



## Prevalence of Hepatitis B and C Viruses in Hemodialysis Patients in central India

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### ABSTRACT

**OBJECTIVE:** The aim of our study is to evaluate the prevalence of hepatitis B and C viruses in hemodialysis patients at Gandhi medical college and Hamidia hospital Bhopal in central India. In addition, to find out the risk factors associated with these infections. **METHODS:** This is a retrospective study which was carried out in dialysis units at Gandhi medical college and Hamidia hospital Bhopal in central India from January 2013 to April 2016. The notes of patients on maintenance hemodialysis were reviewed by the researchers to collect data regarding the serology status of these patients and potential risk factors which could be associated with hepatitis B virus and hepatitis C virus infection. **RESULTS:** A total number of 1253 patients were included in the study from dialysis center Gandhi medical college and Hamidia hospital Bhopal (Madhya Pradesh) India. The mean age was 46.38 Years and standard deviation 14.7 years, it ranged from 14 to 82 years and the number of males was 685 (54.67%) while females formed 568 (45.33%) of the total sample. Most patients 735 (58.66%) were between 40 to 60 years old while 87.95% patients are included in 21 to 60 years age group. 94.33% of patients received blood transfusion. The prevalence of hepatitis B and hepatitis C were 3.43% and 0.80% respectively. Age, gender, blood transfusion, past surgical and dental history was not statistically associated with increased risk of hepatitis B and C transmission. **CONCLUSION** The prevalence of hepatitis B in hemodialysis patient is almost similar to that of general population and Hepatitis C prevalence is still low and more measures are needed to decrease its prevalence in this cohort of patients. Although relatively low prevalence of both hepatitis B and C viruses was found in hemodialysis unit, some higher prevalence values urge for effective prevention control measures and stricter follow up procedures.

**KEYWORDS :** Hemodialysis, Hepatitis B virus, Hepatitis C virus.

### INTRODUCTION

The function of the renal system is to maintain the body's state of homeostasis by regulating fluid and electrolytes, excreting toxic substances, and providing other functions [1]. Dysfunction of the kidneys is common and may occur at any age and with varying degrees of severity [2]. Chronic kidney disease (CKD) is term that describes kidney damage or a decrease in the glomerular filtration rate lasting for three or more months. CKD is associated with decreased quality of life, increased health care expenditures, and premature death [3]. The cause of renal failure may be a primary kidney disorder or secondary to a systemic disease or other urologic defects. Hemodialysis is used for patients who are acutely ill and require short-term dialysis ranging from days to weeks until kidney resumes its function as well for patients with advanced CKD require long-term or permanent renal replacement therapy [2]. In hemodialysis, blood is removed from the patient with needles and plastic tubing and pumped past the dialysis membrane. Poisons and toxins cross the dialysis membrane into the dialysate, which is then discarded, and the blood is returned to the patient [4].

Viral hepatitis and human immunodeficiency virus infection are lead causes of mortality and morbidity in patients with hemodialysis (HD). Both are further promoted by the characteristic immunological dysfunction that develops in renal failure and interferes with the patient's ability to eliminate these viruses. As far as HD is concerned, hepatitis B virus (HBV) and hepatitis C virus (HCV) are the two most important viruses responsible for almost all the patients' morbidity [5].

Viral Hepatitis is a global health problem. It is estimated that about 350 million people are chronically infected with hepatitis B in the world. Also, around 160 million people have chronic hepatitis C worldwide. These infections can lead into cirrhosis, hepatocellular carcinoma and death. (6)

Hemodialysis is the main renal replacement therapy in patients with end-stage kidney disease. This treatment modality carries high risk of transmitting blood born infection such as hepatitis B virus, hepatitis C virus and human immunodeficiency virus to patients with chronic

kidney disease.(7)

Patients who undergo hemodialysis have lower immunity that makes them much more vulnerable to acquire such viruses and have lower response rate to hepatitis B vaccine. (8) They are usually anemic, need blood transfusion and invasive procedures more than the general population which also put them at higher risk of being infected with these viruses.(9)

Therefore, patients undergoing hemodialysis are expected to have the highest rates of hepatitis B virus and hepatitis C virus infections and this is exactly what has been confirmed by the great majority of epidemiological studies which showed prevalence of hepatitis B and hepatitis C infections in hemodialysis units ranges from 1-20% and 1-55% respectively.(10-14)

The presence of hepatitis B virus and/or hepatitis C virus in patients with chronic kidney disease can also increase the morbidity and mortality in these patients. For example, the rate of rejection in kidney transplant and mortality are higher in patients with hepatitis C virus infection than patients without such infection. (5) Also, the response rate to antiviral treatment is decreased and the side effects of antiviral drugs are higher in chronic kidney disease patients.(15)

There are many risk factors which are associated with increased rates of blood born infections among hemodialysis patients. So, identifications of these risk factors and introduction of measures to address these factors have become a priority in hemodialysis units. (16)

There are few studies on the prevalence of hepatitis B virus and hepatitis C virus infections in patients on hemodialysis in India. Aim of study is to find out the prevalence rate and variables associated with higher risks of these infections in Hamidia hospitals Bhopal.

### METHODS

A retrospective medical records review design was conducted. The study population included all patients who undergo HD in the Hamidia hospital Bhopal from January 2013 to April 2016.

The patients were included in the study only if they were attending center for more than one hemodialysis. Patients who underwent for single hemodialysis were excluded.

The records of patients on hemodialysis were reviewed by the investigators to determine the seropositivity and negativity of hepatitis B and hepatitis C, age, gender, history of blood transfusion. In addition, data was collected regarding the serology and immunization status of dialysis staff and whether infection control measures were adopted in dialysis units.

Dialysis units at Hamidia hospital Bhopal follow the standard infection control protocol which includes the use of disposable gloves, disposable kits, disposable needles, separate dialyzers for each patient, and disinfection of surfaces. Disinfection of dialysis machines between hemodialysis sessions at the end of day was done with the appropriate chemical solution in compliance with the manufacturer's recommendations. Hepatitis B and hepatitis C infected patients were dialyzed on separate machines to prevent cross infection.

Patients were considered infected with hepatitis B when they had positive hepatitis B surface antigen by 3rd generation ELISA test in their serum. Patients with positive hepatitis C virus antibody which was also determined by 3rd generation ELISA test were regarded infected with hepatitis C virus, otherwise they were considered not infected.

Data which was collected was analyzed by simple statistics. The mean and the median were used to describe the central tendency of our data, while the range and standard deviation were used to describe the degree of dispersion of our data. Chi square was used to compare the differences between various categorical data frequencies and to calculate the probability value (P value). Student test (t. test) was used to compare the differences between continuous numerical data and to calculate the P- value to determine statistical significance. P value of less than or equal to 0.05 was considered significant in rejecting the null hypothesis and accepting the alternative hypothesis.

**RESULTS**

A total number of 1253 patients were included in the study from dialysis center Gandhi medical college and Hamidia hospital Bhopal (Madhya Pradesh) India. The mean age was 46.38 Years and standard deviation 14.7years , it ranged from 14 to 82years and the number of males was 685 (54.67%) while females formed 568 (45.33%) of the total sample. Most patients 735 (58.66%) were between 40 to 60 years old while 87.95% patients are included in 21 to 60years age group (Table I).

94.33% of patients received blood transfusion. The prevalence of hepatitis B and hepatitis C were 4.49% and 1.28% respectively (Table II).

Age, gender, blood transfusion, past surgical history was not statistically associated with increased risk of hepatitis B and C transmission (Table III).

**TABLE I: Age and gender distribution of dialysis patients**

S NO.	AGE (YEARS)	MALE	FEMALE	TOTAL n=1253
1.	13-20	9(0.71%)	5(0.4%)	14 (1.12%)
2.	20-40	162(12.92%)	205(16.36%)	367 (29.29%)
3.	40-60	428(34.15%)	307(24.5%)	735 (58.66%)
4.	>60	86(6.86%)	51(4.07%)	137 (10.93%)
5.	TOTAL	685 (54.67%)	568 (45.33%)	1253

**TABLE II: Characteristics of dialysis patients**

S NO.	CHARACTERISTICS	NUMBER OF PATIENTS	PERCENTAGE
1.	AGE ( MEAN , SD*)	46.38 YRS, 14.7YRS	
2.	MALE	685	54.67%
3.	FEMALE	568	45.33%
4.	DURATION OF DIALYSIS (MEAN ,SD)	----	28 MONTH,12 MONTH

5.	HISTORY OF DIALYSIS OUTSIDE	325	25.94%
6.	HEPATITIS B POSITIVE	55	4.49%
7.	HEPATITIS C POSITIVE	16	1.28%
8.	BOTH POSITIVE	2	0.16%
9.	BLOOD TRANSFUSION	1182	94.33%
10.	STAFF WITH HBV AND HCV POSITIVE IN UNIT	NIL	----
11.	FAMILY HISTORY OF HEPATITES B	NIL	----
12.	FAMILY HISTORY OF HEPATITES C	NIL	----
13.	SURGICAL HISTORY	825	65.84%

SD\* Standard deviation

**TABLE III: Variables potentially associated with HBV infection**

S NO.	RISK FACTOR	HBV POSITIVE	HBV NEGATIVE	P-VALUE
1.	NO. OF PATIENTS	55	1198	
2.	AGE (MEAN , SD)	39.88(14.91)	40.60(16.36)	
3.	DURATION OF DIALYSIS (MEAN ,SD )	25MONTH,5MONTH	19MONTH,4.5MONTH	
4.	BLOOD TRANSFUSION	55(100%)	1139	0.8719
5.	DIALYSIS OUTSIDE	32	15	<0.0001
6.	SURGICAL HISTORY	28	715	0.5626
7.	FAMILY HISTORY OF HEPATITES B	NIL	12	0.9753
8.	MALE	32	662	0.9108

**TABLE IV: Variables potentially associated with HCV infection**

S NO.	RISK FACTOR	HCV POSITIVE	HCV NEGATIVE	P-VALUE
1.	NO. OF PATIENTS	16	1237	
2.	AGE IN YRS (MEAN , SD)	34.1,(16.70)	42,(16.38)	
3.	DURATION OF DIALYSIS (MEAN ,SD )	26 MONTH, 5.1MONTH	22 MONTH,4.6MONTH	
4.	BLOOD TRANSFUSION	16(100%)	1172	0.89
5.	DIALYSIS OUTSIDE	15	32	0.41
6.	SURGICAL HISTORY	12	528	0.202
7.	FAMILY HISTORY OF HEPATITES C	NIL	2	0.87
8.	MALE	9	681	0.594

**TABLE V: HEPATITES B AND C VIRUS INFECTION AMONG HEAMODIALYSIS PATIENTS**

S.NO	PATIENTS	HBV POSITIVE	HCV POSITIVE	HBV +HCV POSITIVE
1.	BEFORE DIALYSIS	46 (3.67%)	11 (0.88%)	1 (0.08%)
2.	AFTER DIALYSIS	55 (4.49%)	16 (1.38%)	2 (0.16%)
3.	TOTAL	8.16%	2.26%	0.24%

**DISCUSSION**

This has been reported that hemodialysis increase prevalence hep-

atitis B and C viral infection but it change from center to center, region to region and in country, this variability has no relationship with basic prevalence of disease in community. In most of study HBV and HCV infection among hemodialysis patients was between 4 – 11% and 8 – 12% respectively (13,14). In India it is widely variable HBV 1.4-7% , HCV infection 5.9-46% ,co-infection 3.7-37.1%,while worldwide (17) prevalence of HBV and HCV in Indian dialysis patients are 14.2% and 5.9% respectively. The risk for a patients to become HBV positive increases 1.47 times due to one month of dialysis.(16)

Gandhi medical college and Hamidia hospital Bhopal dialysis center is active central in central India hence it reflects the prevalence of HBV and HCV infection in hemodialysis patients in central India. In our study prevalence of HBV infection in hemodialysis patients are 4.49%. Our results on the prevalence of hepatitis B infection among patients on hemodialysis are comparable to previous Indian studies and lower than some Arabian countries like Bahrain where the prevalence is around 11%. This result could be due to hepatitis B vaccination and dialyzing hepatitis B infected patients on dedicated machines. **(11)** On the other hand the prevalence of hepatitis B in hemodialysis patients in western countries like UK and USA is below 1% which is much lower than our results and this is mostly due to lower prevalence of hepatitis B in their general population **(15, 21)**

Our study prevalence of HCV infection in hemodialysis patients are 1.28% It is much lower than other study and this is mostly due to lower prevalence of hepatitis C in central India. HCV seroprevalence ranged between 0.7- 18.1% across different countries. (18)

On the other hand 31.25% and 16.36% of patients become newly positive for HCV and HBV respectively this is comparable to other study. It has been observed that HCV and HBV positive patients had history of blood transfusion. Patients who had not received blood transfusion none of them was positive for HCV and HBV, it means that blood transfusion is a major risk factor. Probably present method of blood screening could not detect virus and it required more specific method like polymerase chain reaction, but it is costly and is not easily available method in India.

In our study Duration of hemodialysis is other risk factor for getting infection as longer the duration there is more possibility of getting infection with HBV and HCV. Similar pattern noted in previous study. (15)

In our study shows increase prevalence of HBV and HCV in hemodialysis patients which is most probably due to blood transfusion but other risk factors like history of surgery, family history of HBV and HCV, status of vaccination, outside dialysis can contribute in transmission of infection also.

This study has several limitations: it is a retrospective study that was carried at one time point; there was no indication of the sequence of events so the cause effect relationship could not be ascertained and the number of patients was relatively small to generalize our results. Hence, more representative studies are needed to confirm our results.

## CONCLUSION

The prevalence of hepatitis B in hemodialysis patient is almost similar to that of general population and more measures are needed to decrease its prevalence in patients. Although relatively low prevalence of both hepatitis C viruses was found in hemodialysis unit, some higher prevalence values urge for effective prevention control measures and stricter follow up procedures.

Increase positive seroprevalence in HBV and HCV after blood transfusion in dialysis patients need improvement in blood bank and newer technique like PCR, ID –NAT etc should be adopted .voluntary blood donation may reduce the burden of blood borne infection.

In a community where HBV and HCV infection prevalence is higher needs adoption of further precautionary measure to reduce morbidity and mortality in hemodialysis patients.

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