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Prevalence of Hepatitis C Virus among Haemodialysis Patients in a Tertiary Care Centre

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A B S T R A C T

Hepatitis C virus infection in hemodialysis patients is mainly associated with prolonged vascular access, and contaminated equipment and as well as due to breakdown of universal precautionary procedures.The study aims on the prevalence of Hepatitis C Virus among hemodialysis patients by Enzyme Linked Immunoassay (ELISA) and Quantitative Hepatitis C RNA real Time PCR. This retrospective record-based study is done from January 2023to December 2023, A total of 191 patients on maintenance haemodialysis were screened and tested for anti-HCV antibodies by 3rd generation ELISA and quantitative HCV RNA detection by real time-PCR as per CDC guidelines. Out of 191, Anti-HCV antibodies were positive in 27patients, comprising 20 (74%) males and 7 (26%) females. HCV RNA was detected in 20patients, 16(80%) males and 4(20%) females, with highest prevalence among 41-60 years (55%). This study can help health professionals to treat patients with HCV on hemodialysis more effectively. Also reinforces the need for establishing effective prevention programs, which could lead to a reduction in the prevalence of HCV among patients on hemodialysis. In the absence of vaccine, routine screening and adherence to standard testing protocol for current HCV infection, infection control practice is the key strategy for preventing HCV transmission in hemodialysis units.

Introduction

Hepatitis C virus is a single stranded positive sense RNA virus that belongs to the Family Flaviviridae, Genus Hepacivirus (Flamm, 2003). The world health organization (WHO) estimates the universal prevalence of HCV infection around 3% (Sy and Jamal, 2006; Makhlough *et al.,* 2013). The prevalence of HCV in Haemodialysis patients ranges from 6- 60% whereas in India various studies show a prevalence of 4.3% to 45% (Agarwal *et al.,* 2009). The risk factors for spread of hepatitis C virus is blood transfusion, chronic dialysis, I.V drug abusers, contact amongst health care staff, Implantation procedures, during surgical and dental procedures, unsafe sex and vertical contact.

Patients with renal failure on dialysis are at huge risk for blood-borne infection due to long-term vascular contact and the possibility of contact to other uninfected patients as well as dialysis equipment (Yen *et al.,* 2003; Strader *et*

al., 2004). The worldwide data suggest that the prevalence of hepatitis viruses among chronic renal failure patients could be as high as 80% (Koirala *et al.,* 2009; Aman *et al.,* 2015) that causes hepatitis and can lead to serious liver complications, including cirrhosis and hepatocellular carcinoma, particularly in patients undergoing haemodialysis, in whom immunity is habitually low. Patients with chronic renal diseases undergoing haemodialysis are recommended to be screened for HCV infection. Currently, the HCV diagnosis is made by two main methods that includes detection of anti-HCV using enzyme-linked immunosorbent assay, which determines a present or resolved past infection, and detection of HCV-RNA in serum via PCR method (CDC, 2013), which indicates an active infection. Detecting reactive antibody against HCV using ELISA is the common screening test for HCV infection, but it has limitations. The prolonged window period and delayed production of anti-HCV in such patients under immunosuppression result in false negatives (Lok *et al.,* 1993). In contrast, HCV RNA does persist in serum and is easily detectable in patients with impaired immune functions such as the ones underwent chronic haemodialysis within the first 2 weeks of infection. The current study aimed at evaluating the prevalence of HCV infection in a haemodialysis patients, and comparing serological (ELISA) and molecular (HCV RNA PCR) methods to detect HCV infection.

Materials and Methods

This retrospective hospital record- based study was carried out by the Department of Microbiology in collaboration with Department of Nephrology tertiary care hospital, KAPV Government Medical College, Trichy, Tamil Nadu, India. Clinical, demographic and geographical data of the renal disease patients admitted to our hospital for haemodialysis was collected from WHONET software for a period of 1 year (January 2023 to December 2023). A total of 191 patients on hemodialysis were studied. The study protocol was approved by our Institutional Ethical Committee.

Inclusion Criteria

Patients attending hemodialysis unit
Age > 18 years includes both gender

Exclusion Criteria

Pregnant women

Patients less than 18 years of age

All the samples were screened for anti-HCV antibodies by 3rd generation HCV Erba Lisa HCV Gen3 according to the manufacturer's instructions. If the sample is reactive for HCV antibodies, further the samples were processed for quantitative HCV RNA PCR by Real time PCR using MY LAB PCR kit. In general all the patients undergoing haemodialysis in our tertiary care hospital were screened for HCV infection.

Results and Discussion

In this retrospective study, we studied the prevalence of hepatitis C infection, in patients who were admitted to our hospital for hemodialysis for the past one year from January 2023 to December2023.A Total of 191 samples were screened for Anti-HCV antibodies as per CDC guidelines and were positive for Anti-HCV antibodies in 27 patients, comprising 20(74.07%) males and 7 (25.92%) females. The highest prevalence was found in the age group of 41-60 years (48.14%%). Further these27Anti-HCV antibodies positive samples were subjected to HCV RNA PCR, 20patients were turned positive. And out of these 20, 16(80%) males and 4(20%) females with highest prevalence among 41-60 years (55%).

This research studied the prevalence of HCV infection inpatients on haemodialysis, based on the HCV ELISA results and retesting the seropositive samples by HCV RNA PCR assay. We report a 14% prevalence of HCV infection in 191 patients on haemodialysis by ELISA and 10% by RNA PCR assay. In this study HCV RNA was detected in 72% seropositive samples which correlates with the study done by Masuko *et al.,* (1994). Some of these cases may be considered either as patients with past infections or intermittent viraemia status. Our study suggests that HCV infection in dialysis patients can be diagnosed more accurately if these patients are tested using two diagnostic methods as per CDC guidelines - a serological test and a molecular assay because if in case HCV antibody reactive by ELISA, HCV RNA not detected by PCR it indicates no current HCV infection. If distinction between true positivity and biologic false positivity for HCV antibody is desired, and if sample is repeatedly reactive in the initial test, test with another HCV antibody assay is recommended. In certain situations, follow up with HCV RNA testing and appropriate counselling is preferred.

Table.1 All collected data was analysed with WHONET software.

Test	Positive	Percentage
Total Patients Screened	191	
Anti HCV antibody	27	14.13%
HCV RNA Real time PCR	20	10.47%

Table.2 Sex Wise Distribution

Sex	Number	Percentage
Male	133	69.63%
Female	58	30.36%
Total	191	

Table.3 Age Wise Distribution

Age	Number	Percentage
18-40	65	34.03%
41-60	93	48.69%
61-80	33	17.27%
TOTAL	191	

Table.4 Sex Distribution for HCV Antibody Positive Cases

Sex	Numbers	Percentage
Male	20	74.07%
Female	7	25.92%
Total	27	

Table.5 Age Wise Distribution for HCV Antibody Positive Cases

Age	Number	Percentage
18-40	11	40.74%
41-60	13	48.14%
>60	3	11.11%
TOTAL	27	

Table.6 Sex Distribution for HCV RNA PCR Positive Cases

Sex	Numbers	Percentage
Male	16	80%
Female	4	20%
Total	20	

Table.7 Age Distribution For HCV RNA PCR Positive Cases

Age	Number	Percentage
18-40	7	35%
41-60	11	55%
>60	2	10%
Total	20	

In the absence of vaccine, routine screening and adherence to standard testing protocol for current HCV infection, infection control practices will remain the key strategies for preventing HCV transmission in hemodialysis units.

HCV infection in these patients is typically associated with high morbidity and mortality; however, the early detection of HCV may retard disease progression and transmission and also reduce the morbidity and mortality.

Our study concludes that due to the absence of vaccine for hepatitis c virus, regular screening of patients for HCV is an absolute necessity for early detection of HCV infection that could result in better management of patients and also stresses the importance of HCV RNA detection by PCR in screening for HCV infection in these patients. Strict adherence to universal precautions, use of dedicated machines along with regular surveillance for HCV in HD units will dramatically decrease the risk of transmission of HCV.

Author's Contributions

All authors mentioned here have made a significant, direct and intellectual contribution to the work, and approved it for publication.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval The study was approved by the Institutional Ethics Committee, KAPV Government Medical College, Trichy, India.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests.

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