ORIGINAL RESEARCH ARTICLE

Prevalence of Hepatitis B and Hepatitis C Infection among Patients Undergoing Dialysis

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ABSTRACT

Background: Hepatitis B and C virus infection is a leading cause of mortality and morbidity among patients who are on haemodialysis. This study is conducted to investigate prevalence of Hepatitis C infection in patient who undergoes haemodialysis

Material & methods: A retrospective study was carried out from September 2020 to September 2021 in General hospital Gandhinagar with the use of ELISA kit by detecting anti-HCV antibody and Hepatitis B surface antigen from serum sample. A total of 100 samples were collected from haemodialysis unit in General hospital Gandhinagar.

Observation: Out of 100 patients, 9% were positive for hepatitis B and 14% were positive for hepatitis C. Among these two cases were coinfected with hepatitis B as well as C.

Conclusion: The risk of hepatitis infection is more associated with patients with chronic renal failure due to high frequency of transfusion of blood and blood products and extracorporeal circulation during haemodialysis. For prevention of spread of hepatitis infection among patients with haemodialysis, dialysis unit must use proper universal precautions, has to properly maintain the machines of dialysis, and also has to follow proper disposal of material used in the unit.

Keywords: Hepatitis B, Hepatitis C, Hemodialysis

INTRODUCTION

Hepatitis B and C are major and serious health problems in India. Patients who are on haemodialysis are at risk of getting infected from both Hepatitis B and C virus infection which can lead to mortality and morbidity. Still, very little research has focused on the morbidity measures of these serious disorders in low- and middle-income countries like India [1].

Hepatitis B and C viruses in patients with haemodialysis are the most common viruses to get infected. Hepatitis infection is transmitted through blood from person to person. So patients with haemodialysis have a strong association with hepatitis B and C infection. Patients who are on dialysis for a very long time is a major factor that lead to hepatitis infection among patients. Hepatitis B and C infections can occur in any group of age and its transmission is complicated. Patients who are taking haemodialysis are at high risk of transmission of hepatitis infection because of receiving large amount of blood transfusions with low immunity level [2].

Primarily hepatitis B and C virus are spread via parenteral route and associated with nosocomial infections. So infection of hepatitis is more prone in patients with haemodialysis than general population. Hemodialysis is a procedure in which blood from the patients is removed via needles and tubing, and after that blood is pumped in the membrane of dialysis. Membranes in dialyzer filter the blood by removing harmful substances which is waste of the body from the blood and purify blood. Then the pure blood is then returned to the patients with kidney disorder. This whole procedure involves blood of the patients, so they are at high risk of hepatitis C and B infections as the virus is blood born [3].

Hepatitis B and C can lead to morbidity and mortality among haemodialysis patients so, health care teams must take precautionary steps to prevent spread of infection of hepatitis among patients with haemodialysis. This virus is spread through contact with blood or other body fluids from an infected patient. Usually infected via contaminated needle, infected blood transfusion, and sexual contact. To decrease the prevalence rate of hepatitis virus in haemodialysis patients' health teams must use proper universal precautions. So that we can prevent nosocomial infection of hepatitis [4].

In Renal disorder, the kidney is not able to filter blood and requires haemodialysis. It is a choice of treatment for renal disorders to filter impure blood. It is an invasive medical procedure which provides filtration to blood and although any invasive procedure carries a risk of infection. Dialysis is a renal replacement therapy in which excess like water, toxins, and solutes from the impure blood are in patients whose kidney is not able to function naturally. Patients who have kidney diseases are mostly anemic, need prolonged vascular access, have more possibility of exposure to contaminated instruments and infected patients and have possibility of cross contamination from the circuit of dialysis.[5].

High risk of infection transmission in haemodialysis is because of several factors involves fast turnover of the patients between dialysis sessions, distance is very less

between dialysis patients from each other and health status of patients on haemodialysis. Many patients have other diseases associated with renal disease and /or condition with weakened immune system and that can increase susceptibility to hepatitis infections. Transmission in dialysis unit happens when dialysis staff is not following strict infection control practices [6].

To prevent the spread of hepatitis infections in patients with renal failure, the health care team plays a major role. The key to prevent infection in patients with haemodialysis is providing information to increase knowledge and to educate patients and staff in dialysis units. Staff must clean fistula site before initiating dialysis every time. Staff must always clean and sterilize hands before touching patients in unit. Wear mask in units. They must test every patient for hepatitis infection so that they can detect hepatitis and isolate than to prevent further transmission. Syringe and needles must be used one time only on the patients. Check blood before transfusing in patients in blood transfusion. These all are key steps to follow to prevent infection among patients admitted in haemodialysis unit [7].

Chronic infections with Hepatitis B and C virus are associated with serious health risks due to hepatic cirrhosis and hepatocellular carcinoma. Patients who are on haemodialysis therapy are at increased risk for acquiring these infections and have a higher prevalence of HBV and HCV than the general population [8]. Global data indicate that the prevalence of Hepatitis B and C infection is high in populations of India. Hepatitis infection was estimated by WHO to affect 3-4.2% of the Indian population and 0.49% of the population of Gujrat [9].

The study aims to estimate the prevalence of hepatitis B virus and hepatitis C virus infections among haemodialysis patients in the civil hospital of Gandhinagar. Chronic haemodialysis patients are at high risk of contracting hepatitis B (HBV) and C (HCV) virus infections.

MATERIALS AND METHOD

Study population and design: Retrospective hospital record-based study was carried out in civil hospital, Gandhinagar, Gujrat for period of 2 year (September 2020 to September 2022). The patient's age, sex, blood transfusion history, duration of haemodialysis, number of haemodialysis sessions per week data were extracted from hospital database and blood test results data from Laboratory information system (LIS). The patient who had undergone multiple haemodialysis were included those who experiencing first time were excluded. Prior informed consent of patients or patients relative was taken. The unit of dialysis has 12 haemodialysis machines. From that one machine is allotted for hepatitis B and two are allotted for hepatitis C infected patients. And to avoid cross contamination these machines are placed away from others.

Specimen collection: Sample is collected by dialysis unit itself. With use of clean vein puncture 3 ml of blood sample was collected in plain vacuette from each patient before dialysis. Then sample was sent in respective laboratory in civil hospital, Gandhinagar for testing of respective blood test. Anti-HCV antibodies and HBsAg surface antigen test done at serology laboratory of Microbiology. For serum separation blood sample was centrifuged at 2000 rpm for 2 minutes Patients were tested for anti-HCV antibodies and HBsAg surface antigen by third generation ELISA.

ELISA: Enzyme-linked immunosorbent assay is used to detect presence and amount of either antigen or antibody in the samples. In this study direct sandwich ELISA is used to detect the presence of Hepatitis B surface antigen in a sample and Indirect ELISA is used for anti HCV antibody.

Ethical permission- no ethical permission has been taken as it is a retrospective study. It was done after the testing of patients' sera.

RESULTS

A total of 100 patients with kidney diseases undergoing haemodialysis as part of their management irrespective of their gender and age were included in this study. In the out of 100 patients 60(60%) were male and 40(40%) were female. Most of the patients were in the age group of 41-80 years thereafter in the age group 61-80 years followed by 21-40 years and Prevalence rate of hepatitis B and C both was 00% in age group below 20 years as well as more than 80 years of age.

Table 1: The prevalence of hepatitis B and C in relation to demographic variables of the samples.

Demographic variables	Negative	Hep B positive	Hep C positive	Both positive	Total
n	79 (79%)	7 (7%)	12 (12%)	2 (2%)	100
Age group					
<20 years	06(7.5%)	00(00%)	00(00%)	00(00%)	6 (6%)
21-40 years	18 (22.7%)	04 (57.14%)	05 (41.66%)	01 (50%)	28 (28%)
41-60 years	24 (30.3%)	02 (28.57%)	06 (50%)	01 (50%)	33 (33%)
61-80 years	31 (39.2%)	01 (14.2%)	01 (8.33%)	00 (00%)	33 (33%)
>80 years	00(00%)	00(00%)	00(00%)	00 (00%)	00 (00%)
Gender					
Male	46 (58.22%)	03 (42.85%)	09 (75%)	02 (100%)	60 (60%)
Female	33 (41.77%)	04 (57.14%)	03 (25%)	00 (00%)	40 (40%)
Duration of dialysis					
1 session per week	25(31.64%)	00(00%)	01(8.33%)	00(00%)	26 (26%)
2 session per week	39(49.36%)	01(14.2%)	03(25%)	01(50%)	44 (44%)
3 session per week	15(18.98%)	06(85.71%)	08 (66.66%)	01(50%)	30 (30%)
Blood transfusion					
1-5 times	18 (22.78%)	00 (00%)	02 (16.66%)	01 (50%)	21 (22%)
5-10 time	45 (56.96%)	02 (28.57%)	03 (25%)	00 (00%)	50 (50%)
>10 times	16 (20.25%)	05 (71.42%)	07 (58.33%)	01 (50%)	29(29%)

Among the 100 patients, 30% of our samples had going through three sessions of haemodialysis per week, 44% sample had two sessions of haemodialysis per week, and 26% had one sessions of haemodialysis per week (Table 1).

In this study, prevalence of hepatitis C was 12 % and the prevalence of hepatitis B was 7 %. Only 2 among the 100 samples is positive for both hepatitis B and C infections. The data shows that, out of 60 males and 40 females, total 42.85 % of male and 57.14% of female responders are infected with hepatitis B. while, 75 % male and 25 % females are infected with hepatitis C. Also, only 2 male patients show both the infections while no female is infected with hepatitis B as well as hepatitis C both.

Out of 7 patients who were positive for HBV, 5 patients had been on haemodialysis for more than 3 years while the other 2 patients have been on haemodialysis for at least 1 to 2 years. Out of 12 patients who were positive for HCV, 8 patients had been on haemodialysis for more than 3 years while the other 4 patients have been on haemodialysis for at least 1 to 2 years.

Table 2: Age and sex distribution of hepatitis B and hepatitis C

Status	Participants (n=100)	Age (mean±SD)	Age range
HBV positive	07	65.8±14.55	24-68 years
HBV negative.	93	47.3±15.3	
HCV positive	12	49.4±10.36	23-62 years
HCV negative.	88	55.7±16	

Table 3: Comparison between gender and Hepatitis infection

Sex/HBV	Male	Female	p-value
HBV positive	3 (5.0%)	4 (10.0%)	>0.05
HCV positive	9 (15.0%)	3 (7.5%	>0.05
HCV & HBV both positive	2 (3.3%)	0 (0.0%)	>0.05

Table 2 and 3 shows that hepatitis B virus infection in seen in 3 male and 4 female with age range of 24 years to 68 years, while hepatitis c infection is seen in 9 male and 3 female with age range of 23 years to 62 years. Suggest that 20 to 70 years age group is getting more infected in dialysis unit.

While comparing patient's sex with hepatitis B virus infection, it was found that there is no statistically significant difference between them (Table 5) While comparing patient's sex with hepatitis C virus infection, it was found that there is no statistically significant difference between them (Table 6). Results show that hepatitis B occurs more often with age group of 24-68 years, while HCV occurs more in age group of 23-62 years.

The study found out that prevalence rate of hepatitis B and C as well as both is seen in the patients who undergone haemodialysis. And it also shows that many factors like duration of haemodialysis, number of sessions per week and blood transfusion can increase the chances of spreading infection of hepatitis among patients with haemodialysis.

DISCUSSION

This retrospective study estimates hepatitis B and C prevalence rates in patients with haemodialysis. The observed result of the study indicates that hepatitis B and C virus infection persisted even in this current environment where infection control protocols followed properly [10].

In this study result shows that prevalence of hepatitis B and C infection in haemodialysis patients is 7% and 12%, respectively. While both hepatitis B and C positive cases are only 2 %. Since hepatitis B and C share a common mode of transmission, we searched for co-infection with HBV and HCV among the patients, as seen in patients, 14 male and 7 female. Research studies on prevalence of hepatitis B and C co-infection in hemolysis are very rare.

Result of the study suggests that spread of hepatitis B and C may be greater importance in haemodialysis units through contamination dialysis instruments and equipment. Patients get infection maybe from repetitive use of analyzer or transfusions. Reuse of equipment requires high level of disinfection. So, reuse of dialysis need to done carefully and correctly and also with strict aseptic techniques to prevent contamination in dialysis units [11].

Several factors are responsible for prevalence of HCV and HBV but the most commons are blood transfusions and duration of dialysis. As per stages of kidney failure and body's requirement, frequency of dialysis varies as per week. Sometimes it is one time in week, two times in a week or three times in a week. And because of that multiple frequency per week they become more prone to hepatitis infection [12].

In this study blood transfusion history was seen among HCV and HBV patients with duration and frequency of haemodialysis is also shows high prevalence. As per this results these two factors are more associated with hepatitis infection transmission. So, as a health care team they need to follow strict aseptic techniques and universal precautions to prevent further infections in patients of haemodialysis unit of Gandhinagar civil hospital [13].

To prevent spread of HCV and HCB in unit of dialysis, infection control practices are needed to follow. Staff of dialysis unit have to evaluate all aspects of infection control practices like: hand washing, use of gloves, preparation of injection, medication administration, care of vascular access, disinfection & cleaning. They can also arrange training programme to provide information and education about current guidelines of infection control. Early identification of infected patients is also helps to prevent transmission by isolating patients with hepatitis [14].

As new strategies become available, consistent adherence to recommended infection control practices will remain main key for prevention spread and transmission of HCV, HBV and any other infections among patients with haemodialysis [15].

CONCLUSION

The risk of hepatitis infection is more associated with patients with chronic renal failure due to high frequency of transfusion of blood and blood products and extracorporeal circulation during haemodialysis.

For prevention of spread of hepatitis infection among patients with haemodialysis, dialysis unit has to use proper universal precautions, has to properly maintain the machines of dialysis, and also has to follow proper disposal of material used in the unit. So that chances of getting cross infection of hepatitis become less [16].

As per immunization, Vaccine of hepatitis B should be administer to patients before beginning of the haemodialysis. Isolation of patients suffering from hepatitis also helps to decrease spread of infection to general population in dialysis units. Also, blood used for any procedures should be screened and tested for hepatitis infections or other infections by using various available techniques [17].

In haemodialysis patients, viral hepatitis has a significant health hazard, mainly in developing countries like India. Strict adherence to universal precautions, hepatitis B vaccination, and isolation of infected patients can control hepatitis B and C infection in haemodialysis departments.

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