

Case Study

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Seroprevalence of Hepatitis C Virus Infection among Chronic Kidney Disease Patients on Maintenance Hemodialysis in a Tertiary Care Hospital

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ABSTRACT

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HCV is a major cause of increased morbidity and mortality in patients with chronic kidney disease (CKD). Since, HCV is transmitted through blood and blood products prevalence of anti-HCV among Hemodialysis (HD) patients is consistently higher among them. Factors such as blood transfusion and frequent parenteral interventions have been shown to be associated with increased risk of HCV infection. A total of 107 blood samples were collected from CKD patients on maintenance hemodialysis in a tertiary care hospital and the sera separated, stored at -20° C and tested for anti-HCV antibodies by using third generation ELISA. Out of 107 CKD Patients 33 (30.8%) were positive for anti-HCV, of 33 seropositives 21 (63.6 %) were males and 12 (36.4%) were females. 19 (57.6%) out of 33 seropositives had received multiple blood transfusions and prevalence of HCV was higher among (75.7%) those patients who had undergone increased duration and number of hemodialysis. Hemodialysis patients should be routinely screened for HCV infection, preferably using serological methods. Strict adherence to universal precautions along with isolating HCV-infected dialysis patients might help to control disease spread in HD units.

Introduction

Hepatitis C virus (HCV) infection is a major public health problem with an estimated global prevalence of 3%. HCV is a major cause of increased morbidity and mortality in patients with chronic kidney disease (CKD) (Fabrizi F *et al.*, 1997).

HCV is a single stranded positive sense RNA virus belonging to the family Flaviviridae and genus Hepacivirus. Prevalence of anti-HCV antibody among Hemodialysis (HD) patients is consistently higher than in general population indicating increased risk of acquiring HCV infection among them. HCV is a blood borne virus and the most common modes of infection are through transfusion of

blood and blood products, unsafe infection practices and inadequate sterilization of medical equipments. A number of risk factors have been identified for HCV infection among dialysis patients, which includes prolonged vascular exposure, multiple blood transfusions, duration of end stage kidney disease, mode of dialysis, and the concurrent prevalence of HCV infection in the dialysis unit increase the risk of acquiring blood borne infections in these patients (Jasuja S *et al.*, 2009).

Patients who are undergoing dialysis should be routinely screened for HCV infections preferably using serological methods.

Development of diagnostic testing confirmed a high incidence and prevalence for HCV infections among HD patients. Currently, third-generation anti-HCV ELISA is largely in use and has shown greater sensitivity and specificity in patients on HD (Fabrizi *et al.*, 1997).

Hepatitis C Virus infection remains frequent in patient receiving long term dialysis both in developed and developing countries like India (Fabrizi, 2012). The prevalence of anti-HCV in patients on hemodialysis from India is reported to be in the range of 3-45% (Agarwal, 1999).

There is wide variation in the prevalence of HCV infection among different dialysis units and countries as shown by Dialysis Outcomes and Practice Patterns Study (DOPPS) (Froio *et al.*, 2003).

The prevalence of anti-HCV antibodies among dialysis patients was found to be 42% in France (Pragati Chigurupathi *et al.*, 2015), 75% in Moldavia (Covic *et al.*, 1999) and 49% in Syria (Othman *et al.*, 2001).

Incidence and prevalence of HCV infection among patients on dialysis is declining in Western countries. In US, incidence has decreased from 1.7% in 1982 to 0.2% in 1997 (Tokars *et al.*, 2000).

This decline is attributed to reduction in post-transfusion HCV infection with proper screening and implementation of universal precautions for infection control.

With this background and knowledge, this study was undertaken to determine the seroprevalence of HCV infection among chronic kidney disease patients undergoing maintenance hemodialysis in a tertiary care hospital.

Materials and Methods

A prospective study was conducted in a tertiary care hospital for a period of 3 months from June – August 2016 in those patients with chronic kidney disease undergoing maintenance hemodialysis were screened for anti- HCV. Renal transplant recipients were excluded from this study.

A total of 107 chronic kidney diseases were included in this study. Institutional ethical committee clearance and informed consent from the patients were obtained.

The socio demographic and clinical data such as age, sex, number of blood transfusions received and number of cycles of Hemodialysis undergone were collected in a pre-filled questionnaire format.

A total of 107 blood samples were collected and the sera separated, stored at -20° C and tested for anti- HCV antibodies by using third generation ELISA.

Results and Discussion

Among the 107 CKD Patients 64 (59.8%) were males and 43 (40.2 %) were females, of this 33 (30.8%) were positive for anti- HCV. Among 33 (30.8%) seropositive patients 21 (63.6 %) were males and 12 (36.4%) were females. Thus the seroprevalance of HCV was significantly higher among males.

Out of 33 seropositive individuals 11 (33.3%) were in the age group of 41-50 years, 8(24.2%) of them were in the age group of 51-60 years and 7 (21%) patients were in 6th decade of life. Out of 33 seropositives 4 (12%) and 3 (9%) patients were in the age group of 3rd and 2nd decade of life. So, in our study seroprevalance was high in patients with 4th and 5th decades of life.

Since HCV is transmitted through blood and blood products, Blood transfusion is one of the important risk factor in HCV transmission. In our present study 19 (57.6%) out of 33 seropositives had received more than 10 times of blood transfusion remaining 42.4 % patients were received less than 10 transfusions. So, our study reveals that patients who had received multiple blood transfusion had high chances of HCV transmission

Based on number of cycles of hemodialysis the seroprevalence of HCV infection was categorized. 14 (42.4%) and 11(33.3%) out of 33 seropositive patients have undergone 401-500 and 301-400 cycles of hemodialysis respectively whereas the number of patients who have undergone less than 100 cycles of hemodialysis was only 3 (6%) out of 33 seropositive patients were observed.

Thus, the highest prevalence of HCV infection (75.7%) was in patients who have undergone more than 300 cycles of hemodialysis and the least prevalence was observed in patients who have undergone less than 100 cycles of hemodialysis. Hence, the risk of acquiring HCV infection increases as the duration and number of cycles of hemodialysis increases.

Patients with end-stage renal disease on maintenance hemodialysis are at high risk for HCV infection for which screening for anti-HCV antibodies is highly recommended. Nosocomial transmission, prolonged vascular access, potential for exposure to infected patients and contaminated equipment and sharing of multi-dose heparin vials are some factors responsible for the high risk in HD patients

According to KDIGO guideline, the prevalence of HCV infection among dialysis patients in different parts of the world varies

from 1%to 90%. The lowest was reported in the European nation with less than 5% prevalence (Fabrizio, 2013).

The prevalence of anti HCV in patients on haemodialysis from India is reported to be in the range of 3-45% (Agarwal, 1999). 13.23 % by Reddy *et al.*, at 2005, Salunkhe *et al.*, in 1992 reported 45%, Chadha *et al.*, in 1993 reported 12.1%, Sumathi *et al.*, in 1993 reported 37.5%, Agarwal *et al.*, in 1999 reported 42%, and Jaiswal *et al.*, (2002) reported in a study from 1992-2000 reported prevalence of 30%. Our study showed HCV the prevalence of 30.8% among the patients on Hemodialysis. It is concordant with similar studies in India carried out by 27.7% Jasuja *et al.*, (2009) and 34.5% by Fabrizio (2013).

However, the above results in contrast with data from Europe and the United States, where anti-HCV has been detected in less than 5 % among HD patients. This discrepancy could be due to the introduction of the screening program for blood donors and subsequent elimination of anti-HCV and other blood-borne viral diseases positive patients, proper sterilisation of medical equipments and thereby decreasing the prevalence of blood-borne viral diseases. (Nicolas S *et al.*, 1994)

The prevalence rate of anti-HCV antibody was found to be higher among men than among women and in older patients, besides increased duration on dialysis, and it correlated with a history of blood transfusion, as reported in the literature (Medeiros MT *et al.*, 2004).

In our study it has been observed that out of 33 seropositives 19 patients (57.6%) had received more than 10 times of blood transfusion remaining 42.4 % patients had received less than 10 times of transfusions. It shows that Blood transfusion is one of the

sources of HCV transmission among HD patients. It is understood that all blood are screened before transfusion. Probably present method of blood screening could not detect some HCV positive blood sample. Hence, screening of HCV should be done by PCR and other Nucleic acid amplification test though these tests are expensive

Duration of dialysis has been reported to be significantly longer among anti-HCV positive patients compared to anti-HCV negative patients. In our study shows the prevalence of anti HCV was 6% in patients who had less than 100 cycles of HD in comparison to 75.7% in patients who had more than 300 cycles of HD indicating that the duration and number of cycles of HD is related to the risk of developing HCV infection.

In our study, only anti HCV was taken as criteria to diagnose HCV infection. Thus, although the limitation exists for the use of single anti HCV test, considering all factors, it is still a test of choice for HCV screening as recommended by Centers for Disease Control (CDC). It is necessary to develop a cost-effective, reliable, and simple HCV screening test in this group of patients for early case detection and improving treatment outcome.

In order to prevent the nosocomial transmission of HCV among HD patients CDC has recommended special precautions such as strict adherence to 'universal precautions', careful attention to hygiene, and strict sterilization of dialysis machines (Sypsa *et al.*, 2005).

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