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Prevalence of Hepatitis B, Hepatitis C and HIV infections among haemodialysis patients in a tertiary care hospital: an experience in North India

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Abstract

Objective: The present study was conducted in a view to study the prevalence of HBV, HCV and HIV in patients undergoing haemodialysis.

Introduction: Dialysis is a process that serves as a substitute for kidney functions. It is considered as a major risk factor for Hepatitis B and Hepatitis C infections including the higher rates of seroconversion as compared to peritoneal dialysis.

Materials and Methods: The present study was conducted in a tertiary care hospital in North India. A total of 138 patients undergoing haemodialysis were included in the study.

Results: The study was carried out on all the patients attending dialysis unit of Tertiary care hospital in North India from September 2018 to January 2019. Out of the total of 138 patients who attended dialysis unit, majority was male (60%). HBsAg was found positive in 1.82% of the total 138 patients and anti HCV antibodies were found positive in 19.3% patients before the start of haemodialysis. Whereas, 2.89% of patients were found positive to HBsAg and 23.7% to anti HCV antibodies during the course of haemodialysis. However, we could not find any HIV positive patient undergoing haemodialysis in our hospital.

Conclusion: In conclusion, the risk of hepatitis B, Hepatitis C, HBV-HCV coinfection and HIV infection is much higher in CKD patients due to frequent exposure to the repeated blood transfusions and extracorporeal circulation during haemodialysis. The prevalence of HCV infection is much higher than HBV infection because of no vaccine available for Hepatitis C virus.

Keywords- Seroconversion, Peritoneal Dailysis, Haemodialysis.

Introduction

Dialysis is a process that serves as a substitute for kidney functions. It is considered as a major risk factor for Hepatitis B and Hepatitis C infections including the higher rates of seroconversion as compared to peritoneal dialysis (1-5). Dialysis is a treatment modality which is required when kidneys are not functioning efficiently, which may occur at any age and with varying severity. Kidney dysfunction or decrease in glomerular filtration rate for more than 3 months leads to chronic kidney disease (CKD). CKD, if untreated may lead to End Stage Kidney Disease (ESKD), in which there is retention of uremic waste and there is a need for a therapy like kidney transplantation or haemodialysis (6). Dialysis is indicated in the patient with acidemia, electrolyte imbalance, fluid overload not responding to diuretics, uraemia as well as in chronic kidney disease and renal failure. Maintenance hemodialysis serves as the main treatment therapy for patients with End Stage Kidney Disease (ESKD) (7). Since, the patients with ESKD are immunosuppressed,

they are usually anaemic and require prolonged vascular access, undergo multiple cycles of haemodialysis for maintenance, repeated blood transfusions, therefore, dialysis carries high risk of transmitting blood borne infections such as HBV, HCV, HIV to the patients (8,9).These infections serve as the leading cause of morbidity and mortality among the dialysis patients (6).

Patients with chronic renal failure being immunosuppressed are not able to control these viral infections efficiently and hence, pose problems in the management of the patients undergoing dialysis (10).

In India, the prevalence of HBV infection among dialysis patients is reported to range between 3.4–43% (10-12). whereas, prevalence of HCV infection among dialysis patients is much higher as compared to that of HBV and ranges from 20-80% (13). Due to widespread implementation of HBV vaccination, the number of HBV infection is controlled (14). However, in haemodialysis patients, the response to HBV vaccine is poor and it has been reported that around 30-40% of patients on haemodialysis are unable to produce antibodies against HBV vaccine (15).This is because of the poor immunity of the patients on haemodialysis. Moreover, most of the patients with HCV infections also don't produce antibodies after HBV vaccination (16).

The present study was conducted in a view to study the prevalence of HBV, HCV and HIV in patients undergoing haemodialysis.

Materials and Methods

The present study was conducted in a tertiary care hospital in North India. A total of 138 patients undergoing haemodialysis were included in the study. The written informed consent was taken from the patients. The blood samples of the patients undergoing haemodialysis for the first time, were screened for HBsAg, anti HCV antibodies and anti HIV antibodies. Subsequent testing for the same was done every month to look for any seroconversion. Detailed history of patients regarding age, sex, no. of cycles, IV drug abuse, blood transfusion, HBV vaccination, kidney transplantation and any other surgery was taken. Baseline parameters such as serum urea, creatinine, serum alanine aminotransferase, serum aspartate aminotransferase were recorded.

Detection of HBsAg

HBsAg (Hepatitis B surface antigen) was detected by enhanced chemiluminescence assay (VITROS ECi/ECiQ Immunodiagnostic System, Orthoclinical Diagnostics). ECi is an immunometric technique that involves simultaneous reaction of HBsAg in the sample with mouse monoclonal anti- HBs antibody in the conjugate. Unbound conjugate is removed by washing and the bound HRP (horse radish peroxidase) conjugate is measured by luminescent reaction.

The reactive samples by ECi were also tested by immunochromatographic card test.

Detection of anti HCV antibodies

Antibodies to HCV were detected by enhanced chemiluminescence assay (VITROS ECi/ECiQ Immunodiagnostic System, Orthoclinical Diagnostics).

VITROS Anti HCV test uses three recombinant hepatitis C virus encoded antigens, namely c22-3, c200 and NS-5.

This immunometric technique involves a two stage reaction. In first stage, HCV antibody present in the sample binds with the HCV recombinant antigens coated on the wells. Unbound sample is removed by washing. In the second stage, horseradish peroxidase (HRP) -labelled antibody conjugate (mouse monoclonal anti-human IgG) binds to any human IgG captured on the well in the first stage. Unbound conjugate is removed by washing.

The bound HRP conjugate is measured by a luminescent reaction.

The samples which were reactive for antibodies to HCV were also tested with immunochromatographic card test. In case of any discordant results, the result was confirmed by PCR.

Detection of Anti HIV antibodies:

Antibodies to HIV were detected by enhanced chemiluminescence assay using VITROS HIV Combo test (VITROS ECi/ECiQ Immunodiagnostic System, Orthoclinical Diagnostics).

The VITROS HIV Combo test uses 3 recombinant antigens derived from HIV-1 envelope, HIV-1 group O envelope and HIV-2 envelope. It also uses antibodies to HIV p24 antigen. This helps in simultaneous detection of antibodies to HIV-1 and HIV-2 as well as HIV p24 antigen in the early stage in the same test.

The sample found reactive was confirmed by the 2nd test based on immunochromatographic principle.

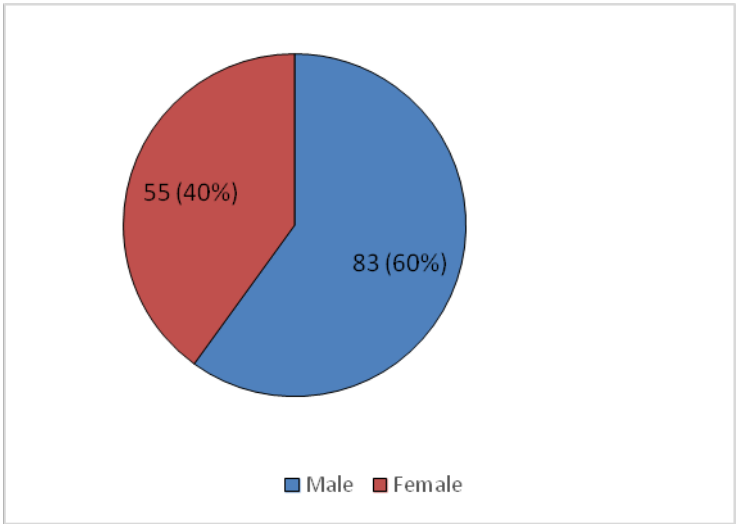
Results

The study was carried out on all the patients attending dialysis unit of Tertiary care hospital in North India from September 2018 to January 2019. Out of the total of 138 patients who attended dialysis unit, majority were male (60%). There was a wide age range (21-71years) of patients, with mean age being 51.5 years. The detailed history of blood transfusion, renal transplant, IV drug abuse, tattoo on the body, any surgical procedure and vaccination against Hepatitis B virus was taken and noted. Out of 138 patients undergoing dialysis, 97 were vaccinated against Hepatitis B virus before the initiation of haemodialysis, whereas rest were getting vaccinated during haemodialysis.

Table 1: Demographic profile of patients.

Parameter	**Number (%)**
Male: female	83(60):55 (40)
History of blood transfusion	67(48%)
History of renal transplant	1 (0.3%)
Frequency of haemodialysis:	
<10	32.3%
10-20	24.6%
21-30	43.1%
31-40	0
41-50	0
>50	0
History of IV drug abuse	14 (10%)
History of blood transfusion	70 (50.6%)
History of body tattooing	28 (20%)
History of surgical procedure	70 (50.7%)
History of HBV vaccination	97 (70%)

Fig 1: Overall gender predominance in the study group.



Total patients = 138

Male: Female = 1.5:1

Table 2: Hepatitis B and Hepatitis C virus infections among haemodialysis patients

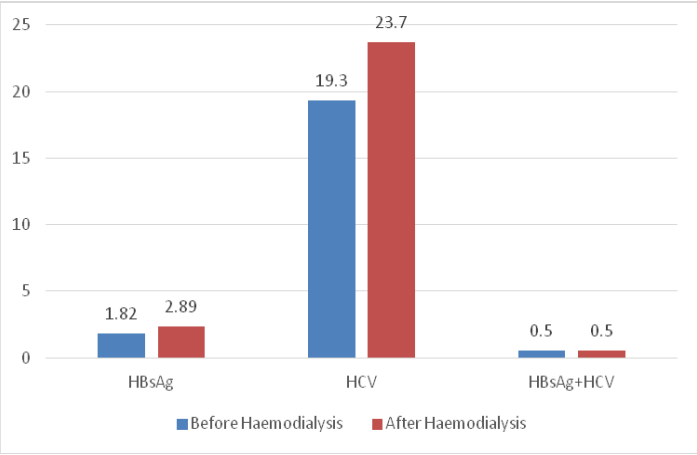
Patients	HBsAg (%)	HCV (%)	HBsAg +HCV (%)
Before haemodialysis	3 (1.82%)	27 (19.3%)	1 (0.5%)
During haemodialysis	4 (2.89%)	33 (23.7%)	1 (0.5%)
Total patients	7 (5.1%)	60 (43.5%)	1 (0.5%) *

*Patient having HBsAg + HCV coinfection was same before and during the treatment.

HBsAg was found positive in 1.82% of the total 138 patients and anti HCV antibodies were found positive in 19.3% patients before the start of haemodialysis. Whereas, 2.89% of patients were found positive to HBsAg and 23.7% to anti HCV antibodies during the course of haemodialysis.

However, HBV-HCV coinfection was seen only in0.5% of patients on haemodialysis.

Fig. 2: Comparison of viral markers in patients before and during hemodialysis



Interestingly, 70 (50.6%) out of 138 patients received blood transfusion during or before the haemodialysis. The patients who were positive to HBV or anti HCV antibodies were found to receive blood transfusion atleast once in life time.

Out of 7 patients which were positive for HBsAg, 87.5% were male, whereas only 12.5 % were female. And 72.7% of 60 patients, who were positive for anti HCV antibodies were male, whereas only 27.2% were female.

Table 3: Gender distribution in acquired viral infections.

	HBsAg +	Anti HCV +	Anti HIV +	Total
Male	6 (87.5%)	44 (72.7%)	0	50 (74.03%)
Female	1 (12.5%)	16 (27.2%)	0	17 (26%)

Fig. 3: Distribution of gender in patients reactive for Hepatitis B, C and HIV

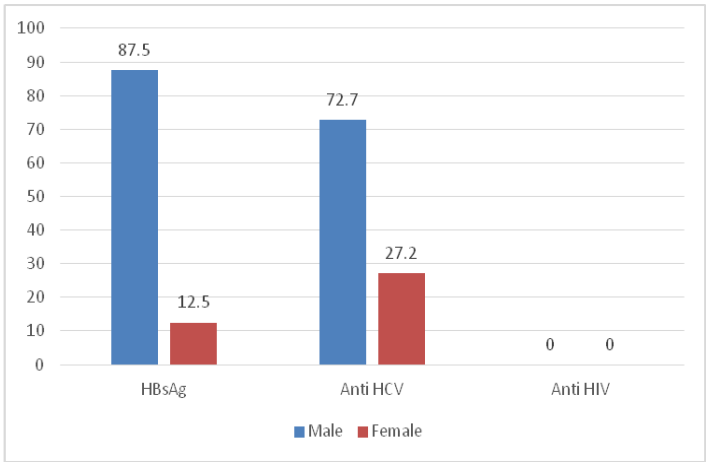


Table 4: Association of blood transfusion among Infected patients

	Total	History of blood transfusion (N=70)
HBsAg (+)	7	5 (7.2%)
HCV (+)	60	39 (55.1%)

However, we could not find any HIV positive patient undergoing haemodialysis in our hospital.

Discussion

Patients with CKD undergoing haemodialysis are at high risk of acquiring Hepatitis B, Hepatitis C and HIV infections because of immunosuppression and repeated and prolonged exposure to vascular access which may be the cause of potential exposure to contaminated equipment (17,18).

The prevalence of HBV and HCV infections were found to be high amongst the male population (60%) as compared to female (40%) in our study.

The association between males and females having HBV infection and HCV infection were found highly statistically significant for both the parameters by Chi-square test (P = 0.0001). Our results were comparable with that of the study done in a tertiary care hospital in Tamil Nadu, where prevalence were found to be more amongst males (87%) as compared to females (13%) (14). Study done in a tertiary care hospital by Mittal et.al also found the higher prevalence of infections in males (30.5%) as compared to females (11.8%) (19). This may be because in an Indian set ups, males are actively involved in earning for family and move out , therefore more chances of exposure.

In India, the rate of prevalence of HCV infection among the general population is 1.85% (20).

Rate of infection with HCV in dialysis patients in India is variable, ranging from 20-80%.

In our study, HCV infection in patients before the initiation of haemodialysis was found to be 19.3% and in patients undergoing haemodialysis was found to be 23.7 %. The rate increased to almost 4.4% during the process. This increase may be due to repeated exposure to vascular access. Although our result was comparable with the study done by Reddy et al, who conducted the study in a medical college in Hyderabad, which states that the rate of HCV infection among the patients undergoing haemodialysis is 5.9% (10).But our result was much less as compared to the results of Mittal et.al. in a similar study done in a medical college of Uttarakhand, where the rate of HCV infection initially was found to be 16.1% and during the haemodialysis, the rate increased to almost double i.e. 30 % (19). Whereas, Chandra et al. have reported that among CKD patients, renal transplant patients or patients on haemodialysis, the prevalence of HCV infection was 46%, which was much higher as compared to our study (12).

Medical college in Pondicherry also reported the high HCV infection rate of 15% in patients undergoing haemodialysis (14).

HBV infection among patients on haemodialysis is much less than HCV infection.

In our study, only 1.82 % of patients were found positive for HBV infection before the start of haemodialysis. The number slightly increased to 2.89 % during haemodialysis. This small number may be found because 70% of the patients were previously vaccinated against Hepatitis B infection. While our results were comparable with that of study done by Reddy et al. who found only 1.8 % patients reactive for HBsAg (10). And also the study conducted at medical college in Pondicherry found

6% prevalence of HBV infection in patients on haemodialysis (14).This was much less than the study conducted in a medical college in Uttarakhand, where at the initiation of haemodialysis, 10.2% of patients were found to be reactive for HBsAg, while the number increased to 11 % during haemodialysis (19).

Studies on prevalence of HCV and HBV coinfection in haemodialysis are rare.

While we found only 1 (0.5%) patient with HBV-HCV co-infection. This number was much less as compared to other studies. This may be because most of our patients were immunized to HBV vaccine and those who were not vaccinated, were given vaccine in our institute during the procedure. Reddy et.al. in their study, found 3.7% cases to be positive for Hepatitis B and C co-infection(10). The rate of HBV-HCV coinfection was much higher i.e. 37.10% in the study done by Chandra et.al (12).

In conclusion, the risk of hepatitis B, Hepatitis C, HBV-HCV coinfection and HIV infection is much higher in CKD patients due to frequent exposure to the repeated blood transfusions and extracorporeal circulation during haemodialysis. The prevalence of HCV infection is much higher than HBV infection because of no vaccine available for Hepatitis C virus.

Immunization with HBV vaccine before the start of haemodialysis helps in reducing the Hepatitis B infection among haemodialysis patients. Universal work precautions are always recommended to reduce the infection load in the dialysis unit.

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