.70
Bharakahu	35	32.1
AJK	9	8.30
Murree	11	10.1
Khushab	1	0.90
Sargodha	2	1.80
Mianwali	2	1.80
Hangu	1	0.90
Fatehjang	1	0.90
Total	109	100.0

Regarding the history of previous HCV infection, 8.3% of the patients reported a prior positive HCV diagnosis, whereas 91% had no known history of infection. The cumulative percentages are presented in Fig. 2.

Of the 109 patients tested during dialysis, 26 individuals (23.85%) were found to be HCV-positive, while 83 individuals (76.14%) tested negative. In the current study, 109 patients were included for detecting

any previous history of HCV, of which 8.3% were positive, and 91% were negative. The cumulative percentage is shown below in Table II.

As per our study, 109 patients were tested for HCV undergoing the dialysis procedure, out of which (n=26) were HCV positive and (n=83) were HCV negative. The frequency is mentioned in Table II.

Table II. Patients with previous history of HCV and dialysis procedure

Status	Frequency (n)	Percentage
Previous history of HCV		
Yes	9	8.3%
No	100	91%
Total	109	100%
Undergoing the dialysis procedure		
Yes	26	23%
No	83	73%
Total	109	100%

Additionally, patients were asked about lifestyle habits, including alcohol consumption and smoking. Only 2 patients reported both drinking and smoking, while the vast majority (n = 107) denied any such habits (Table III). The data of patients taking steroids and family history of dialysis are also outlined in Table III.

Table III. The history of patients with drinking alcohol & smoking, patients on steroids and patient's family history of dialysis

Status	Frequency (n)	Percentage
History of drinking alcohol & smoking		
Yes	2	1.8%
No	107	98.2%
Total	109	100%
Patients on steroids		
Yes	0	0%
No	109	100%
Total	109	100%
Family history of dialysis		
Yes	10	9.1%
No	99	90.8%
Total	109	100%

A regression analysis was conducted to evaluate the potential association between gender and HCV prevalence. The dependent variable (HCV status) showed a 0.079 level of impact; however, the independent variable (gender) did not demonstrate a statistically significant relationship with HCV prevalence. This suggests that while there may be differences in prevalence between males and females, gender alone was not a significant predictor in this cohort.

DISCUSSION

The findings of our study align with those of several previously conducted investigations across different regions of Pakistan. In our study, a total of 109 dialysis patients were evaluated for hepatitis C virus (HCV) infection. Among these, 26 patients (23.85%) tested positive for HCV, while 83 (76.15%) tested negative. The majority of participants were male (67; 61.5%), and 42 (38.5%) were female.

A comparable study was conducted at the Institute of Child Health, Lahore, which included 60 patients undergoing dialysis irrespective of age or gender. Among them, 17 (28.33%) were female and 43 (71.66%) were male. The study revealed that 12 out of 47 patients undergoing hemodialysis (25.53%) were HCV-positive, a prevalence rate closely mirroring our own findings (21).

Another study at Ayub Teaching Hospital in Abbottabad involved 480 dialysis patients—198 females and 282 males. A total of 140 patients (29.17%) tested positive for HCV when combining molecular and serological test results (22). Again, this rate is consistent with our study's HCV positivity rate of 23.85%.

Additionally, a multi-center study conducted in Khyber Pakhtunkhwa (KPK) examined 953 dialysis patients. The results showed that 169 patients (17.7%) were HCV-positive, 31 (3.3%) tested positive

for hepatitis B virus (HBV), and 8 patients (0.8%) were co-infected with both HBV and HCV (23). Although the HCV prevalence in this study was slightly lower than ours, the findings still underscore the significant burden of viral hepatitis in the dialysis population.

In Peshawar, a related study was conducted at Lady Reading Hospital where 200 dialysis patients were tested. The study showed that 37% were positive for anti-HCV antibodies and 8% tested positive for anti-HBV antibodies. Among this cohort, 39% were female and 61% were male (24). These results further support our study's observation that a substantial proportion of the dialysis population is at risk for HCV infection, particularly among males.

Collectively, these comparative studies highlight the persistent and widespread nature of HCV infection among dialysis patients in Pakistan. The relatively high prevalence rates observed can be attributed to multiple factors, including inadequate sterilization practices, reuse of medical equipment, lack of standardized infection control procedures, and the frequent need for blood transfusions among end-stage renal disease patients.

Our study, in line with previous research, emphasizes the urgent need for rigorous screening, preventive measures, and awareness programs targeted at reducing the burden of HCV among hemodialysis patients. Implementation of strict infection control protocols, regular HCV screening, and training for healthcare personnel in dialysis units is crucial for reducing transmission and improving patient outcomes. The data of this study is limited because only one tertiary care hospital was included which restrict the venerability of the findings to other setting or population of Pakistan.

CONCLUSION

This study involved 109 dialysis patients, comprising 67 males and 42 females, representing diverse geographic regions including Bhara Kahu, Abbottabad, and Islamabad. Among these participants, 26 patients tested positive for HCV, while 83 tested negative. The overall prevalence of HCV among this hemodialysis population was relatively low. However, the findings underscore the heightened vulnerability of dialysis patients to HCV infection due to compromised liver and kidney functions. Continuous monitoring, early detection, and preventive strategies remain critical to minimizing the burden of HCV in this high-risk group.

Recommendations:

Given the elevated risk of hepatitis C virus (HCV) infection among dialysis patients, it is recommended that nucleic acid testing (NAT) be routinely implemented for early and accurate diagnosis. NAT is considered the gold standard for detecting transfusion-transmitted infections and can significantly improve early identification and intervention. Furthermore, future studies should aim to include data from multiple healthcare institutions to improve the generalizability and reliability of findings across broader populations.

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