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Hepatitis b virus and hepatitis c virus co-infection in haemodialysis patients in a tertiary care centre of north western zone of Rajasthan, India

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Abstract
Background: Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections represent significant public health issues globally. They are important causes of morbidity and mortality in haemodialysis patients. Patients with HBV/HCV co-infection have a higher risk of progression to cirrhosis and decompensated liver disease and have an increased risk of hepatocellular cancer (HCC). Because the two hepatotropic viruses share same modes of transmission, co-infection with the two viruses is not uncommon, especially in areas with a high prevalence of HCV infection and among people at high-risk for parenteral infection.
Aims: To estimate the prevalence of HBV and HCV co-infection among haemodialysis patients.
Materials and Methods: This single centered hospital-based study was carried out in a tertiary care hospital in Bikaner (Rajasthan), India. All the patients who underwent haemodialysis from November 2017 and June 2018 were included in the study. Patients of all age groups were tested for HBsAg and anti-HCV antibodies by rapid card method-Alere Trueline, Alere Medical Pvt. Ltd, Gurgaon, Haryana, India. All positive cases for HBsAg were comfirmed by ELISA method- Hepalisa (J. Mitra & co. Pvt.Ltd). Okhla Indi. Area, New Delhi and for anti-HCV antibodies by Erba Lisa (Gen3) Transasia bio-medicals LTD. Ringanwada, Daman, India.
Results: Of the total 112 patients on haemodialysis, 5 (4.46%) were found to be having HBsAg infection, 3 (2.68%) were found to be positive for HCV and co-infection with HBV/HCV was observed in 2 (1.78%) patients. Out of the total 10 patients having HBV & HCV infection, 7 (70%) were males and 3 (30%) were females and majority of the infected patients were found to be of 41-60 years of age group followed by 21-40 years of age group and 61-80 years of age group.
Conclusion: The risk of co-infection is greater among the chronic renal failure (CRF) patients due to the high frequency of transfusions of blood/blood products and extracorporeal circulation during haemodialysis. Patients with HBV/HCV co-infection have a higher risk of progression to cirrhosis and decompensated liver disease and further have an increased risk of HCC. In our study, out of the total 112 patients, 5 (4.46%) were found to be having HBsAg infection, 3 (2.68%) were found to be positive for HCV and dual infection was observed in 2 (1.78%) patients.

Keywords: Dialysis, hepatitis b virus, hepatitis c virus

Introduction
Hepatitis B virus (HBV) and Hepatitis C virus (HCV) share several important similarities, including considerable diffusion worldwide, the modes of transmission, the hepato-tropism and the capacity to induce a chronic infection that may lead to cirrhosis and hepatocellular carcinoma (HCC) development.[1-3] Consequently, it is not surprising that their combined infection is a fairly frequent occurrence particularly in highly endemic areas and among subjects with a high risk of parenteral infections.[4]
Haemodialysis (HD) patients are at high risk for viral hepatitis due to the high number of blood transfusion session. These patients are often anemic, require prolonged vascular access, have high possibility of exposure to infected patients and contaminated equipment, and cross contamination from the dialysis circuits.[5,6] Hepatitis B (HBV) and Hepatitis C (HCV) viral infections are important causes of morbidity and mortality in haemodialysis patients and pose problems in the management of these patients in the renal dialysis units.[7] An estimated 400 million persons are carriers of HBV worldwide; 75% of whom reside in Asia and the Western Pacific, and HCV infection is estimated at approximately 170 million people globally.[8]

The reported prevalence and incidence of HCV infection in haemodialysis patients varies from country to country and ranges between 1 and 84.6%.[9]

Prolonged vascular exposure and multiple blood transfusions increase the risk of acquiring these blood-borne infections in haemodialysis patients. Contaminated devices, equipment and supplies, environmental surfaces, and attending personnel may also play a crucial role in the nosocomial transmission of these infections. Infections with hepatitis viruses in haemodialysis patients are further promoted by the significant immune status dysfunction developing due to irreversible renal compromise. [10]

HBV infection is less prevalent than HCV in haemodialysis units. The introduction of HBV vaccination, isolation of HBV positive patients, use of dedicated dialysis machines and regular surveillance for HBV infection has dramatically reduced the spread of HBV in this setting. [11] There are very few studies on the prevalence of such dual infections in haemodialysis patients from this region. Therefore, the present study was undertaken to estimate the prevalence of HBV and HCV co-infection among haemodialysis patients.

Materials and Methods

This study was carried out in the serology laboratory, department of Microbiology, Sardar Patel Medical College & attached groups of hospital, Bikaner, Rajasthan. Clinical, demographic and geographical data of the renal disease patients admitted to our hospital for haemodialysis was collected for a period from November 2017 and June 2018. A 5-ml venous blood sample was collected from all the patients who came with lab requisitions for the testing of HBsAg and anti-HCV Ab. The blood was allowed to clot for 45 min at room temperature and the serum was separated after centrifugation at low speed. The serum sample obtained was then tested for HBsAg and anti-HCV antibodies. HBsAg and anti- HCV antibodies were determined using a rapid card method -Alere Trueline, Alere Medical Pvt. Ltd, Gurgaon, Haryana, India. Both tests were performed in accordance with the manufacturer's instructions with adequate controls. All Positive cases for HBsAg were comfirmed by ELISA method- Hepalisa (J. Mitra & co. Pvt. Ltd.) Okhla Indi. Area, New Delhi and for anti-HCV antibodies by Erba Lisa (Gen3) Transasia bio-medicals LTD. Ringanwada, Daman, India.

Results

In this present study we included a total number of 112 patients who were enrolled for haemodialysis from November 2017 and June 2018. In our study, majority 96 (85.71%) of patients undergoing haemodialysis were of chronic renal failure (CRF) whereas 16 (14.29%) were of acute renal failure [Table 1]. The underlying cause of CRF were diabetic nephropathy 32 (33.33%) followed by hypertensive nephropathy 24 (25.0%) and chronic glomerulonephritis 22 (22.92%).[Table 2] Of the total 112 patients, 5 (4.46%) were found to be having HBsAg infection, 3 (2.68%) were found to be positive for HCV and dual infection was observed in 2 (1.78%) patients [Table 3]. Both the patients with dual infection were having history of transfusion of blood or blood products and haemodialysis from other centers. Out of the total 10 patients, 7 (70%) were males and 3 (30%) were females [Table 4] and most of the infected patients were in the 41-60 years of age group followed by 21-40 years and 61-80 years of age group (Table-5).

Table 1: Type of renal failure in 112 patients undergoing haemodialysis

Type of renal failure	No. of patients	%
Acute renal failure	16	14.29
Chronic renal failure	96	85.71
Total	112	100

Table 2: Underlying diseases in 96 patients of CRF undergoing haemodialysis

Disease of CRF	No. of patients	%
Diabetic nephropathy	32	33.33
Hypertensive nephropathy	24	25.0
Chronic glomerulonephritis	22	22.92
Others*	18	18.75
Total	96	100

Table 3: Showing prevalence of HBV and HCV infection in haemodialysis population

Viral Marker	Seropositivity (%)
HBsAg	5 (4.46%)
Anti HCV	3 (2.68%)
Both (HBsAg + Anti HCV)	2 (1.78%)

Table 4: Sex distribution among patients positive for HBsAg and anti-HCV undergoing repeated haemodialysis

	HBsAg		Anti-HCV		Co-infection (HBV+HCV)	
	Number of total samples	Positive (%)	Number of total samples	Positive (%)	Number of total samples	Positive (%)
Male	66 (58.93%)	4 (6.06%)	66 (58.93%)	2 (3.03%)	66 (58.93%)	1(1.5%)
Female	46 (41.07%)	1 (2.17%)	46 (41.07%)	1 (2.17%)	46 (41.07%)	1(2.2%)
Total	112	5 (4.46%)	112	3 (2.68%)	112	2 (1.78%)

Table 5: Showing Age distribution patients under haemodialysis

Age Group	Number of patients	Positivity		
		HBsAg Positive	Anti-HCV Positive	Co-infection (HBV +HCV)
0-20	10 (8.93%)	_	_	_
21-40	23(20.5%)	1 (0.89%)	1 (0.89%)	1 (0.89%)
41-60	51(45.5%)	3 (2.6%)	2 (1.78%)	1 (0.89%)
61-80	22 (19.6%)	1 (0.89%)	_	_
>80	6 (5.3%)	_	_	_
Total	112	5 (4.46%)	3 (2.68%)	2 (1.78%)

Discussion

The prevalence of viral hepatitis is greater in patients on haemodialysis than in the general population affecting quality of life and mortality. Patients diagnosed with CRF on maintenance haemodialysis pose a higher risk of acquiring HBV or HCV infections due to frequent use of blood and blood products and multiple invasive procedures performed in these patients. [12] The literature review points to the fact that viral hepatitis is a serious threat for haemodialysis patients as 1.9% of all deaths among this population are related to the consequence of viral hepatitis. [11]

The results from our study demonstrate that the prevalence of HBV and HCV infections in haemodialysis patients is 4.46% and 2.68%, respectively**,** which is comparable with rates reported from different studies all over the India and ranges between 1 & 84.6%. [9] In India, reported prevalence of HBV and HCV infection among haemodialysis patient is variable. Reddy *et al* have reported that among patients on haemodialysis 5.9% were HCV positive while 1.4% patients had HBV infection and 3.7% had co-infection with HBV and HCV.[13] Chandra *et al* have reported that among the patients of chronic kidney disease, renal transplant or haemodialysis, HBV, HCV and co-infection of both viruses were 7%, 46% and 37.10% respectively.[14] Since both these viruses share a common mode of transmission, we looked for the co-infection with HBV and HCV among the patients, was seen in two patients, one male and one female (2/112 = 1.78%). Studies on the prevalence of HCV and HBV co-infection in haemodialysis are rare. Kara *et al.* reported dual infection in three patients out of 67 haemodialysis patients. [15] Hung *et al.* reported co-infection of 30.4% and it was higher than non-haemodialysis patients which was only 3.8%. [16] Reddy *et al*. found 3.7% prevalence of dual infection in haemodialysis patients. [13] In another study by Saravanan *et al*., out of 251 patients, 67 (26.7%) were positive for anti-HCV, 112 (44.6%) were positive for HBV, 15 (5.9%) had dual infection, and 57 (22.7%) were nonHBV/nonHCV. [17] Other studies reported the prevalence of HBV, HCV, and HBV/HCV co-infection as 7, 46, and 37%; [10] 11, 30 and 3%; [18] 2.6, 31.1, and 1.2%, [19] respectively. Prevalence of HBV and HCV infection in our study may be due to the study population being restricted to haemodialysis patients and also due to the lesser sample size in the current study. Moreover, the population being rural and illiterate in our region lack risk perception due to unsafe therapeutic injections by quacks. Many dental procedures are being performed by untrained individuals using the unsterilized equipment.

Conclusion

The prevalence of HBV and HCV infections and HBV/ HCV co-infection in haemodialysis patients of our setting was found to be 4.46%, 2.68%, and 1.78%, respectively. The risk of co infection is greater among the CRF patients due to the frequent exposure to blood from transfusions and extracorporeal circulation during haemodialysis. Strict adherence to universal precautions, proper maintenance of haemodialysis machines and proper disposal of used material (tubing, catheters, and fluid) should be implemented in the dialysis units to decrease the risk of transmission of HBV and HCV. Immunization with HBV vaccine before beginning the dialysis, isolation of HBV positive patients, use of dedicated machines, and regular surveillance for HBV infection helps dramatically in decreasing the spread of HBV in haemodialysis units. Moreover, the blood used for transfusion should be screened for HBV and HCV by adopting methods like PCR or by using nucleic acid techniques.

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