

SEROPREVALENCE OF HCV INFECTION AMONG PATIENTS IN A TERTIARY CARE HOSPITAL IN BANGALORE

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ABSTRACT

BACKGROUND

Hepatitis C virus (HCV) is a parenterally transmitted hepatitis virus infecting approximately 3% of the world population. Chronic infection with HCV is one of the major causes of liver cirrhosis and hepatocellular carcinoma. A high prevalence of HCV infection in haemodialysis patients has been reported.

Aims and Objectives- To determine the prevalence of HCV by antibody testing among patients, with special reference to patients undergoing haemodialysis.

MATERIALS AND METHODS

Total number of 700 patients attending the OPD (out of whom 37 were on dialysis) were screened for HCV seropositivity using the HCV TRI-DOT card test and Cobas Anti-HCV II assay.

Statistical Analysis Used- Percentages and Chi-square test.

Settings and Design- It is a prospective study conducted at a tertiary care hospital in Bangalore. The study was conducted between December 2014 and May 2015.

RESULTS

Out of 700 individuals tested during the study period, 59 (8.4%) were tested positive for HCV antibodies. HCV seropositivity was found in 31/37 (83.8%) haemodialysis patients and 28/663 (4.2%) non-haemodialysis patients with a significant p value of <0.05. Out of total positives, there were 14 female patients (23.7%) and 45 male patients (76.3%). There was a high rate of seropositivity in patients between 51-60 years of age (27.1%). Mean duration of haemodialysis was three to four years and two to three dialyses were done every week. Liver enzymes Aspartate transaminase (AST), Alanine transaminase (ALT) levels were found to be elevated among three HCV positive haemodialysis patients and ten HCV positive non-haemodialysis patients.

CONCLUSION

This study showed a high seroprevalence among dialysis patients, with greater prevalence among males and in patients above 50 years of age.

KEYWORDS

Chronic Hepatitis, Hepatitis C Virus, Haemodialysis, Seroprevalence.

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BACKGROUND

HCV is a RNA virus belonging to Flaviviridae family, genus Hepacivirus. HCV affects patients who undergo multiple blood transfusions, intravenous drug users and those undergoing maintenance haemodialysis patients. HCV infection can lead to chronic hepatitis, liver cirrhosis and hepatocellular carcinoma.^{[1],[2],[3]} The success of current treatment of HCV is 11-30%. The dearth of an efficient vaccine emphasises the need for periodic surveillance of the disease to determine specific measures for disease prevention and control.^[4]

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Hence, a study was undertaken to estimate the seroprevalence of HCV in general population, with special reference to haemodialysis patients. Understanding the current seroprevalence of HCV in a tertiary care setup gives us an opportunity to assess a large population and provides insight into the discordant knowledge surrounding the prevention and precautions to prevent transmission of HCV, which in turn warrants stringent vigilance and education regarding precautions, prevention and treatment of HCV.

MATERIALS AND METHODS

It is a prospective study conducted at a tertiary care centre in Bangalore. The study was conducted between December 2014 and May 2015. Total number of 700 patients attending the General OPD and Urology OPD (out of whom 37 were on dialysis) were screened for HCV seropositivity. Blood samples were drawn from the patients and serum was separated within two hours after blood sampling. Each patient's sera were divided into two 0.5 mL aliquots. One sample was stored at -20°C and the test was performed with the second sample. The sera were tested for antibodies against HCV

proteins using the HCV TRI-DOT card test (J. Mitra & Co. Pvt. Ltd, India) and Cobas Anti-HCV II assay (Roche Diagnostics, USA).

Statistical analysis was done using percentages and Chi-square test.

RESULTS

Out of 700 individuals tested during the study period, 59 (8.4%) were tested positive for HCV antibodies. HCV seropositivity was found in 31/37 (83.8%) haemodialysis and 28/663 (4.2%) non-haemodialysis patients with P value of zero. [Table-1]. Out of total positives, there were 14 female (23.7%) and 45 male patients (76.3%). [Figure-1]. The seropositivity was found to be high in patients between 51-60 years of age (27.1%). [Figure-2]. Mean duration of haemodialysis was three to four years and two to three dialyses were done every week. Liver enzymes Aspartate transaminase (AST), Alanine transaminase (ALT) were evaluated among the positives, AST and ALT levels were found to be elevated among three HCV positive haemodialysis patients and ten HCV positive non-haemodialysis patients [Figure 3]. The comorbid conditions in haemodialysis patients include Type 1 and type 2 Diabetes Mellitus (45%), HTN- Hypertension (23%), CRF- Chronic renal failure (20%), Hepatitis B virus infection (7%) and HIV infection (5%). [Figure 4].

	Positive	Negative
Haemodialysis	31	06
Non-haemodialysis	28	635

Table I. HCV Seropositivity among Haemodialysis and Non-haemodialysis Patients

Year	Seroprevalence	Studies
1995-2000	0.87- 1.85%	Theodore et al, ^[5] Chowdhary et al ^[6]
2001-2005	2-7.9%	Khaja et al, ^[7] Arora et al, ^[8] Bhattacharya et al ^[9]
2006-2010	0.1-1 %	Arora D et al, ^[10] Bommanahalli et al ^[11]
2011-2015	1.17-1.8%	Vallab et al, ^[12] A. Chakraborty et al ^[13]

Table II. Seropositivity among General Population from 1995-2015

Year	Seroprevalence	Studies
1995-2000	4.3 - 28%	Mukhopadhy ^[1]
2001-2005	1.5 - 5.9%	Reddy et al ^[14] G A Reddy et al ^[15]
2006-2010	1.5%- 27.7%	Lavanchy et al ^[16] Jasuja et al ^[17]
2011-2015	1.1 - 33.4%	Kranthi et al ^[18] Mittal G et al ^[19] Malhotra R ^[20]

Table III. Seropositivity among Patients Undergoing Maintenance Haemodialysis from 1995-2015

Table II and Table III: Trends in HCV infection over a decade.

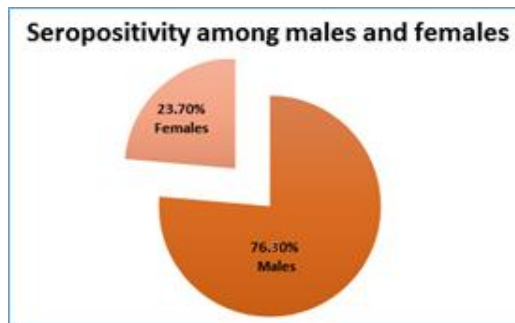


Figure 1. Gender Distribution of HCV Seropositivity

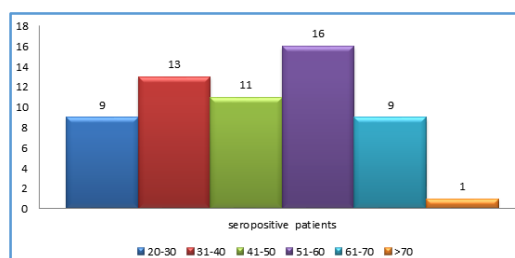


Figure 2. Age Distribution among Seropositive Patients

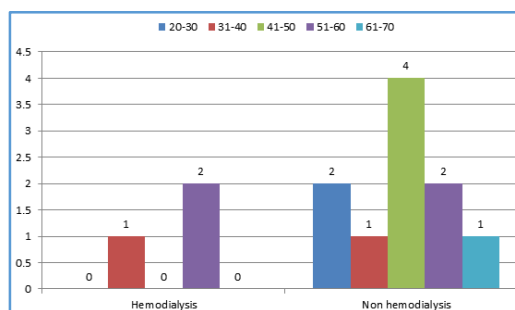


Figure 3. Status of raised Liver Enzymes (AST and ALT) among HCV Positive Patients

AST- Aspartate transaminase, ALT- Alanine transaminase

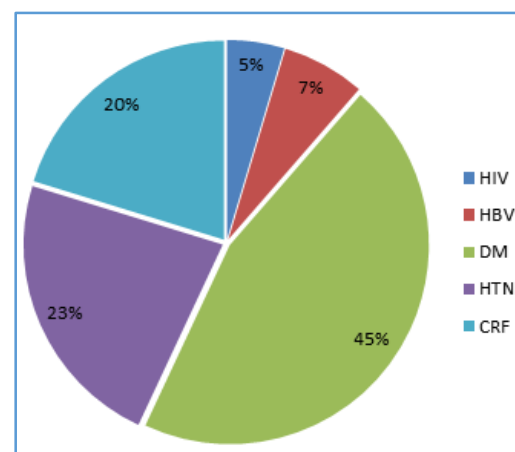


Figure 4. Comorbid Conditions in Haemodialysis Patients

HIV- AIDS, HBV- Hepatitis B virus, Type 1 and type 2 Diabetes Mellitus, HTN- Hypertension, CRF- Chronic renal failure.

DISCUSSION

Hepatitis continues to be a serious problem in chronic dialysis units even after the introduction of serological tests and vaccines for HBV infection and universal precaution standards. The available data suggests that HCV is a major

cause of NANB hepatitis throughout the world.^[21] The spread of HCV in haemodialysis units is declining, but the prevalence of HCV continues to remain high in this group of patients.^[4]

The overall HCV seroprevalence in our study was observed to be 8.4%. The seropositivity was found to be high in patients of age group 51-60 years (27.1%) with male preponderance (76.3%), which was similar to the studies done by Asima Banu et al and Kranthi Kosaraju et al^{[2],[11]} [Figure 1 and 2].

In some studies by Preeti et al and Mohammed Ali et al, gender had no correlation with anti-HCV antibodies.^{[4],[22]} The high prevalence of alcoholism (leading to chronic liver disease) among males may seem to contribute to higher seroprevalence of HCV. A higher number of males are blood donors compared to females, hence males are screened more often.^[4]

The seroprevalence of HCV in our study was found to be 83.8% in haemodialysis patients. Several studies from India and other countries have reported prevalence rates ranging from 1% to 68%,^{[23],[24],[25],[26]} Health care procedures related to nosocomial infections, unsafe drug injection practices, and blood transfusions are key factors in HCV transmission. In haemodialysis facilities, the most common lapses of healthcare quality are contamination of dialysis systems, inadequate disinfection and cleaning of environmental surfaces, improper contact of health care staff with equipment and patients and mishandling of parenteral medications. Although the precise modes of transmission have not been identified, breakdown in standard infection control practices, physical proximity to an infected patient and sharing of dialysis machines are possible causes for increased prevalence of HCV in haemodialysis patients. Therefore, strict adherence to universal precautions and careful attention to hygiene are recommended to reduce the transmission of HCV in dialysis units.^{[21],[11]}

Contradictory to our finding, other studies show prevalence of 1- 28%.^{[1],[21],[11],[26],[17]} This low prevalence can be attributed to the fact that the risk of acquiring HCV infection in haemodialysis units has decreased partially after the isolation of HCV positive patients in separated haemodialysis units. Chances of false positives or false negatives cannot be completely ruled out. Hence, we need to detect HCV RNA by PCR for confirmation.

Non-haemodialysis patients showed a seroprevalence of 4.2% which is in conformity with various other studies showing prevalence between 4 – 45%.^[4]

The mean duration of haemodialysis was two years compared to other studies which showed higher mean duration of six years by Mohammed Ali et al and 7.2 years by Jeffers et al.^{[22],[21]} HCV was found to be more prevalent among patients who had undergone haemodialysis for a longer duration owing to greater exposure over the years.

As seen in Figure- 3, our study showed raised AST and ALT levels among three HCV positive haemodialysis patients and ten HCV positive non-haemodialysis patients which is in consensus with other studies such as Fabrizio^[24] and Marinaki et al.^[27] Haemodialysis patients with chronic hepatitis due to HCV infection have serum aminotransferase levels which are at the upper limit but still within the normal range, although higher compared to HCV negative haemodialysis patients. There is no definite explanation regarding the lower transaminase levels observed in

haemodialysis patients, although several aetiologies have been postulated-

1. AST levels reflect the high metabolic activity of homocysteine due to its high values observed in haemodialysis patients and their correlation with low AST.
2. Haemodilution.
3. Vitamin B6 deficiency and Uremic toxins.
4. Dialysis procedure and activation of IFN- γ and lymphocytes.^[14]

Changing trends in HCV prevalence over past 20 years (as depicted in Table II and III) has shown decrease in percentage probably due to improved technology, safer techniques of blood transfusion and increased awareness regarding the disinfection of dialysis machines by improving the surveillance system of HCV, better education of nurses in the dialysis centres. However, despite reduction of hepatitis C prevalence, haemodialysis patients still comprise a high risk group.

Although the third generation ELISA is considered highly sensitive, a major drawback of this assay is that a substantial number of haemodialysis patients will still test negative for anti-HCV antibodies even with detectable hepatitis C viraemia.^[7] In addition to this, it is now well documented that the commercially available third-generation ELISA cannot be used to detect the viral infection in Indian patients owing to genotype variations.^[7] To overcome this problem, sensitive diagnostic peptide-based enzyme immunoassays that are cost-effective and designed to detect HCV infection in Indian patients have been developed. Presently, an indigenous peptide-based HCV EIA kit is available (Xcyton™, Bangalore, India). Significance of detection of HCV-RNA in patient sera by RT-PCR lies in the observation that a positive result in RT-PCR is indicative of active viral replication.^[7] Therefore, it would be pertinent to detect HCV-RNA by RT-PCR as it is the most sensitive and specific assay for HCV detection. However, due to hitherto undetermined prevalence, non-availability and financial constraints refrain us from performing the RT-PCR test.

CONCLUSION

This study showed a high seroprevalence among dialysis patients with greater prevalence among males and more frequently in the age group of 50 years and above. The risk is greater among haemodialysis patients as they frequently undergo blood transfusion. Simple measures such as enforced general asepsis rules, careful disinfection and equipment sterilisation, routine testing of patients, serial determination of hepatic enzymes should be the common practice in the dialysis centres.^[8]

Nonetheless, now, the Centres for Disease Control and Prevention (CDC) does not recommend dedicated machines, patient isolation, or a ban on re-use in haemodialysis patients with HCV infection.

The guidelines for preventing HCV infection in haemodialysis settings recommend fundamental infection control practices and routine screening of haemodialysis patients for HCV. Isolating HCV-infected patients or using dedicated machines for such patients are not advocated, except as necessary during local outbreaks.^[28]

Infection with HCV is unique and represents an enigma to the clinician for the simple reason that majority of the patients remain asymptomatic, with fluctuating liver enzyme

levels. Thus, rather than developing novel therapeutic strategies, development of a vaccine that can prevent the viral infection should be of paramount importance. A major impediment in this direction is the variation in the genome of HCV observed either as quasi-species or as genotypes.

A known HCV infected patient is the most important reservoir of infection. Therefore, prompt screening, strict adherence to universal precautions and educational programs to increase awareness about safe blood transfusion can contribute to reduce the burden of this disease.

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