

Seroprevalence of hepatitis B, C and D viral among hemodialysis patients in Tehran

Davood Yadegarynia¹, Hossein Hatamai², Sara Rahmati Roodsari^{2*}, Zahra Arab-Mazar¹

¹Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

²School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Received: February 2017, Accepted: May 2017

ABSTRACT

Background and Objectives: Different studies show that the prevalence of hepatitis viruses in hemodialysis (HD) patients is much greater than general population. It is important to be aware of local prevalence data, in order to control infections and prevention of nosocomial transmission. The aim of this cross-sectional study was to investigate the seroprevalence of hepatitis B, C, and D viral infections among HD patients.

Materials and Methods: During 2016, a cross-sectional study was conducted in Tehran, among 360 HD patients from 5 hemodialysis centers. All HBsAg positive subjects were screened for Hepatitis B surface Ag (HBsAg), Hepatitis C virus Ab (HCVAb) and Hepatitis D virus antibody (HDVAb), using specific enzyme linked immunoassay.

Results: 360 patients were involved including 213 males (59.17%) and 147 females (40.83%). The mean age in current study was 53.43 years. HBV positive (HBsAg positive) was found in 1.39% of patients, HCVAb in 3.06%, whereas no HDV positive patient was diagnosed. In HD, duration of 1-5 years has the highest frequency rate.

Conclusion: Prevalence of HBV, HCV and HDV in hemodialysis patients seems low in Tehran province. Due to higher prevalence of HCV, it is recommended to check the patients for anti-HCV Ab before admission to the centers.

Keywords: Seroprevalence, HBV, HCV, HDV, Hemodialysis

INTRODUCTION

Viral infections are at increased risk of contraction, in patients undergoing dialysis treatment, and in particular HD due to the lack of cellular immunity, which increases their susceptibility to infection. However, this treatment helps to increase patients

longevity, it also make them susceptible to some infection such as blood borne viruses. HBV and HCV infections are more frequent in HD patients compared to general population and are known to cause chronic liver disease (1, 2). This arises as a consequence of sharing dialysis machines or lack of inadequate infection control methods in hemodialysis centers (3).

More than 75% of HBV infected patients live in Asia and more than 8% of the population are chronic carriers (4). Prevalence rate of HBV in Iran is around 1.7-2.1 percent (5). In dialysis units, HBV transmission has been observed among patients to patient and

*Corresponding author: Sara Rahmati Roodsari, MD, MPH, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Tel: +9822439963

Email: s_r_r85@yahoo.com

patient to staff. In previous studies, the prevalence rate of HBV infection in HD patients ranged from 0% to 58% (6, 7). Viral hepatitis is complicating HD and it has been observed from the earliest days of this therapy. Routine screening of blood donor products, HBV vaccination and periodic measurement of anti-HBV antibodies help to decrease the prevalence rate of HBV in general population and HD in the past years (8).

Since HCV in most of infected patients are asymptomatic, it will be transmitted easily in the absence of standard infection control measures. Moreover, due to lack of an effective vaccine for HCV, it seems that HCV is the most common cause of chronic viral hepatitis in HD patients (9). The prevalence rate of HCV among HD patients is variable between different countries and between different studies (10) ranging from 3% in the Netherlands, Europe to more than 76% in Indonesia, Asia (11, 12). Also the prevalence rate varies among different dialysis centers in a single country (13-15). In the previous studies in Iran, the prevalence rate of HCV antibody has been reported 4.9%, inpatients of the central province, 5.5% in Shiraz (16), 9.55% in Rasht (17), 23.9% in Qazvin (18) and 13.2 % in Tehran (19).

Hepatitis D virus (HDV) is a small virus, requiring the concomitant presence of HBV for survival and pathogenicity (20). Approximately, 5% of the HBV patients are infected with HDV worldwide (21). In Iran, among HBsAg positive patients the 5.7-12.7 percent are infected with HDV (22). The HBV/HDV transmission is a major risk factor among HD patients. Different rates of HDV transmission in HD patients were reported in previous studies (23). It seems that it is important to know the prevalence of HDV infection in HD patient with HBV infection.

In this cross-sectional study, considering the importance of population study, we aimed to estimate the prevalence of HBV, HCV, and HDV infections in Tehran selected hemodialysis centers, in 2016.

MATERIALS AND METHODS

This study was a cross-sectional study, conducted in five hemodialysis centers in Tehran province, in 2016. 360 patients, who were under HD treatment, were included in the study. The Ethical Committee of Shahid Beheshti University of Medical Sciences

in Iran approved this study (ethics committee code: IR. SBMU. RETECH.REC.1395.462). All the enrolled participants were informed about study and written informed consent was obtained.

Demographic information such as gender, age, location of residence (urban vs. rural), education and marital status were collected from the patients (Table 1). Five mL of blood was withdrawn from each patient. The blood samples were centrifuged at 4000 rpm for 10 minutes and serum was separated and stored below -80°C for further use.

Serological markers of HBV (HBsAg: hepatitis B surface antigen, HBcAb: hepatitis B core antibody, and HBsAb: hepatitis B surface antibody) and HDV infection were tested in the present study via direct immunoenzymatic assay (24) of the sandwich type using commercial kits (Diapro, Italy). Samples found to be positive for HBsAb, were tested for anti-HDV antibody using immunoglobulin G (IgG) antibodies in the above-mentioned enzyme-linked immunosorbent assay (24) and also by using the competitive ELISA method. Anti-HCV antibodies was determined using ELISA (BIORAD, France).

Statistical analysis was performed using SPSS version 16 (SPSS Inc, Chicago, IL, USA).

RESULTS

Total of 360 HD patients were participated in this study. 213 (59.17%) of patients were male and 147 (40.83%) were female; the mean age of patients was 53.43 years. Based on serological assays, it was determined that five (1.39 %) patients were HBV positive (HBsAg-positive) 11 (3.06%) were HCV positive, whereas no HDV positive patients was found. The highest frequency for duration of dialysis is 1-5 years (Table 1).

DISCUSSION

The present study was aimed to assess and determine seroprevalence of Hepatitis B, Hepatitis C and Hepatitis D viral infections among HD patients in Tehran, during 2016. In HD patients the prevalence of viral hepatitis and also the rate of mortality is much greater than general population. HD patients are recognized as one of the high-risk groups for hepatitis C virus (HCV) infection (25). Viral hepatitis is still a

Table 1. Socio-demographic characteristics of hemodialysis patients and controls

Variable	N	Percentage
Age (years)		
>60	58	16.11%
40-60	132	36.67%
20-40	90	25%
<20	3	0.83%
Marital Status		
Single	25	6.94%
Married	335	93.05%
Residence		
Urban	262	72.77%
Rural	98	27.22%
Educational level		
Illiterate	100	27.77%
Primary School	190	52.77%
High School	57	15.83%
College and higher	13	3.6%
Duration of hemodialysis (years)		
>5	58	16.11%
1-5	213	59.17%
<1	89	24.72%

significant health problem especially in HD patients, particularly in the developing countries. Nowadays, early detection help us to better control and prevent the widespread presence of hepatitis in dialysis units.

Some investigators studied the prevalence of HBV, HCV and HDV in HD patients, but the results were varying in different population (26, 27). Alavian et al. reported that the prevalence of HBV among HD patients in Iran, was reduced from 3.8 % in 1999 to 2.6 in 2006 (2). The prevalence of HBV infection in the current study is low, compared with some similar studies (28-30).

Different studies confirmed that length of HD and use of shared machine was associated with high HBV prevalence in HD patients. In 2004, Sartor et al. reported that using shared devices in HD patients are associated with increased risk of viral infection (31). Patients were categorized in three groups based on the length of hemodialysis: Less than one year, between 1-5 years and longer than 5 years. Our study shows that the frequency of patients in 1-5 years category is higher compared to category of less than 1 year.

In present study, the rate of HCV infection in HD patients is comparable with other studies in other part of country. For example, in Tehran province, 1.9% of HD patients has positive HCVAb (32). In another study by Kheirabad, the rate of HCV in HD patients in Hormozgan province was 3.36% (33). It seems that we can conclude that Iran is one of the low prevalence countries for HCV, among HD patients.

Our findings revealed that in this study, performed in Tehran province, none of the patients were infected with HDV. The finding of this research study is compatible with recent studies in Iran (2, 29).

Among HD patients, especially HBs-Ag-positive patients, HDV infection become a major concern, while this virus can transmit at very high-serum titration (34). El Hady et al. demonstrated that HDV is much more frequently transmitted in HBV renal patients compared with HBV non-renal patients (35). HDV can cause chronic liver disease (36) and since an efficient proper treatment has not been found yet for HDV infection (37), prevention and early detection seems to be the best solution in order to limit the rate of transmission. As a result, designing an integrative protocol appears to play a vital role in lowering the morbidity and mortality among HBsAg-positive HD patients.

In conclusion, the prevalence of HBV, HCV and HDV infection in HD center of Tehran is moderate low. Educating people about HBV transmission risk factors and national vaccination help to decrease the prevalence rate among HD patients.

ACKNOWLEDGEMENTS

We greatly acknowledge the participants and the study team. We would like to appreciate also the contributions of the staff members of Hemodialysis Centers for their kind cooperation during sample collection. Most importantly, the authors would like to thank all participants for their authorization in collecting blood samples. This Article has been extracted from the MPH thesis of Dr. Rahmati Roodsari at School of Public Health, Shahid Beheshti University of Medical Sciences.

We would also like to express our gratitude to Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences for financial support during this study.

REFERENCES

1. Oguchi H, Miyasaka M, Tokunaga S, Hora K, Ichikawa S, Ochi T, et al. Hepatitis virus infection (HBV and HCV) in eleven Japanese hemodialysis units. *Clin Nephrol* 1992;38:36-43.
2. Alavian SM, Bagheri-Lankari K, Mahdavi-Mazdeh M, Nourozi S. Hepatitis B and C in dialysis units in Iran: changing the epidemiology. *Hemodial Int* 2008;12:378-382.
3. Elamin S, Abu-Aisha H. Prevention of hepatitis B virus and hepatitis C virus transmission in hemodialysis centers: review of current international recommendations. *Arab J Nephrol Transplant* 2011;4(1):35-47.
4. Kane M. Global programme for control of hepatitis B infection. *Vaccine* 1995;13:S47-S9.
5. Esmaeilzadeh A, Goshayeshi L, Bahari A, Ganji A, Mozaffari HM. Regional distribution of hepatitis delta virus in Iran: a Systematic literature review. *Govaresh* 2017;22(1):57-63.
6. Department of Health and Social Security: Report of advisory committee on hepatitis and treatment of chronic renal failure 1970-1972. London, DHSS, 1972.
7. Mohammed AA, Enan KA, Khair OM, Hussien MO, El Hussein ARM, Elkhidir IM. Prevalence of occult hepatitis B virus (HBV) infections in haemodialysis patients in Khartoum State, Sudan from 2012 to 2014. *J Med Lab Diagn* 2015;6:22-26.
8. Edey M, Barraclough K, Johnson DW. Review article: Hepatitis B and dialysis. *Nephrology* 2010;15:137-145.
9. Sulowicz W, Radziszewski A, Chowaniec E. Hepatitis C virus infection in dialysis patients. *Hemodial Int* 2007;11:286-295.
10. Druwe P, Michielsen P, Ramon A, De Broe M. Hepatitis C and nephrology. *Nephrol Dial Transplant* 1994;9:230-237.
11. Schneeberger PM, Keur I, van Loon AM, Mortier D, de Coul KO, Verschuuren-van Haperen A, et al. The prevalence and incidence of hepatitis C virus infections among dialysis patients in the Netherlands: a nationwide prospective study. *J Infect Dis* 2000;182:1291-1299.
12. Handajani R, Lusida M, Darmadi S, Adi P, Ishido S, Katayama Y, et al. Differential prevalence of hepatitis C virus subtypes in healthy blood donors, patients on maintenance hemodialysis, and patients with hepatocellular carcinoma in Surabaya, Indonesia. *J Clin Microbiol* 1996;34:2875-2880.
13. Tokars JI, Miller ER, Alter MJ, Arduino MJ. National surveillance of dialysis associated diseases in the United States, 1995. *ASAIO J* 1998;44:98-107.
14. Keur I, Schneeberger P, Van der Graaf Y, Vos J, Van Dijk W, Van Doorn L-J. Risk factors for HCV infection in two haemodialysis units in the Netherlands. *Neth J Med* 1997;50:97-101.
15. Hinrichsen H, Leimenstoll G, Stegen G, Schrader H, Fölsch U, Schmidt W. Prevalence and risk factors of hepatitis C virus infection in haemodialysis patients: a multicentre study in 2796 patients. *Gut* 2002;51:429-433.
16. Petrosillo N, Gilli P, Serraino D, Dentico P, Mele A, Ragni P, et al. Prevalence of infected patients and understaffing have a role in hepatitis C virus transmission in dialysis. *Am J Kidney Dis* 2001;37:1004-1010.
17. Ansari M, Kooloobandi A. Prevalence of hepatitis C virus infection in thalassemia and haemodialysis patients in north Iran-Rasht. *J Viral Hepat* 2002;9:390-392.
18. Alavian S, Tabatabaei S, Lankarani K. Epidemiology of HCV infection among thalassemia patients in eastern Mediterranean countries: a quantitative review of literature. *Iran Red Crescent Med J* 2010;2010:365-376.
19. Alavian SM, Einollahi B, Hajarizadeh B, Bakhtiari S, Nafar M, Ahrabi S. Prevalence of hepatitis C virus infection and related risk factors among Iranian haemodialysis patients. *Nephrology* 2003;8:256-260.
20. Husa P, Linhartova A, Nemecek V, Husova L. Hepatitis D. *Acta Virol* 2005;49:219.
21. Ghadir MR, Belbasi M, Heidari A, Sarkeshikian SS, Kabiri A, Ghanooni AH, Iranikah A, Vaez-Javadi M, Alavian SM. Prevalence of hepatitis d virus infection among hepatitis B virus infected patients in qom province, center of Iran. *Hepat Mon* 2012;12:205-208.
22. Rizzetto M, Alavian SM. Hepatitis delta: the rediscovery. *Clin Liver Dis* 2013;17:475-487.
23. Delić D, Gotić M, Oštrić V, Fridman V, Nikolić P, Jemuović L, et al. Epidemiology of hepatitis D virus (delta) infection in Yugoslavia. *Liver* 1993;13:302-304.
24. Martins MA, França E, Matos JC, Goulart E. Post-discharge surveillance of children and adolescents treated for surgical site infections at a university hospital in Belo Horizonte, Minas Gerais State, Brazil. *Cad Saude Publica* 2008;24:1033-1041.
25. Alavian SM, Kabir A, Ahmadi AB, Lankarani KB, Shahbabaie MA, Ahmadzad-Asl M. Hepatitis C infection in hemodialysis patients in Iran: a systematic review. *Hemodial Int* 2010;14:253-262.
26. Mashragi F, Bernstein RS, Al-Mazroa M, Al-Tawfiq JA, Filemban S, Assiri A, et al. HIV transmission at a Saudi Arabia hemodialysis unit. *Clin Infect Dis* 2014;59:897-902.
27. Su Y, Yan R, Duan Z, Norris JL, Wang L, Jiang Y, et al. Prevalence and risk factors of hepatitis C and B virus infections in hemodialysis patients and their spouses: A multicenter study in Beijing, China. *J Med Virol* 2013;85:425-432.
28. Bahri F, Kheirabad AK, Ghasemzadeh I, Shoja S, Gouklani H. Hepatitis Viruses B and D and Human

- Immunodeficiency Virus infections in hemodialysis patients in the south of Iran: prevalence and genotypes. *Hepat Mon* 2016;16(1): e32971.
29. Zahedi MJ, Moghaddam SD, Alavian SM, Dalili M. Seroprevalence of hepatitis viruses B, C, D and HIV infection among hemodialysis patients in Kerman Province, South-East Iran. *Hepat Mon* 2012;12(5):339-343.
 30. Voiculescu M, Iliescu L, Ionescu C, Micu L, Ismail G, Zilisteanu D, et al. A cross-sectional epidemiological study of HBV, HCV, HDV and HEV prevalence in the SubCarpathian and South-Eastern regions of Romania. *J Gastrointestin Liver Dis* 2010;19:43-48.
 31. Sartor C, Brunet P, Simon S, Tamalet C, Berland Y, Drancourt M. Transmission of hepatitis C virus between hemodialysis patients sharing the same machine. *Infect Control Hosp Epidemiol* 2004;25:609-611.
 32. Ashkani-Esfahani S, Alavian SM, Salehi-Marzijarani M. Prevalence of hepatitis C virus infection among hemodialysis patients in the Middle-East: A systematic review and meta-analysis. *World J Gastroenterol* 2017;23(1):151-166.
 33. Kheirabad AK, Bahri F, Kargar M, Ghasemzadeh I. Hepatitis C and G Virus infection prevalence among hemodialysis patients and associated risk factors in the Hormozgan province of southern Iran. *Hepat Mon* 2016;16(10):e40375.
 34. Hosseini-Moghaddam SM, Afshar-Imani A, Rizzetto M, Alavian SM. Viral hepatitis D among hemodialysis patients: a worldwide underestimated problem. *Hepat Mon* 2009;9:305-311.
 35. El Hady HA, Yassein YS, Tawfek AR, Elsayed AF, Dewedar MK. Study of epidemiological features of hepatitis D virus infection in HBsAg-positive chronic hemodialysis patients. *Menoufia Med J* 2016;29(1):37-43.
 36. Alavian SM. Hepatitis D is a forgotten problem in hemodialysis patients in the world. *Hepat Mon* 2008;8(1):9-10.
 37. Hsieh TH, Liu CJ, Chen DS, Chen PJ. Natural course and treatment of hepatitis D virus infection. *J Formos Med Assoc* 2006;105:869-881.