

Original Research Article

Seroprevalence of Hepatitis B and Hepatitis C in end-stage renal disease patients on maintenance hemodialysis: a single-center study from Bangladesh

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ABSTRACT

Background: Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections are important causes of morbidity and mortality in hemodialysis (HD) patients. The aim of this study was to estimate the seroprevalence of HBV and HCV among end-stage renal disease (ESRD) patients on maintenance HD.

Methods: This cross-sectional study was conducted in the hemodialysis unit of a military hospital of Bangladesh from October 2013 to March 2014 and included 141 maintenance HD patients. All patients were assessed by HBsAg and anti-HCV antibodies in addition to routine liver function tests.

Results: The age range of the study subjects were 18-70 years, and the majority (85.11%) were male. Among them 22 (15.60%) were positive for anti HCV, 5(3.5%) were positive for HBsAg, and 3 patients (2.13%) were positive for both HBsAg and anti-HCV. The duration of hemodialysis was higher in anti-HCV positive patients (49 ± 24 vs. 25 ± 10 months, $p < 0.05$) than anti-HCV negative ones. Anti-HCV positive patients in this study received a higher number of blood transfusion (units) than anti-HCV negative patients (7.5 ± 4.3 vs. 2.8 ± 1.7 units, $p < 0.05$). HBsAg positive patients also received a higher number of blood transfusion (units) than HBsAg negative patients (8.2 ± 3.1 vs. 3.2 ± 1.2 units, $p < 0.05$).

Conclusions: Hepatitis C virus was the major form of hepatitis in HD patients in this study. The duration of HD was higher in anti-HCV positive patients; the numbers of blood transfusion units were higher in patients positive for HCV and HBV than the negative ones.

Keywords: End-stage renal disease, Hemodialysis, Hepatitis B, Hepatitis C

INTRODUCTION

Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are still major public health problems around

the globe. These viruses cause chronic hepatitis, cirrhosis and hepatocellular carcinoma, all of which are major public health concerns.¹ An estimated 400 million persons are carriers of HBV worldwide, 75% of whom

reside in Asia and the Western Pacific regions. HCV infection is estimated at approximately 170 million people globally.² Since both viruses are efficiently transmitted by the parenteral route, patients undergoing HD are at high risk of acquiring these blood-borne hepatitis agents.³ Duration of dialysis and the number of blood transfusion are the reported risk factors for these infections among patients on HD.⁴ The reported prevalence and incidence of HCV infection in HD patients varies from country to country and ranges between 1 and 84.6%.⁵ HBV infection is less prevalent than HCV in HD units.⁶ HBV and HCV viral infections are important causes of morbidity and mortality in HD patients and pose problems in the management of these patients in the renal dialysis units. Timely detection of HBV and HCV infection among HD patients is necessary for the due performance of therapy, as well as for taking preventive measures for the protection of other patients and staff in HD units.⁷

Little data are available on hepatitis B and C prevalence in HD patients in Bangladesh. Hence, the present study is carried out to know the seroprevalence of HBV and HCV among patients on maintenance HD.

METHODS

This cross-sectional study was conducted among end-stage renal disease (ESRD) patients on maintenance HD in the Nephrology and Dialysis Department of Combined Military Hospital, Dhaka from October 2013 to March 2014 with prior approval of the ethical committee of the hospital.

The patients who were undergoing HD for more than 6 months in the Department were included in the sample. Patients with known seropositivity for HBV and HCV and those who were vaccinated for HBV were excluded. Informed and written consent was obtained from all patients. Finally, a total of 141 patients were recruited for the study.

Detailed history including socio-demographic information was collected through face to face interview from patients and/or attendants, complete physical examination was done. A semi-structured questionnaire was used to collect data. A checklist was used to collect disease-specific records. HBsAg, anti-HCV were tested in all the study subjects by ELISA method. Serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), serum bilirubin, and serum albumin were also measured in all. Confidentiality and privacy were maintained throughout the study. Participant refusal and withdrawal from the study at any time were accepted. All interviewed questionnaires were checked for its completeness, accuracy, and consistency to exclude missing or inconsistent data. Data were checked, cleaned and edited properly before analysis.

Statistical analysis was done using Statistical Packages for Social Sciences (SPSS), version 20.0 software. All data were expressed in percentages or as Mean±SD as appropriate. Student's t-test or Chi-square test was used for comparison of the values of variables among different groups as applicable. p-value ≤0.05 was considered to be statistically significant.

RESULTS

The majorities (41.13%) of the study subjects were in the age group 45-54 years, followed by 35-44 years (25.53%), 55-64 years (14.89%), 25-34 years (10.64%), <25 years (5.67%), and ≥65 years (2.13%). 85.11% of them were male. Diabetes mellitus (DM) ranked the top of the etiology of ESRD (37%), followed by hypertension (24%) and glomerulonephritis (23%) (Table 1).

Table 1: General characteristics of the study subjects (n=141).

Variables	No. (%)
Age group	<25 yrs
	8 (5.67%)
	25-34 yrs
	15 (10.64%)
	35-44 yrs
	36 (25.53%)
Age group	45-54 yrs
	58 (41.13%)
	55-64 yrs
	21 (14.89%)
	≥65 yrs
	3 (2.13%)
Gender	Male
	120 (85.11%)
	Female
	21 (14.89%)
Causes of CKD	Diabetes
	52 (37%)
	Glomerulonephritis
	32 (23%)
	Hypertension
	34 (24%)
	Obstructive uropathy
	10 (7%)
	Hereditary
	3 (2%)
Causes of CKD	Pyelonephritis
	3 (2%)
	Drugs
	2 (1.5%)
	Unknown
	5 (3.5%)

Total 21.28% of the subjects were infected with hepatitis viruses. HBV infection was found in 3.55%, HCV infection in 15.6%, and 2.13% were infected with both HBV and HCV. 78.72% of the subjects had neither of HBV nor HCV infection (Table 2).

Table 2: Frequency of Hepatitis B & Hepatitis C among dialysis patients (n=141).

Virus Status	Frequency	%
Hbsag And/Or Anti- HCV Positive	30	21.28%
HBsAg Positive	5	3.55
Anti-HCV Positive	22	15.60
Both Positive	3	2.13
HBsAg and anti-HCV Negative	111	78.72%

The quantity of transfused blood measured by the numbers of blood transfusion units was higher in HCV positive patients (7.5 ± 4.3) than the HCV negative patients (2.8 ± 1.7); the difference was statistically significant ($p < 0.05$). HBV infected HD patients also received more blood transfusion than HBV negative ones (8.2 ± 3.1 vs. 3.2 ± 1.2 , $p < 0.05$) (Table 3).

Table 3: Blood transfusion with HBsAg and anti-HCV Status.

Hepatitis Virus		Blood transfusion (Units) (mean \pm SD)	p-value
HCV	Anti-HCV positive	7.5 ± 4.3	<0.05
	Anti-HCV negative	2.8 ± 1.7	
HBV	HBsAg positive	8.2 ± 3.1	<0.05
	HBsAg negative	3.2 ± 1.2	

The duration of HD was statistically higher in patients infected with HCV than non-infected ones (49 ± 24 vs. 25 ± 10 years, $p < 0.05$). The duration was also higher in HBV infected subjects than HBV negative ones though it

was not statistically significant (62 ± 28 vs. 50 ± 32 years, $p = 0.21$) (Table 4).

Table 4: Duration of hemodialysis with HBsAg and anti HCV Status.

Hepatitis Virus		Duration of hemodialysis (months) (mean \pm SD)	p-value
HCV	Anti-HCV positive	49 ± 24	<0.05
	Anti-HCV negative	25 ± 10	
HBV	HBsAg positive	62 ± 28	0.21
	HBsAg negative	50 ± 32	

Serum ALT, AST, and bilirubin levels were higher in HCV positive subjects than HCV negative ones. HBV positive subjects also had higher serum ALT, AST, and bilirubin than HBV negative subjects. Serum albumin levels were lower in HBV and HCV infected subjects than those who were negative for HBV and HCV respectively. None of these differences reached the level of statistical significance with the exception of serum ALT levels in HBV-positive and negative patients (Table 5).

Table 5: Liver function status of the study subjects.

Tests	HCV positive patients (mean \pm SD)	HCV negative patients (mean \pm SD)	p-value
ALT (U/L)	92.0 ± 3.3	85.6 ± 6.0	0.541
AST (U/L)	102.5 ± 3.2	52.9 ± 5.7	0.033
Serum Bilirubin (μ mol/L)	9.5 ± 3.4	9.3 ± 3.6	0.550
Serum Albumin (gm/L)	31.3 ± 2.9	34.7 ± 4.2	0.539
HBV Positive Patients		HBV Negative Patients	
ALT (U/L)	98.0 ± 4.5	35.7 ± 5.0	0.011
AST (U/L)	92.5 ± 5.5	29.8 ± 5.9	0.067
Serum bilirubin (μ mol/L)	10.9 ± 3.4	9.9 ± 3.7	0.592
Serum albumin (gm/L)	27.3 ± 2.1	33.7 ± 5.1	0.613

DISCUSSION

The current study found 21.28% of patients on maintenance HD infected with HBV and/or HCV, 3.55% were positive for HBsAg, 15.6% were positive for anti-HCV, and the other 2.13% were found positive for both. Bangladesh has an intermediate prevalence of hepatitis B infection with a 4% HBsAg positive population.⁸ The seroprevalence of HCV is also low in Bangladesh, only 0.88% were found positive for anti HCV in a study.⁹ The frequencies of both hepatitis viral infections in the HD patients were higher than the population prevalence. Prolonged vascular exposure and multiple blood transfusions increase the risk of acquiring these blood-

borne infections in HD patients. The nosocomial transmission of these infections is also promoted by contaminated devices, equipment and supplies, environmental surfaces, and attending personnel. Significant immune dysfunction resulting from irreversible renal compromise further promotes infections with hepatitis viruses in HD patients.¹⁰ Viral hepatitis is a serious threat for HD patients as 1.9% of all deaths among this population are related to the consequence of viral hepatitis.⁶

Previous studies also reported higher but the variable frequency of HBV and HCV infections in HD patients of Bangladesh in comparison to the general population. The

prevalence of anti-HCV antibody was 69% in another study conducted among the HD patients by Ahmed et al. in 2003 at Bangabandhu Sheikh Mujib Medical University, Dhaka.¹¹ In another study in Bangladesh done in 2004-2005 found 12% of all patients on maintenance HD serologically positive for HBV and another 71% positive for HCV.¹² Among HD patients in a military hospital of Bangladesh in 2013 HBsAg and anti-HCV prevalence rate was 9.1% and 27.3% respectively.¹³ The current study found lower frequencies of HBV and HCV infections in HD patients. The study results indicate a decreasing trend of HBC and HCV infections among HD patients in Bangladesh. This is probably because of the introduction of HBV vaccination, regular surveillance for the hepatitis viruses and isolation of the carriers and use of dedicated dialysis machines for the infected patients.

The HBV and HCV infections remain alarmingly high in different risk groups including HD patients in developing countries and it has become a major cause of increased morbidity and mortality in HD. The prevalence of HBV among dialysis patients in India is reported to range between 3.4-43%. The prevalence of HCV among dialysis patients in India is reported to range between 20 and 80%. However, the prevalence of HCV infection in western countries ranges between 4 and 23.3%.¹⁴

Co-infection with HBV and HCV was found in 2.13% of the study subjects. Both viruses share a common mode of transmission. Co-infection with HBV/HCV was observed in 0.8% patients in India by Malhotra *et al.*¹⁵ Patients with dual HBV/HCV infection have a higher risk of progression to cirrhosis and decompensated liver disease and further have an increased risk of hepatocellular carcinoma (HCC).¹⁵

Anti-HCV positive patients in this study received a higher number of blood transfusion (units) than anti-HCV negative patients (7.5 ± 4.3 vs. 2.8 ± 1.7 units, $p < 0.05$). HBsAg positive patients also received a higher number of blood transfusion (units) than HBsAg negative patients (8.2 ± 3.1 vs. 3.2 ± 1.2 units, $p < 0.05$). Zacks et al, Chawla et al, and Agarwal et al, also had similar observations.^{4,16,17}

The anti-HCV positive patients had been on dialysis for 49 ± 24 months, the duration is higher than those with negative anti HCV (25 ± 10 months) and the difference is statistically significant. Zacks et al, and Chawla et al, had similar observations.^{4,16}

The status of the liver function of the study participants was assessed. The HBsAg positive HD patients had higher serum ALT (98.0 ± 4.5 vs. 35.7 ± 5.0 U/L, $p=0.011$), AST (92.5 ± 5.5 vs. 29.8 ± 5.9 U/L, $p=0.067$), bilirubin (10.9 ± 3.4 vs. 9.9 ± 3.7 $\mu\text{mol/L}$, $p=0.592$), and lower serum albumin (27.3 ± 2.1 vs. 33.7 ± 5.1 gm/L, $p=0.613$) than HBsAg negative HD patients. The anti HCV positive HD patients also had higher serum ALT (92.0 ± 3.3 vs. 85.6 ± 6.0 U/L, $p=0.541$), AST (102.5 ± 3.2 vs. 52.9 ± 5.7 U/L, $p=0.033$), bilirubin (9.5 ± 3.4 vs. 9.3 ± 3.6 $\mu\text{mol/L}$, $p=0.550$), and lower serum albumin (31.3 ± 2.9 vs. 34.7 ± 4.2 gm/L, $p=0.539$) than anti HCV negative HD

patients. Serum ALT, AST, and bilirubin were also found higher among HBV and HCV positive patients than those who were negative for viral markers in a study done by Rahman.¹³

CONCLUSION

High frequency of HCV infection among hemodialysis patients was observed in the current study. Increased duration of dialysis and a higher number of blood transfusions has been shown to be associated with increased frequency of HCV and also HBV infection. Interventions to reduce the occurrence of these infections are of utmost need to reduce the risk of long-term complications.

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