Prevalence Rate of Hepatitis C virus (HCV) and Hepatitis B virus (HBV) Infection in Iraqi Patients on Hemodialysis: Cross Sectional Study

Wisam Hatef Kareem Al-Muramdy

Ph.D. Dr. Physician / Department of Medicine/ Al-Diwaniyah Teaching Hospital/ Al-Diwaniyah Province/ Iraq

Abstract

Background: Globally, the prevalence rate of chronic HCV infection is highly variable and it is estimated to range from 5 % up to 60 %. In the United States, it has been estimated that the prevalence rate of HCV in patients on hemodialysis is 5 times as that seen in the general population; the prevalence rate in those patients has been approximately 8 %. Hepatitis B virus infection was also a common health issue affecting patients on hemodialysis; however, a great reduction in the incidence rate of HBV in those patients has been noticed over that last decades. This reduction in the incidence of HBV has been attributed to vaccination, the use of erythropoietin instead of frequent blood transfusion for treatment of anemia and screening of blood donors.

Aim of the study: the current study was planned and carried out aiming at exploring the prevalence rates of both HBV and HCV in patients and hemodialysis.

Patients and methods: The current cross sectional study was based on the inclusion of 160 patients with chronic renal failure and on regular hemodialysis. The study was carried out in the dialysis unit at Adiwaniyah Teaching Hospital, Adiwaniyah Province, mid-Euphrates region of Iraq. The study started on the second of January 2019 and Ended on the 15th of September 2019. From each patient, a 5 ml sample of venous blood was obtained and send to the central Laboratory of Adiwaniyah Teaching Hospital for purpose of serologic identification of HBV and HCV infection in addition to estimation of both blood urea and serum creatinine.

Results: HCV was detected in 34 (21.2 %), while HBV was seen in 2 (1.2 %) and combined HBV and HCV infection was observed in 2 (1.2 %). According to serologic method, 122 (76.2 %) were free of HCV or HBV infection.

Conclusion: HCV was far more frequent than HBV infection in Iraqi patients with hemodialysis with prevalence rates of 21.2 % versus 1.2 %, respectively.

Key words: *Prevalence, HCV, HBV, Iraqi patients, hemodialysis*

Introduction

Based on available laboratory investigations routinely done for hemodialysis patients, Hepatitis C virus infection appears to be highly prevalent in comparison with the general population [(1)]. Besides, the existence of such chronic HCV infection is associated with morbidity in patients on hemodialysis [(1)]. The principal risk factors for HCV infection in those patients are contact with blood and blood products [(1)]. Globally, the prevalence rate of chronic HCV infection is highly variable and it is estimated to range from 5 % up to 60 % [(2- 3)]. In the United States, it has been estimated that the prevalence rate of HCV in patients on hemodialysis is 5 times as that seen in the general population; the prevalence rate in those patients has been approximately 8 % [(4)]. The incidence rate of HCV in patients on hemodialysis in Europe is also higher than that in the general population with considerable variation in the incidence rates from region to region, but in general it is lowest in northern European countries such as England

and Sweden and lowest in southern European countries such as Italy and Spain [5- 6].

Hepatitis B virus infection was also a common health issue affecting patients on hemodialysis; however, a great reduction in the incidence rate of HBV in those patients has been noticed over that last decades. This reduction in the incidence of HBV has been attributed to vaccination, the use of erythropoietin instead of frequent blood transfusion for treatment of anemia and screening of blood donors. Nevertheless, the risk of acquiring HBV by hemodialysis patients is still high because of several risk factors such as shared hemodialysis devices, increased exposure to blood and blood products, immunodeficiency state and frequent skin breaching. Indeed, acute infection with HBV in dialysis patients is usually mild and frequently asymptomatic; however, significant proportion of patients may progress to carrier state or chronic hepatic disease, increased risk of cirrhosis and even liver cancer [7- 8].

Here in Mid-Euphrates region of Iraq, there are limited resources with respect to hemodialysis unit in Adiwaniayh Teaching Hospital at Adiwaniayh province. The number of hemodialysis devices and related equipments is limited and vaccination against HBV is frequently unavailable. For these reasons, we expect to find a relatively high prevalence rate of HBV and HCV infections in Iraqi patients on hemodialysis. Therefore, the current study was planned and carried out aiming at exploring the prevalence rates of both HBV and HCV in patients and hemodialysis.

Patients and Method

The current cross sectional study was based on the inclusion of 160 patients with chronic renal failure and on regular hemodialysis. The study was carried out in the dialysis unit at Adiwaniyah Teaching Hospital, Adiwaniyah Province, mid-Euphrates region of Iraq. Patients were randomly selected in such a way that the first patient was chosen according to a random digit generated by computer software and the rest of patients were selected as every other 3 patients. The study started on the second of January 2019 and Ended on the 15th of September 2019.

The main variables included in the present study were age, gender, cause of renal failure, blood urea and serum creatinine before and after the last session of dialysis in addition to the primary outcome which was serologic evidence of HBV and HCV infection. From each patient, a 5 ml sample of venous blood was obtained and send to the central Laboratory of Adiwaniyah Teaching Hospital for purpose of serologic identification of HBV and HCV infection in addition to estimation of both blood urea and serum creatinine before hemodialysis session. Another sample of venous blood was obtained few hours after the end of dialysis session in order to measure blood urea and serum creatinine after hemodialysis. The same routine laboratory methods that are usually carried out in central laboratory were performed in the current study.

Data were then transformed into an SPSS spread sheet (IBM, Chicago, USA, version 23). Categorical data were expressed as number and percentage, whereas numeric data were expressed as mean, standard deviation and range. Paired t-test was used to study difference in mean blood urea and serum creatinine before and after hemodialysis sessions. The level of significance was considered at $P \leq 0.05$.

The study was approved by institutional ethical approval committee and verbal consent was obtained from each participants. In addition to formal official agreement obtained from Health Directorate in Adiwaniyah province.

Results

The general characteristics of patients enrolled in the current study are shown in table 1. The mean age of patients was 47.65 ±16.43 years with a wide range of age of 5 to 86 years. The study included 83 (51.9 %) males and 77 (48.1 %) females. According to blood group, the most frequent group was O+, 37 (23.1 %), followed by B+, 37 (23.1 %) and then by A+, 31 (19.4 %), whereas, the least frequent blood group was AB-, 1 (0.6 %), as shown in table 1. The most frequent cause of renal failure was systemic hypertension, 49 (30.6 %) followed by diabetes mellitus, 17 (10.6 %); other causes are shown in table. In 34 (21.3 %), no cause was identified.

Prevalence rate of hepatitis C virus (HCV) and hepatitis B virus (HBV) infection in patients on hemodialysis is shown in table 2. HCV was detected in 34 (21.2 %), while HBV was seen in 2 (1.2 %) and

combined HBV and HCV infection was observed in 2 (1.2 %). According to serologic method, 122 (76.2 %) were free of HCV or HBV infection.

Mean blood urea before dialysis was 250.90 ±52.81 mg/dl and it was reduced following dialysis to 100.38 ±16.97 mg/dl. Mean serum creatinine before dialysis was 12.43 ±1.75 mg/dl and it was reduced following dialysis to 9.88 ±1.78 mg/dl. The reduction in both serum creatinine and blood urea was highly significant ($P < 0.001$); however, normal serum creatinine or blood urea levels were not achieved in any participant, as shown in table 3.

Table 1: General characteristics of the study sample

Characteristic	**Value**
Age (years)	
Mean ±SD	47.65 ±16.43
Range	5 -86
Gender	
Male, n (%)	83 (51.9 %)
Female, n (%)	77 (48.1 %)
Blood group	
A+, n (%)	31 (19.4 %)
B+, n (%)	37 (23.1 %)
AB+, n (%)	9 (5.6 %)
O+, n (%)	71 (44.4 %)
A-, n (%)	2 (1.2 %)
B-, n (%)	3 (1.9 %)
AB-, n (%)	1 (0.6 %)
O-, n (%)	6 (3.8 %)
Cause	
Systemic hypertension, n (%)	49 (30.6 %)
Diabetes mellitus, n (%)	17 (10.6 %)
Systemic hypertension + Diabetes mellitus, n (%)	13 (8.1 %)
Chronic infection, n (%)	12 (7.5 %)
Renal stone, n (%)	8 (5.0 %)
Shock, n (%)	7 (4.4 %)
Systemic Lupus Erythematosus, n (%)	2 (1.3 %)
Iatrogenic, n (%)	8 (5.0 %)
Glomerulonephritis, n (%)	3 (1.9 %)
Cardiac failure, n (%)	2 (1.3 %)
Congenital, n (%)	2 (1.3 %)
Benign Prostatic Hyperplasia, n (%)	3 (1.9 %)
No identifiable cause, n (%)	34 (21.3 %)

n: number of cases; SD: standard deviation

Table 2: Prevalence rate of hepatitis C virus (HCV) and hepatitis B virus (HBV) infection in patients on hemodialysis

Characteristic	n	%
HCV	34	21.2
HBV	2	1.2
HBV and HCV	2	1.2
Negative	122	76.2

HCV: hepatitis C virus; HBV: hepatitis B virus

Table 3: Blood urea and serum creatinine before and after hemodialysis

Characteristic		Before dialysis	After dialysis	P †
Blood Urea	Mean ± SD	250.90 ±52.81	100.38 ±16.97	< 0.001 HS
	Range	133 -413	66 -157	
Serum Creatinine	Mean ± SD	12.43 ±1.75	9.88 ±1.78	< 0.001 HS
	Range	6.6 -16.1	4.6 -13.7	

SD: standard deviation; †: Paired sample t-test; HS: highly significant at $P \leq 0.01$

Discussion

The advent of hemodialysis has dramatically improved the quality of life of patients with chronic renal failure since it has extended their life span and reduced significantly complications associated with chronic renal failure. However, the problem of contact with blood and blood products accompanying hemodialysis has resulted in substantial increase in the prevalence rate of HCV and HBV infection in those patients.

Here in Iraq and particularly in the mid-Euphrates region of Iraq, we suffer shortage in resources and equipments related to hemodialysis. Therefore, a relatively large number of patients share limited number of hemodialysis devices and equipments. In addition, to the limitation in screening programs related to detection of infected blood and blood products in the available blood bank within our relatively poor province. Therefore, we expect to see a relatively high prevalence rate of HCV and HBV infection in patients undergoing regular hemodialysis.

For those reasons the current cross sectional study was planned and conducted in the hemodialysis unit of Adiwaniayh Teaching Hospital. One limitation was the unavailability of molecular diagnostic PCR method for more accurate detection of HCV and HBV genome in the blood of patients undergoing dialysis, thus we depend for identification of these viruses on the available routine serological methods in the central hospital laboratory.

The current study showed that HCV infection prevalence rate was 21.2 %, whereas, that of HBV was 1.2 %. The present findings suggested a higher prevalence rate for HCV in hemodialysis patients than that reported in the United States (8 %) (4, 9). In addition it is more than that reported in Sweden and England, 8.8 % and 2 %, respectively (5, 6). However, it approaches the reported prevalence rate in Spain, Italy and Turkey, 25 %, 27 % and 30 % (5, 6). Therefore, it appears that in our patients, the prevalence rate of HCV is among highest levels worldwide. This may be attributed to limited number of equipments that are shared by large number

of hemodialysis patients. In addition, it may be attributed to less proper screening of blood and blood products for HCV infection in the available local blood bank. In the currents study, on the other hand, the prevalence rates of HBV infection alone or in combination with HCV were relatively small, 2 % and 2%, respectively. Indeed, these figures are very close to what was reported by other authors in other regions of the world. For example, the estimated prevalence of HBV alone in hemodialysis patients in North India was 1.5 % while co-infection with both HBV and HCV was seen in 0.8% (10). Co-infection with both HBV and HCV was reported from various studies to range from 0.8 % up to 37 % (10-16).

Indeed, it has been stated that approximately 2 % of all mortality in hemodialysis patients are attributed to concomitant viral infection. Therefore, efforts should be made by our health institutes in order to minimize to a lesser degree the prevalence rate of HCV and HBV infection in our hemodialysis patients. These efforts should be mainly directed toward provision of a larger number of hemodialysis equipments to minimize sharing such equipments among large number of patients and also efforts should be directed toward screening of blood and blood products for infectious agents and particular for HCV and HBV.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Al-Diwaniyah teaching hospital and all experiments were carried out in accordance with approved guidelines.

References

1. Caragea D, Mihailovici A, Streba C. Hepatitis C Infection in Hemodialysis Patients. Curr Health Sci J. 2018; 44(2):107–112.
2. Sun J, Yu R. Zhu B. Wu J. Larsen S. Zhao W. Hepatitis C infection and related factors in hemodialysis patients in china: systematic review and meta-analysis. Ren Fail. 2009; 31(7):610–620.
3. Alavian S, Kabir A, Ahmadi A B. Lankarani K B. Shahbabaie M A. Ahmadzad-Asl M. Hepatitis C infection in hemodialysis patients in Iran: a systematic review. Hemodial Int. 2010; 14(3):253–262.
4. Patel P, Thompson N D, Kallen A J. Arduino M J. Epidemiology, surveillance, and prevention of hepatitis C virus infections in hemodialysis patients. Am J Kidney Dis. 2010; 56(2):371–378.
5. Barril G. Decrease in hepatitis C virus (HCV) prevalence in hemodialysis patients in Spain: effect of time, initiating HCV prevalence studies and adoption of isolation measures. Antiviral Res. 2003;60(2):129–134.
6. Taskapan H. Patient to patient transmission of hepatitis C virus in hemodialysis units. Clin Nephrol. 2001;55(6):477–481.
7. Recommendations for preventing transmission of infections among chronic hemodialysis patients. Centers for Disease Control and Prevention. MMWR Recomm Rep. 2001; 50: 1–43
8. Schroth R, Hitchon C, Uhanova J. Hepatitis B vaccination for patients with chronic renal failure. Cochrane Database Syst Rev. 2004; CD003775
9. Finelli L, Miller J, Tokars J, Alter M J. Arduino M J. National surveillance of dialysis-associated diseases in the United States. Semin Dial. 2005;18(1):52–61.
10. Malhotra R, Soin D, Grover P. Galhotra S. Khutan H. Kaur N. Hepatitis B virus and hepatitis C virus co-infection in hemodialysis patients: A retrospective study from a tertiary care hospital of North India. J Nat Sci Biol Med. 2016;7(1):72–74.
11. Bhaumik P, Debnath K. Prevalence of hepatitis B and C among haemodialysis patients of Tripura, India. Euroasian J Hepato-Gastroenterol. 2012;2:10–3.
12. Hung K, Chen W, Yang C S. Lee S H. Wu D J. Hepatitis B and Hepatitis C in haemodialysis patients. Dial Transplant. 1995;24:135–9.
13. Reddy G A, Dakshinamurthy K V, Neelaprasad P. Gangadhar T. Lakshmi V. Prevalence of HBV and HCV dual infection in patients on haemodialysis. Indian J Med Microbiol. 2005;23:41–3.
14. Kara I H, Yilmaz M E, Sari Y. Diizen S. Usul Y. Isikoglu B. Seroprevalence and risk factors of HCV in dialysis patients in a University Haemodialysis Center of southeast Anatolia, Turkey. Dial Transplant. 2001;30:748–55.

15. Saravanan S, Velu V, Nandakumar S. Madhavan V. Shanmugasundaram U. Murugavel K G. et al. Hepatitis B virus and hepatitis C virus dual infection among patients with chronic liver disease. J Microbiol Immunol Infect. 2009;42:122–8.
16. Jain P, Nijhawan S. Occult hepatitis C virus infection is more common than hepatitis B infection in maintenance hemodialysis patients. World J Gastroenterol. 2008;14:2288–9.