

Hepatitis C Virus Frequency in Hemodialysis Patients at A Tertiary Care Facility in Rawalpindi, Northern Pakistan

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ABSTRACT

Objective: To detect the frequency of anti-HCV antibodies in hemodialysis patients.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of Virology, Armed Forces Institute of Pathology, Rawalpindi Pakistan, from Jul to Dec 2021.

Methodology: One hundred and fifteen patients were selected from the Hemodialysis Centre. Blood samples were taken from patients undergoing hemodialysis to detect anti-HCV by enzyme-linked immunosorbent assay. The samples were spun up and checked for anti-HCV antibodies using the Bio-Rad Monolisa anti-HCV version 3 kit and a 3rd generation ELISA.

Results: A total of 115 patients were tested for anti-HCV. The anti-HCVs in this study were detected in 34(29.56%) patients. The mean duration of hemodialysis was 2.3±1.4 years. Out of 115 patients, 81(70.4%) had no significant history. Of the 34 positive patients, 15(44.2%) had a history of intravascular exposures, 12(35%) had a history of blood transfusion, 3(8.8%) had a history of tooth extraction surgery during the dialysis period, and 4(11%) had a history of minor surgery during dialysis.

Conclusion: The study emphasizes the significant frequency of HCV infection in hemodialysis patients, particularly those with a history of intravenous exposure and blood transfusions.

Keywords: anti-HCV, Blood transfusion, Chronic kidney disease, hemodialysis.

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INTRODUCTION

Hepatitis C virus (HCV) infection is a common occurrence in patients undergoing hemodialysis, and it poses a significant risk of liver disease such as cirrhosis and hepatocellular cancer.¹ According to the World Health Organisation (WHO), an estimated 58 million people suffer from chronic HCV infection, with 1.5 million new cases reported in 2022.²

Acute HCV infections, which are usually asymptomatic, account for approximately 15% of cases, while 80-85% present as chronic HCV infections³. Patients undergoing hemodialysis are at a higher risk of HCV infection than the general population, which significantly impacts their life expectancy and overall health outcomes⁴. HCV infection in hemodialysis patients varies among countries, with developed countries reporting lower frequency rates ranging from 1.4% to 28.3% and developing countries reporting higher frequency rates ranging from 4.7% to 41.9%⁵. The main risk factors contributing to increased HCV transmission in

hemodialysis patients include the mode of dialysis, blood transfusions, multiple hospitalisations, and the long duration of hemodialysis. Other factors, such as organ transplantation, excessive exposure to intravenous procedures, and comorbidities, also increase the risk of HCV infection⁶.

The number of HCV infections in dialysis patients has gone down recently, according to studies. This is because of using screened blood products, putting in place infection control measures, reducing the number of times dialyzers are used, and putting anti-HCV-positive patients on separate, dedicated dialysis machines⁷. Patients undergoing peritoneal dialysis are at a lower risk of HCV infection than those undergoing hemodialysis. However, the risk of HCV infection increases with time on dialysis, particularly after five years, and a high frequency is observed in centres with more HCV-infected patients undergoing dialysis^{8,9}.

This study aims to determine the frequency of anti-HCV in hemodialysis patients in Rawalpindi, Northern Pakistan, to evaluate the disease burden within this patient population and develop policies aimed at reducing HCV seroconversion among dialysis patients.

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METHODOLOGY

The cross-sectional study was carried out at the Virology Department, the Armed Forces Institute of Pathology (AFIP), from July to December 2021 after approval from the Institutional Review Board (READ-IRB-21-624) was obtained. The sample size was calculated by using the WHO calculator taking the population of HCV among dialysis patients as 25%.⁶ In the study, the non-probability consecutive sampling technique was employed.

Inclusion Criteria: Patients of either gender, aged 18 to 85 years, undergoing hemodialysis, were included.

Exclusion Criteria: Patients with debilitating or critical disease, or who were unwilling to follow up, patients who tested positive for anti-HCV before starting dialysis were excluded.

Demographic data was taken after written informed consent. Patients were informed about the study's purpose, and written consent was obtained. A blood specimen of participants was drawn at the Armed Forces Institute of Pathology, Rawalpindi and transported to the Virology Department. The patient's clinical history was collected using a predesigned proforma. Samples were collected using aseptic techniques after the written consent of the patient. About 3 to 5 ml of blood was drawn into a clot activator tube. Samples were transported to the Virology Department, AFIP, at a temperature range of 2–8 degrees Celsius. Specimens were centrifuged at 3500 rpm for 4 minutes to separate serum and analyzed for anti-HCV antibodies using the Monolisa anti-HCV Plus version 3 kit (Bio-Rad, USA). The optical density was analysed by an ELISA plate reader.

Statistical Package for Social Sciences (SPSS) version 25.0 was used for the data analysis. Quantitative variables with normal distribution were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages.

RESULTS

The study included 115 patients, out of them 34(29.5%) were found to be anti-HCV positive. Among the HCV-positive patients, 21(62%) were males and 13(38%) were females. The patients' mean age was 55.33±11.95 years, and the average duration of hemodialysis was 2.34±1.45 years.

Out of 115 patients, 81(70.4%) had no significant history. Of the 34 positive patients, 15(44.2%) had a history of intravascular exposures, 12(35%) had a

history of blood transfusion, 3(8.8%) had a history of tooth extraction surgery during the dialysis period, and 4(11%) had a history of minor surgery during dialysis. as shown in Figure. The number of hemodialysis centres used by HCV-positive patients also causes an increase in the frequency of HCV among hemodialysis patients (Table).

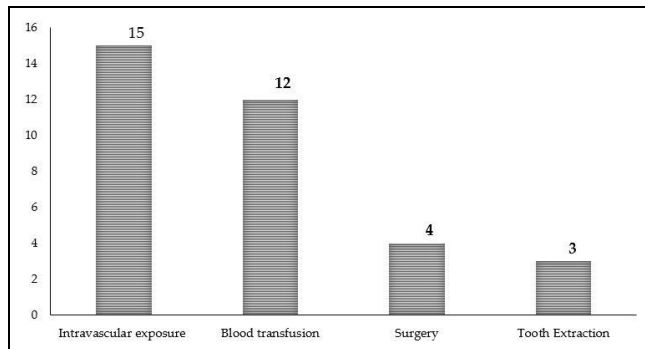


Figure: Frequency of risk factors among HCV Positive Patients (n=34)

Table: Number of Dialysis Centers Used by HCV Positive Patients (n=115)

Number Of Dialysis Center Used By The Patients	Number of Patients (Percentage)
Dialysis from 1 dialysis center	58(50.4%)
Dialysis from 2 dialysis centers	39(33.9%)
Dialysis from 3 dialysis centers	11(9.6%)
Dialysis from 4 or more dialysis centers	7(6.1%)
Total	115

DISCUSSION

According to our study, anti-HCV was detected in 29.56% of hemodialysis patients. Males had a higher frequency of anti-HCV than females. The long duration of hemodialysis, blood transfusions, and frequent intravascular exposures were the major contributing factors¹⁰. Jadoul *et al.* conducted a study in the USA that investigated the frequency of hepatitis C virus infection among hemodialysis patients. The study found that almost 10% of people got HCV. However, the number of people getting HCV went down over the next few years because of better screening for blood products, treatment with erythropoiesis-stimulating agents that cut down on the need for transfusions, and stricter preventative measures¹¹. However, in developing countries like Pakistan, where such facilities are limited, the HCV infection rates among hemodialysis patients continue to be comparatively high.

A study by Hinrichsen *et al.*¹² in Germany aimed to determine the frequency of HCV in patients

undergoing hemodialysis. The study found an overall HCV frequency of 6.1% among 2796 participants from forty-three dialysis centers, which was lower than the frequency found in the previous study. The low frequency in Germany was probably due to the overall decrease in the frequency of hepatitis C in the country. Patients' use of multiple dialysis centers may have contributed to an increase in frequency in the previous study. Contrary to the previous study's findings, Kerollos *et al.* conducted a study in Egypt that found a hemodialysis patient's HCV frequency was 34.8%.¹³ The study found that blood transfusions and medical personnel's handling of supplies were significant contributing factors to the high frequency of HCV.

Similarly, a study conducted by Qorbani *et al.* in Iran found a frequency of anti-HCV of 11%, which is lower than the previous study's results¹⁴. One possible reason for the higher frequency in the previous study could be a relatively smaller sample size as compared to the much larger sample size in the Iranian study. A larger sample size may provide a more accurate estimate of the true frequency of HCV infection in the hemodialysis patient population.

A study organised by Gao *et al.* in China showed anti-HCV in 41.1% of patients¹⁵. The frequency of HCV infection among hemodialysis patients may also differ between China and Pakistan due to differences in healthcare practices, public health programmes, and socioeconomic factors. Another study conducted in Puducherry, India, in a tertiary care hospital showed HCV frequency in hemodialysis patients at 13.2%, which was lower than the previous study¹⁶. This may be due to better adherence to universal and transmission-based precautions, the use of dedicated machines, and regular hemodialysis surveillance. Khan *et al.* conducted a study in Pakistan that found anti-HCV present in 32.33% of hemodialysis patients¹⁷. The results of the study were comparable to those of the previous study. Lodhi *et al.* conducted a study in Quetta to analyse the main risk factors that contributed to HBV, HCV, and HIV infection in patients with renal failure. In this study, hemodialysis patients had a 43.2% frequency of HCV¹⁸. The disparity in frequency estimates between this study and the results of our study was probably due to differences in the sample sizes of the studies.

CONCLUSION

In conclusion, the study revealed a significant frequency of HCV infection among hemodialysis patients. The findings suggest that hemodialysis patients are at risk of

HCV infection, especially those with a history of frequent intravenous exposure and blood transfusions. The study highlights the need for increased measures to ensure the safety of hemodialysis procedures and minimise the risk of disease transmission. By implementing effective infection control measures and ensuring appropriate screening and monitoring of patients, the spread of HCV infection in hemodialysis units can be minimised, providing safer and more effective care for patients undergoing hemodialysis.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

MAR, MKS: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

EG, SKN: Study design, drafting the manuscript, critical review, approval of the final version to be published.

FA, HH: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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