

Seroprevalence of Hepatitis B and C among Hemodialysis patients in Ad Diwaniyah governorate

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Abstract

It is well known that patients undergoing Hemodialysis (HD) , are at high risk for contracting viral infections. This is due to their underlying impaired cellular immunity, which increases their susceptibility to infection. In addition, the HD needs blood exposure to infectious materials through the extracorporeal circulation for a prolonged period. This study was conducted to estimate the prevalence of HBsAg and anti HCV Ab and to find out risk factor for transmission of HBV and HCV infection in patients undergoing HD in Ad Diwaniyah teaching hospital. A total of 216 patients undergoing regular HD in Ad Diwaniyah teaching hospital were investigated from 1st March 2018 to 31st November 2018. The patients who included in this study consist of (110 males and 106 female) with age ranging from (16-86) years and The mean (\pm SD) age of the participants was 51.89 (\pm 15.54) years. Clinical data such as age, gender, duration of dialysis, frequency of dialysis per week, number of blood transfusion were noted. Blood samples were collected from each patient, Serum was tested for HBsAg and anti HCV Ab.

Results

Out of 216 HD patients, HBsAg was detected in one (0.46%) patients, HCV was detected in 40 (18.52 %) patients , HBV and HCV coinfection was detected in 2 (0.93%) patients , and 173 (80.09%) patients were uninfected. There was a significant relationship between anti-HCV-positive patients with Number of sessions and duration of HD ($P < 0.05$). No significant relationship was found between (HCV Ab and HBsAg) positivity with gender, age and blood transfusion, ($P > 0.05$)

Conclusion

In conclusion, patients on maintenance HD in Ad-Diwaniyah teaching hospital have a high prevalence of HCV infection and lower rates of HBV infection. There was a significant relationship between anti-HCV-positive patients with Number of sessions of HD and dialysis duration. No significant relationship was found between HCV antibody positivity with gender, age and blood transfusion .

INTRODUCTION

Chronic kidney disease (CKD) is defined as kidney damage, or an estimated glomerular filtration rate less than 60 ml/min/1.73 m² persisting for three months or more irrespective of the cause ^(1,2). The number of patients undergoing renal replacement therapy (RRT) each year, varies enormously among world. These rates have increased steadily over the last decade ⁽³⁾. Despite the widespread use of renal transplantation and peritoneal dialysis, hemodialysis (HD) stays the main RRT in most countries ⁽⁴⁾.

It is well known that patients who undergoing HD, are at risk for contracting viral infections. This is due to underlying impaired cellular immunity . In addition, the HD needs blood exposure to infectious materials through the extracorporeal circulation for a prolonged period. Moreover, HD patients may needs transfusion of blood, frequent admission to the hospital and surgery, which increase opportunities for nosocomial infection exposure. The most common viral infections encountered in HD units are Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and, to a lesser extent, human immunodeficiency virus infection (HIV) ⁽⁵⁾. HCV is classified in the genus Hepacivirus of the family Flaviviridae⁽⁶⁾. It is a prominent cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma, with up to 185 million chronically infected individuals world-wide, most of them are undiagnosed and not receive treatment, protective vaccine is not available, and those who clear infection with treatment or spontaneously are susceptible to reinfection ^(7,8). Nosocomial transmission through the use of insufficiently decontaminated materials or the contaminated gloves or hands of health care workers is responsible for a substantial number of new infections worldwide ⁽⁹⁾. HCV is classified into seven recognized genotypes^(10,11,12). The predominant of HCV genotype in Iraqi patients was genotype (4) followed by genotype (1b) ⁽¹³⁾. HBV is a member of the Hepadnaviridae family, genus is Hepadnavirus. It's genome is the smallest known human virus genome⁽⁹⁾. It is one of the most common causes of chronic liver disease and HCC worldwide. Approximately one-third of the world's population have serological evidence of past or current infection with hepatitis B⁽¹⁴⁾.

AIMS OF THE STUDY

This study was conducted to estimate the prevalence of Hepatitis B surface antigen (HBsAg) and HCV antibody and to find out risk factor for transmission of HBV and HCV infection in patients undergoing HD in Ad Diwaniyah teaching hospital.

PATIENTS AND METHOD

A total of 216 out of 232 patients undergoing regular HD in hemodialysis center in Adiwaniyah teaching hospital were investigated from 1st March 2018 to 31st November 2018.

Clinical data such as age, gender, duration of dialysis, frequency of dialysis per week, number of blood transfusion were noted.

Blood samples were collected from each patient and serum was tested for HBsAg and anti HCV Ab.

Viral screening of all HD patients done previously take in consideration.

Inclusion criteria:

- Any patients dialysed more than three month in AD Diwanyiah teaching hospital.

Exclusion criteria:

- Patients infected with HBV or HCV before HD.
- Patients diagnosed with HBV or HCV infection at first session of HD.

- Patients who dialysed in multiple HD units.
- Patients who dialysed less than 3 months.

16 patients were excluded in this study, 7 of them doing dialysis in another centers, 6 of them dialysed less than 3 months and 3 of them was positive Anti HCV Ab before dialysis.

RESULTS

This study consisted of 216 patients: 110 males (50.93%) and 106 females (49.07%). Their ages ranged from 16 to 85 years with The mean (\pm SD) age of the participants was 51.89 (\pm 15.54) years.

Out of 216 HD patients, HBsAg was detected in one (0.46%) patients, HCV was detected in 40 (18.52 %) patients , HBV and HCV coinfection was detected in 2 (0.93%) patients , and 173 (80.09%) patients were uninfected [Figure 1].

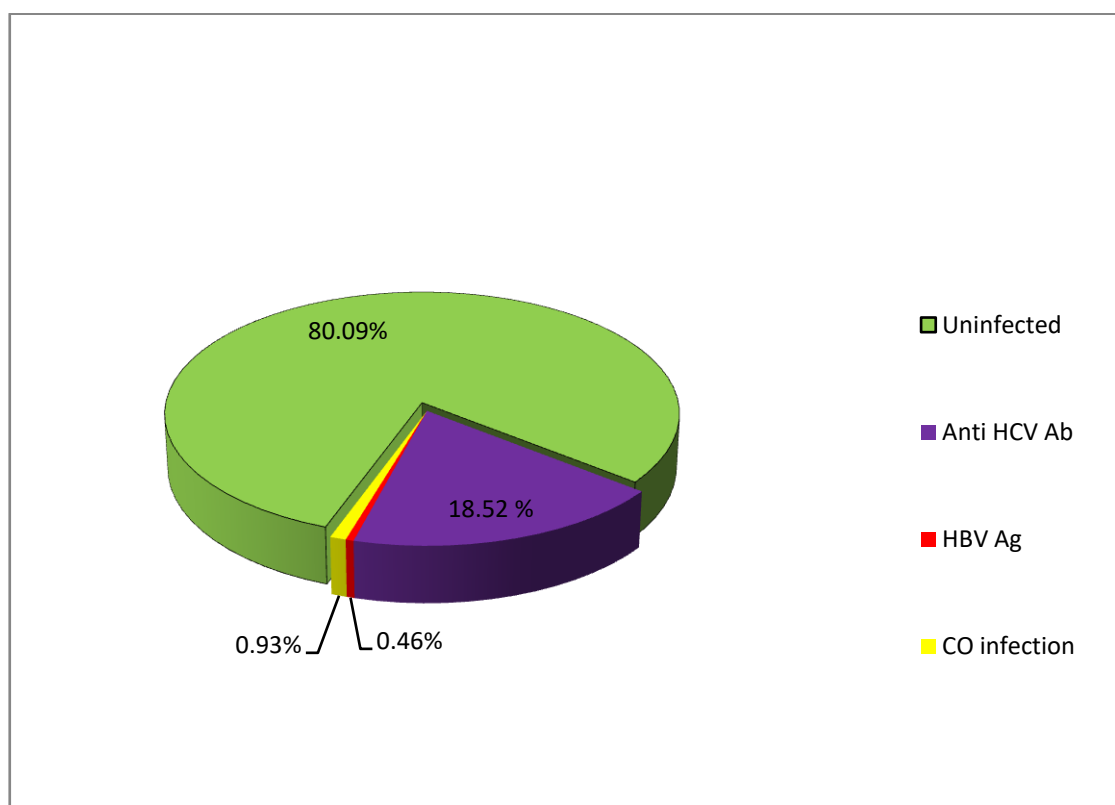


Figure (1) The distribution of Hepatitis B and C in HD

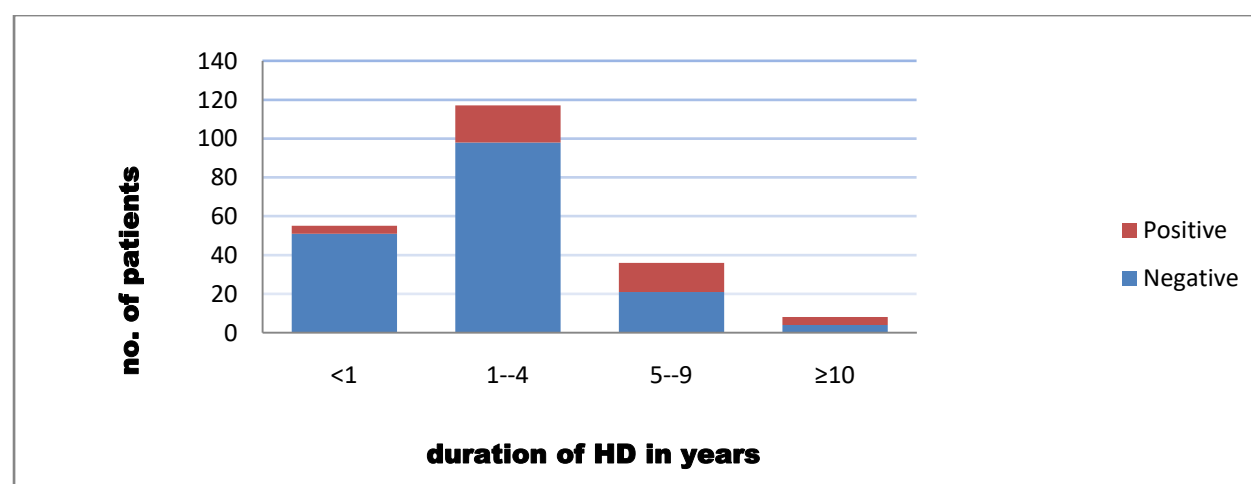
According to duration of HD ,55 patients were on HD less than 1 year, 4 of them found to be Anti HCV Ab positive and no one of them was HBsAg positive. 117 Patients were undergoing HD (1-4) years, 19 (16.24%) of them found to be Anti HCV Ab positive and 2(1.71%) of them was HBsAg positive 36 Patients were underwent HD (5-9) years, 15 (41.67%) of them found to be Anti HCV Ab positive and 1(2.78%) of them was HBsAg positive 8 Patients were underwent HD more than 10 years, 4 (50%) of them found to be Anti HCV Ab positive and no one of them was HBsAg positive as shown in tables (1&2) figure (2)

Table (1): The distribution of patients with HCV according to Duration of HD in years

Duration of HD in years	Anti HCV Ab		Total	p-value
	Positive	Negative		
<1	4(7.27%)	51(92.73%)	55	0.03
1-4	19 (16.24%)	98(83.76%)	117	
5-9	15(41.67%)	21(58.33%)	36	
≥10	4(50%)	4(50%)	8	
Total	42	174	216	

Table (2):The distribution of patients with HBV according to Duration of HD in years

Duration of HD in years	HBsAg		Total	p-value
	Positive	Negative		
<1	0(0%)	55(100%)	55	0.9
1-4	2(1.71%)	115(98.29%)	117	
5-9	1(2.78%)	35(97.22%)	36	
≥10	0(0%)	8(100%)	8	
Total	3	213	216	

**Figure (2)Hepatitis C according to Duration of HD in years**

The distribution of patient according to the no. of sessions of HD, there was 52 patient underwent less than 100 sessions, 4 of them was Anti HCV Ab positive and no one of them was HBsAg positive .

92 patient underwent (100_499) sessions of HD , 8 of them was Anti HCV Ab positive and no one of them was HBsAg positive.

46 patient underwent(500_999) sessions of HD , 15 of them was Anti HCV Ab positive and 2 of them was HBsAg positive.

26 patient underwent more than 1000 sessions , 15 of them was Anti HCV Ab positive and one of them was HBsAg positive. as shown in tables (3&4) figure (3).

Table (3): The distribution of patients with Hepatitis C according to Number of sessions of HD

Number of sessions of HD	Anti HCV Ab		Total	p-value
	Positive	Negative		
<100	4(7.69%)	48(92.31%)	52	0.01
100-499	8(8.7%)	84(91.3%)	92	
500-999	15(32.61%)	31(67.39%)	46	
≥1000	15(57.7%)	11(42.3%)	26	
Total	42	174	216	

Table (4): The distribution of patients with HBV according to Number of sessions of HD

Number of sessions of HD	HBsAg		Total	p-value
	Positive	Negative		
<100	0(0%)	52(100%)	52	0.8
100-499	0(0%)	92(100%)	92	
500-999	2(4.35%)	44(95.65%)	46	
≥1000	1(3.85%)	25(96.15%)	26	
Total	3	213	216	

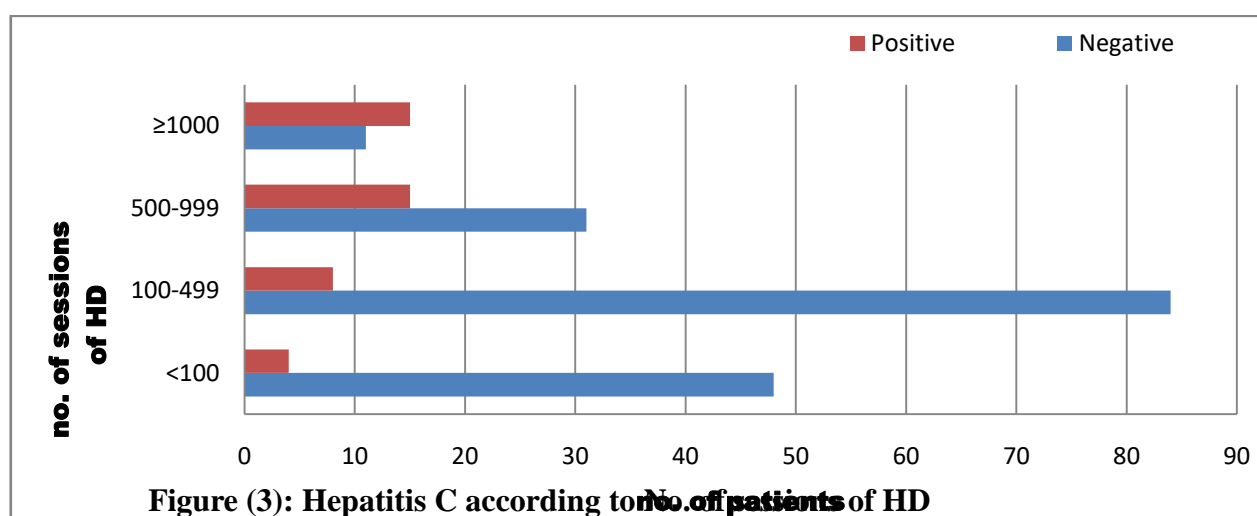


Figure (3): Hepatitis C according to Number of sessions of HD

Among (133) patients who had blood transfusion history less than 10 pints, two (1.5%) were infected with HBsAg and 19(14.29%) was infected with HCV. And among (83) patients who receive 10 pints or more there was one (1.2%) infected with HBsAg and 23(27.71%) was infected with HCV.

There was no significant difference found between HBV and HCV infected patients compared to uninfected patients, in relation to blood transfusion. as shown in tables (5&6)

Table (5): The distribution of patients with HCV according to NO. Of transfused unit

NO. Of transfused blood unit	Anti HCV Ab		Total	p-value
	Positive	Negative		
<10	19(14.29%)	114(85.71%)	133(100%)	0.2
≥10	23(27.71%)	60(72.29%)	83(100%)	
Total	42	174	216	

Table (6): The distribution of patients with HBV according to NO. Of transfused blood unit

NO. Of transfused blood unit	HBsAg		Total	p-value
	Positive	Negative		
<10	2(1.5%)	131(98.5%)	133(100%)	0.9
≥10	1(1.2%)	82(98.8%)	83(100%)	
Total	3	213	216	

No significant relationship was found between HCV antibody positivity with gender, age and blood transfusion, ($P > 0.05$).

There was a significant relationship between anti-HCV-positive patients with Number of sessions of HD and dialysis duration ($P < 0.05$). However, there was no significant relationship between HBsAg positivity with age, gender, blood transfusion, dialysis duration and Number of sessions.

DISCUSSION

In this study, the prevalence of HCV infection was (19.44%) and HBV infection was (1.38%) among hemodialysis patients. Which mean a higher rate of HCV infection compared with that of HBV infection. HBV infection rate in the current study was lower than that observed in patients undergoing HD in Basra 31.1%⁽¹⁵⁾ and those of other countries, for example 3.8% in Palestine⁽¹⁶⁾, 5.9% in Jordan⁽¹⁷⁾, 4.3% in Turkey⁽¹⁸⁾, 7% in Kerman Iran⁽¹⁹⁾, while it was in agreement with a study sample from the Dialysis Outcomes And Practice Patterns Study (DOPPS) which including 8615 patients undergoing HD from 308 HD unite in the developed countries, their mean HBV prevalence was 3% with a median of 1.9%⁽²⁰⁾.

The low HBV rate in this study could be explained by lower rates of HBV infection in Ad-Diwaniyah city among general population, successful hepatitis B vaccination program, strict viral screening for all people who want to do (surgical operation, marriage, and labor) , effective screening of donated blood, adherence to infection control measures , and dialyzing of HBV positive patients on dedicated machines .In this study gender and blood transfusion were not associated with increased rate of HBV, this observation was inconsistent with those of several studies that show higher rates of HBV infection related to these potential risk factor ⁽²¹⁻²⁴⁾but it was similar to that of a study from Iran ⁽¹⁹⁾The prevalence of HCV in this study was (19.44%) which was higher than that of general population in Iraq 0.4% ⁽¹⁶⁾, this difference of prevalence clearly refer to the importance of nosocomial transmission among patients undergoing HD. This study was in agreement with a study sample from patients undergoing HD in Iraq 20% ⁽²⁵⁾ but it was lower than patients undergoing HD in Basra 42.6% ⁽¹⁵⁾.An overall prevalence of HCV infection was 25.3% which reported in patients undergoing HD in Middle-East region⁽²⁵⁾ with various rates in different regions such as 7.4% in Palestine ⁽¹⁶⁾, 31.1% in Libya ⁽²²⁾, 51% in Egypt ⁽²⁴⁾, 12% in Iran ⁽²⁵⁾, and 7.9% in Turkey ⁽¹⁸⁾. Duration and number of sessions of HD was a significant risk factor for HCV infection in HD patients, this explained that nosocomial transmission of HCV was related to dialysis, since longer duration of dialysis mean a longer period at risk of acquiring an infection, Same observations are reported by other studies ^(22- 26) A relatively large study in Brazil demonstrated that patients on HD for more than 3 years had a 13.6-fold greater risk of HCV positivity compared with subjects with less than 1 year of HD treatment⁽²⁷⁾Although blood transfusion was an important risk factor for HCV infection in some studies ^(23,25), in this study and several others ^(24,26) no significant relation was observed, which could be the result of effective viral screening of donated blood. Numerous measures have been taken to decrease the prevalence of viral hepatitis in HD units. However, isolation of machines and patients in separate rooms, to prevent or decrease transmission of viral hepatitis in HD units, remains a controversial issue⁽⁵⁾.The hemodialysis machine and dialysis membranes themselves are not considered sources of HCV infection and patients are not routinely dialyzed on dedicated machines⁽⁶⁾.Although the strict adherence of universal precautions is considered the standard preventive tool in HD patients, the application of these universal precautions is not optimal in some circumstances, such as limitation of nursing staff⁽²⁸⁾, high HCV positive (prevalence more than 10%) and crowded units, and it is also due to inadequate infection control measures and procedures and/or a breakdown in infection control measures ⁽²⁹⁾. which include inadequate isolation of infected patients, contamination of dialysis machines , improper sterilization and inadequately trained practicing staff on the value of wearing gowns, gloves and masks, hand washing and proper disposal of contaminated materials

Studies supporting isolationKarkar et al. have reported a significant decrease in the prevalence of HCV-positive patients from 57% to 29% after applying an isolation protocol⁽⁵⁾.Mohamed et al. have reported similar results in reducing the HCV-positive prevalence from 50% to 23% by the application of isolation protocol during a five years period (2003 – 2008)⁽³¹⁾. Hussein et al., by using a more developed and sensitive virological test (HCV-RNA), reported that the prevalence of HCV positivity with complete isolation decrease from 16.2% in 2005 to 6.5% in 2009, with zero seroconversion during the study period⁽³²⁾.

Problems with isolation

In spite of the value of HCV isolation application in controlling the epidemic of HCV infection in HD units, this protocol has many drawbacks:

- a. There is a considerable difficulties in the diagnosis and isolation of HCV-infected patients in the early phase of the infection⁽³³⁾.
- b. There are many genotypes of HCV⁽³⁴⁾, and the lack of cross-immunity between the many strains of HCV limits the usefulness of patients isolation. In addition, grouping of anti-HCV-positive patients together increases their exposure to various strains of HCV and may increase the risk of multiple infections⁽³⁵⁾.
- c. Unlike HBV, HCV is present in low level in the serum and is probably destroyed within a few hours when the sample is stored at room temperature⁽³³⁾. The risk of nosocomial transmission of HCV is thus expected to be lower than that of HBV. This is supported by the demonstration that the risk for transmission of HCV after accidental puncture with an infective needle is only 5-10% versus more than 30% for HBV⁽³⁵⁾.
- d. Isolation of anti-HCV-positive patients is difficult and, it is unlike HBV, needs four places for proper isolation, one each for: HBV and HCV negative patients, HBV and HCV positive, HBV negative and HCV positive and HBV positive and HCV negative.

As a result of these problems and as an alternative to isolation policy, the majority of HD units strictly adhere to “the universal infection control precautions⁽³⁷⁾”.

CONCLUSION

In conclusion, patients on maintenance HD in Ad-Diwaniyah teaching hospital have a high prevalence of HCV infection and lower rates of HBV infection.

The factors associated with HCV infection are highly suggestive of nosocomial transmission within HD units, usually because of lapses in effective infection control practice.

There was a significant relationship between anti-HCV-positive patients with Number of sessions of HD and dialysis duration.

RECOMMENDATIONS

The following is a general guide to control acquired infection in the dialysis units

1) Strict adherence to infection control measures and more effective follow-up procedures .

- (1) Use of disposable gloves when dealing with patients.
- (2) Items that used on a treatment station should be either for single use or disposable, and reserved for a single patient and multi-dose medication vials should be prepared for use away from the patient station .

(3) Clean areas should be designated and used for the preparation of medications and should be separated from contaminated area.

2) reduce dependence on transfusions of blood for the treatment of anemia and the blood used for transfusion should be screened for viral infection .

3) Immunization: Hepatitis B vaccination is recommended early in the course of kidney disease for all susceptible patients and to healthcare workers

4) Containment and Management:

- Dialyze HBsAg-positive patients in a separate room with dedicated machine, equipment, medications and supplies.
- strict isolation of HCV+ patients in combination with implementation of universal prevention measures are recommended to avoid burden of virus transmission and morbidity.

5) Cleaning and Disinfection

6) Screening: Serologic testing of all chronic kidney disease patients should occur prior to admission to the HD unit and annual testing of patients is required for early detection of these infections

7) Education: The hemodialysis program should have an educational plan for patients and their families regarding the patient's role in infection prevention and control. The program should also provide educational opportunities for healthcare workers to gain knowledge about transmission of bloodborne viruses.

Special Issue: The 3rd International (virtual) Conference for Medical Sciences

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