

Prevalence of asymptomatic hepatitis B virus and hepatitis C virus infections in patients with maintenance hemodialysis of a tertiary care hospital in western Maharashtra

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Abstract

Introduction: Patients on Maintenance Hemodialysis (HD) are at high risk of viral hepatitis due to blood transfusion, prolonged vascular access, exposure to infected patients and contaminated equipments etc. Knowledge of the prevalence of such infections is very important to access magnitude of the problem because these infections play important role in the morbidity and mortality of hemodialysis (HD) patients.

Aim and Objectives: This study was done to determine the prevalence of Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections in patients on hemodialysis at our tertiary care hospital of Western Maharashtra.

Materials and Methods: Settings and Design: Hospital based cross sectional study was conducted for six months in HD unit at our tertiary care hospital. All patients (n=135) were screened for Hepatitis B surface antigen and antibodies to HCV (anti-HCV). Prevalence, age and sex wise distribution as well as risk factors for transmission of these infections were observed.

Results: Total 135 HD patients were screened for presence of HBV and HCV infections. Of these, 39 (28.9%), 20 (14.8%), 6 (4.4%) were found to be having HCV, HBV and Dual HBV and HCV infection respectively.

Conclusions: HCV was the most prevalent among HD patients than HBV. History of multiple blood transfusions, HD outside center or longer duration of HD were all important risk factor noted for high prevalence of sero-positivity for HBV and/or HCV. Strict adherence to universal precautions careful attention to hygiene and strict sterilization of dialysis machines are important to prevent further transmission of these viruses.

Keywords: Hemodialysis, HBsAg, Anti HCV antibodies, Hepatitis.

Introduction

Dysfunction of the kidneys is now a global pandemic and occurs at any stage of life with varying degree of severity. Patients suffering with End Stage Renal Disease (ESRD) are largely dependent on Hemodialysis (HD). Survival rate of patients with Chronic Renal Failure (CRF) has significantly increased due to widespread access to dialysis.¹ Although, HD is an important modality of therapy for CRF patients, it may also lead to the transmission of some blood borne infections. Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) infections are the most common infections among patients with maintenance hemodialysis.²

There are several reasons because of which, patients on maintenance HD are always at high risk of acquiring such types of infections. Repeated transfusion of blood and blood products, contaminated equipments, cross contamination from the dialysis circuits, lack of universal and safety precautions, etc may lead to high possibility of exposure to infected patients.³ Not only these but poor immunological status due to renal impairment also predispose these patients to infections.⁴ Infections due to these pathogens ultimately lead to increased morbidity and mortality in HD patients and it becomes challengeable task in the management of these patients in renal dialysis units.

The prevalence of HBV and HCV vary widely across countries, ranging from 1% in UK to more than 90% in Eastern Europe.⁵ Even in India wide ranges of prevalence rate of HBV (3.4 to 43%) and HCV (4.3 to 45.2%) infections in HD patients have been reported.^{4,6} Dual infections due to HBV and HCV is yet another important problem among patients with long term HD which leads to more severe liver disease and responsible for increase mortality rate.⁷

Knowledge of the prevalence of such infections is very important to access magnitude of the problem and to take all preventive measures to decrease the disease burden. This will ultimately improve morbidity and mortality profile of HD patients. Therefore, in the present study we planned to assess the prevalence of HBV and HCV in HD patients of our tertiary care hospital.

Materials and Methods

Study Design: Prospective, cross sectional study.

Settings: A study was carried out in the Department of Microbiology in collaboration with Department of Nephrology in our hospital. Study protocol was approved by the Institutional Ethics Committee.

Inclusion Criteria: Only CRF patients on maintenance hemodialysis were included in the present study with their written informed consent.

Study Size: A total of 135 patients on hemodialysis, irrespective of their age and sex were studied over a period of six months.

Data Source: A preformed proforma was filled with all necessary information along with details of clinical examinations and history. Clinical history included history of multiple blood transfusions, transplantation history, vaccination, duration of HD, history of hypertension, diabetes mellitus etc.

Sample Collection and Processing: With all aseptic precautions, 5 ml of blood was collected in plain sterile vacutainer. Separated serum was collected in sterile tubes and was used for further study. Anti HCV antibodies were detected by using 3rd generation ELISA (HCV MICROELISA Kit by, J Mitra Pvt. Limited, New Delhi). HBsAg was detected by using 3rd generation ELISA kit. (Hepelisa kit by, J Mitra Pvt. Limited, New Delhi). All the tests were performed in accordance with manufacturer's instructions with controls.

Results were collected after reading absorbance by Biorad ELISA reader with dual filters at 450nm and 630nm, immediately after adding stopping solution. Positive samples were retested and negative samples were randomly reexamined for confirmation.

Variables: Age, Sex and duration of HD

Bias: Reporting bias

Statistical Methods: Relevant statistics were applied. Simple tabulations and proportions were calculated.

Results

Total 135 patients participated in the study. Out of this 104 (77%) were males and 31 (23%) were females. Male to female ratio was 3.3:1. Most of the patients were between 21 to 60 years age group and mean age was 46.16 years. Total 35 (26%) patients had history of HD outside the center and 84 (62.2%) patients gave history of blood transfusions. There were 94 (69.6%)

patients on HD for more than one year and 41(30.4%) were on dialysis for less than a year (Table 1). Hypertensive nephropathy with CRF was found to be the commonest cause for HD with incidence rate of 47 (34.9%) followed by diabetes mellitus (DM) nephropathy with incidence rate of 38 (28.1%) whereas 28 (20.7%) patients were with non specific cause for HD (Table 2). Of the total 135 patients, 39 (28.9%) were HCV infected, 20 (14.8%) patients were with HBV and 6 (4.4%) were suffering with dual infection of HCV and HBV. However, 70 (51.9%) patients were remained uninfected during our study period (Fig. 1). Total 51 (49%) male patients were positive for HBV, HCV or both. Whereas, 14 (45%) female patients were positive for either HBV or HCV and there was no case of dual infection found. Prevalence of HBV and HCV infections among male patients was 16 (15.4%) and 29 (27.9%) respectively. While in females it was 4 (12.9%) and 10 (32.2%) respectively. Maximum numbers of cases were belonging to the age group of 41 to 60 years and there was only one case from age group below 20 years. Of the total 65 sero-positive cases, 26 (40%) were belongs to 41 to 60 years age group and 25 (38.4%) were in the age group 21 to 40 years. There were six cases with dual infection out of which five were from age group more than 60 years. (Table 3) Total 21/84 (25%) patients who gave history of blood transfusion, were found to be sero-positive to HBV and/or HCV. Whereas, 17/35 (48.5%) patients who gave history of HD outside our center were sero-positive for HBV, HCV or both. When duration of HD was studied, we observed that 35.1% patients were on HD for more than a year and 12.1% were so for less than a year. (Table 1). Of the total 135 patients, 71 (52.6%) were vaccinated before commencing HD, 50 (37%) were vaccinated at the time of HD, and 14 (10.4%) were not yet vaccinated against HBV.

Table 1: Demographic profile of patients on maintenance hemodialysis

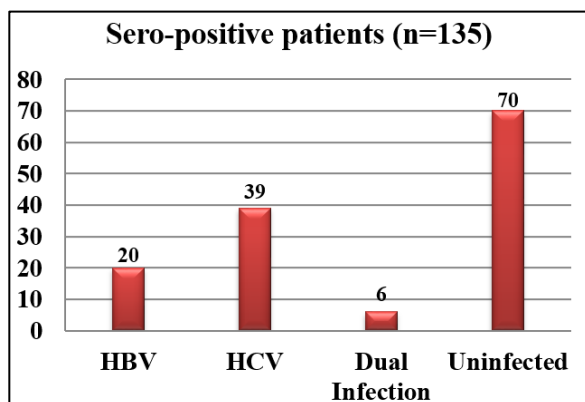
Parameter		Total patients (n=135)	Sero-positive patients
Patients on HD		135	65 (48.1%)
Males		104 (77%)	51 (49%)
Females		31 (23%)	14 (45%)
History of HD outside center		35 (26%)	17 (48.5%)
History of Blood Transfusions		84 (62.2%)	21 (25%)
Duration of HD	>one year	94 (69.6%)	33 (35.1%)
	<one year	41 (30.4%)	5 (12.1%)
Male:Female ratio	3.3:1`	-	-
Average age	46.1 years (19-80 years)	-	-

Table 2: Underlying diseases in patients of CRF undergoing maintenance hemodialysis

Underlying Diseases	Number of patients
Hypertension	47 (34.9%)
Diabetes mellitus	38 (28.1%)
Chronic glomerulonephritis	13 (9.6%)
Obstructive nephropathy	03 (2.2%)
Use of NSAID	02 (1.5%)
Urolithiasis	04 (3%)

Table 3: Frequency age distribution of HBV and/or HCV sero-positive patients on maintenance hemodialysis

Sex	Male (n=51/104) (49%)			Total Male	Female (n=14/31) (45.1%)			Total Female	Total n=65 (%)
	HBV infected	HCV infected	Dual infected		HBV infected	HCV infected	Dual infected		
Age									
0-20	-	1	-	1	-	-	-	-	1 (1.5)
21-40	6	11	-	17	1	7	-	8	25 (38.5)
41-60	8	12	1	21	2	3	-	5	26 (40)
≥61	2	5	5	12	1	-	-	1	13 (20)
Total (%)	16 (15.4)	29 (27.9)	6 (5.7)	51 (49)	4 (12.9)	10 (32.2)	-	14 (45.1)	65 (100)

**Fig. 1: Hepatitis B virus and/or hepatitis C virus infections in patients on maintenance hemodialysis**

Discussion

In India the HBV and HCV prevalence rate in general population is around 4.7% and 1.85% respectively.³ But in case of HD patients the prevalence rate is varies from center to center, region to region and country to country.³

In our study anti-HCV antibodies were found in 28.8% of patients. This is lower than studies conducted by Rawat et al. (36.75%), Mittal et al. (30.5%), Chandra et al (46%), and higher than Jasuja et al. (27.7%) and Subramanian et al. (2.7%).^{3,7,9-11}

Worldwide prevalence rate ranging from 4-15% for HBsAg in HD patients has been reported, whereas, in India it ranges from 3.4% to 45%.^{4,12} We report 14.8% HBV positivity among HD patients which in agreement

with the study conducted by Mittal et al (10.2%), Bhaumika et al (12.1%).^{7,13} However, Rawat et al reported 7% HBV positivity and Saravanan et al reported 33.5% positivity in their studies.^{3,14}

Since, HBV and HCV share common mode of transmission, we looked for dual infections of HBV and HCV in HD patients. We found 6 (4.4%) of patients were infected with HBV and HCV both. Hung et al reported 30.4% of HBV and HCV dual infection in HD patients.¹⁵ Reddey et al.¹⁶ reported 3.7% and Saravanan et al.¹⁴ reported 5.9% prevalence rate of dual infection in their respective studies.

Previous studies reported the prevalence of HBV, HCV, and Dual infection as 2.6%, 31.1% and 1.2%,⁸ 7%, 46%, and 3.7%,¹³ 1.5%, 33.5% and 0.5%,¹⁷ 11%, 30% and 3%,¹⁸ respectively.

In the present study prevalence of HCV was high among HD patients. Our hospital is tertiary care hospital where patients are referred from different part of the district and neighboring states as well. Most of the patients were with previous history of HD at different centers and history of blood transfusions for multiple times.

We report high prevalence of HCV (28.8%) than HBV (14.8%). previous studies support our results which clearly indicate that HCV is more prevalent than HBV in HD patients.^{8,13,17,18}

HCV as well as HBV infections were more frequently encountered among the age group of 41- 60 years, followed by 21-40 years, indicating pattern of infectivity of HBV and HCV was mainly towards older age group. There was no significant difference noted in

the prevalence rate of HBV or HCV infections in any particular age or sex. However, dual infections were seen only in the age group of more than 60 years and all were male patients. Other studies also reported high prevalence of sero-positivity in older age group.^{3,19} There is no clear statement in the previous studies about variation in predisposing age or sex of HD patients for infection.¹⁹

Patient visits multiple centers for variety of reasons like travelling, emergency, surgery, or as per their convenience. Patients with history of HD at different centers showed 48.5% sero-positivity. This reflects differences in adherence to infection control policies in individual centers.

Total 62.2% patients were having history of blood transfusion, out of which 25% were sero-positive for HBV and/or HCV. Prevention of nosocomial transmission is of vital importance. Antiviral treatment for HCV and HBV infections is highly expensive and not readily available. Inadequate screening of blood and blood products as well as screening procedures used are most commonly responsible for transmission of these viruses during blood transfusion. According to Al-Hegami et al.⁵ and Alashek et al.⁸ history of blood transfusion and number of transfusions is strongly associated with HBV and HCV infection. We used 3rd generation ELISA kits for screening of HCV with sensitive 100% and specificity of 97.4% and also for HBV with sensitive and specificity of 100%.

We report 35.1% sero-positivity among the patients on HD more than one year and it was 12.1% in patients who were on HD less than one year. Patients on longer duration of HD are at high risk of acquiring infections.^{5,8}

Hepatitis B vaccination is recommended for all susceptible chronic hemodialysis patients. Early vaccination and regular monitoring of the titers is necessary in the high risk group patients to maintain sero-protective level against HBV.⁴

Lack of strict adherence to universal precautions, sharing of articles, instruments, medicines etc among HD patients have been reported the important mode of transmission of these viruses.^{5,8,19} To prevent transmission of these infections, utmost priority should be given for wearing and changing gloves and gowns between patients, decontamination of equipment circuits and surfaces after treatment and no sharing of instruments or medications among the HD patients. Previous studies showed that spread of these infections is declined dramatically when infected patients were treated with dedicated HD unit.^{5,19}

Conclusion

Chronic CRF cases are at high risk of viral hepatitis caused by HCV and HBV. HCV was the most prevalent among HD patients. History of multiple blood transfusions, HD outside center or longer duration of HD were all important risk factor noted for high

prevalence of seropositivity for HBV and/or HCV. There was no specific correlation with age and sex among the positive patients. High prevalence of asymptomatic HCV and HBV infections indicates routine screening of HD patients for HCV and HBV, preferably using serological methods. This will helpful to prevent further transmission of viruses as well as to reduce morbidity and mortality rate of the patients on maintenance dialysis.

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