

Shiraz E-Medical Journal
Vol. 13, No. 3, July 2012

<http://semj.sums.ac.ir/vol13/jul2012/90027.htm>

**Epidemiology of Hepatitis C Virus Infection in ESRD Patients in
Khuzestan Province, Iran**

Seyed Seifollah Beladi Mousavi ¹, Eskandar Hajiani ^{2*}, Fatemeh Hayati ¹, Seyed Jalal Hashemi ²,
Aliakbar Shayesteh ², Seyed Mohammad Salehi Behbehani ¹, Abdorrahim Masjedi Zadeh ², Beladi
Mousavi M ¹

¹ Section of Nephrology, Department of Internal Medicine, Emam Hospital, Ahwaz Jundishapur University of Medical Sciences, Ahwaz, Iran

² Division of Gastroenterology, Department of Internal Medicine, Emam Hospital, Ahwaz Jundishapur University of Medical Sciences, Ahwaz, Iran

³ Section of Nephrology, Department of Internal Medicine, Emam Hospital, Ahwaz Jundishapur University of Medical Sciences, Ahwaz, Iran

⁴ Section of Gastroenterology, Department of Internal Medicine, Emam Hospital, Ahwaz Jundishapur University of Medical Sciences, Ahwaz, Iran

⁵ Department of Internal Medicine, Emam Hospital, Ahwaz Jundishapur University of Medical Sciences, Ahwaz, Iran

⁶ Department of Chemistry, Behbahan Branch, Islamic Azad University, Behbahan, Iran.

*Corresponding author: Eskandar Hajiani, Department of Internal Medicine, Faculty of Medicine, Jundishapur University of Medical Sciences, Ahwaz, Iran. Telephone: +98-9161135191 Fax: +98-6112216504. Email; ehajiani@gmail.com

Received for Publication: October 27, 2011, Accepted for Publication: May 28, 2012

Abstract

Objective: Liver disease caused by hepatitis C virus (HCV) in patients with end-stage renal disease (ESRD) causes significant morbidity and mortality. The aim of this study was to determine the prevalence of HCV infection and its relationship in ESRD patients living in the province of Khuzestan, Iran.

Material and Methods: In a cross sectional study from December 2010 to March 2011, entire of ESRD patients treated with hemodialysis (HD) or peritoneal dialysis (PD) in the Khuzestan province enrolled for the study. A standardized questionnaire was used to collect Social and demographic data including cause of ESRD and date of onset of PD or HD. Blood samples were tested for hepatitis C antibody (anti-HCV) by enzyme-linked immunosorbent assays (ELISA). The Research Center of Ahwaz Joundishapur University of Medical Sciences approved the study.

Results: In overall, 1117 ESRD patients were enrolled for the study. The prevalence of anti-HCV was 3.4 % (38 patients, 20 males with Mean age of 45.29 years and 18 females with Mean age of 45.6 years). The most common Cause of ESRD in anti-HCV positive patients was high blood pressure in 45.4%, followed by, DM in 28.7%, and unknown in 13.9%. We did not find any association between both sexes ($P = 0.06$) and also between mean age of anti-HCV positive and negative patients ($P = 0.59$). There was a significant association between high blood pressure as cause of ESRD with anti-HCV positivity (0.033).

Conclusion: Although, the prevalence of HCV infection among ESRD patients has decreased in recent years, however it remains as a significant cause of viral hepatitis among these patients in Khuzestan province.

Keyword: Hepatitis C Virus; End-Stage Renal Disease; Hemodialysis

1. Introduction

Evaluation of incidence and prevalence of viral hepatitis among ESRD patients and Comparison with last years in same center and other centers in same countries and other countries is a good guide for detection and better resolving the problem of ESRD patients.

According to the many studies, in the last decades, hepatitis B virus (HBV) has been the major cause of viral hepatitis in end-stage renal disease (ESRD) patients in developed and developing countries.(1, 2)

However, because of some factors such as routine screening of patients and staff for HBsAg and anti-HBs antibody and hepatitis B vaccination in susceptible patients and staff and some other factors, the incidence and prevalence of HBV infection in dialysis patients has significantly decreased.(3-7)

In comparison, it appears that in recent years, hepatitis C virus (HCV) is an increasingly recognized infectious among patients with end stage renal disease treated with dialysis.

The aim of this study was to investigate the prevalence of HCV infection and its relationship in ESRD patients living in the province of Khuzestan, Iran.

2. Material and Methods

In a cross sectional study from December 2010 to March 2011, entire of ESRD patients treated with hemodialysis (HD) or peritoneal dialysis (PD) liv-

ing in the province of Khuzestan, Iran enrolled for the study.

The ESRD was defined as irreversible and permanent loss of renal function due to any causes requiring hemodialysis (HD) or peritoneal dialysis (PD).

HD was performed one, two or three times a week, for about 2-4 hours for each treatment with blood flow rate of 200-400 mL/min, and the dialysate flow rate of 500 mL/min and bicarbonate-based dialysis solution at a delivered bicarbonate concentration of 35-40 mEq/L.

Two different types of dialyzers, semi-synthetic or synthetic dialyzer membranes were used in our province.

ESRD patients that they were on PD received Continuous Ambulatory Peritoneal Dialysis (CAPD) three, four or five times in a 24-hour period

A standardized questionnaire was used to collect Social and demographic data and medical records, including cause of ESRD and date of onset of PD or HD.

Blood samples were tested for hepatitis C antibody (anti-HCV) by enzyme-linked immunosorbent assays (ELISA). The Research Center of Ahvaz Jondishapur University of Medical Sciences approved the study.

After collection of data, the statistical package for social sciences (SPSS) version 15 software was used for data analysis and Statistical significance was

considered at the p value of <0.05 in all analyses.

3. Results

In overall, in the period of study 1117 ESRD patients received peritoneal or hemodialysis in Khuzestan province that they were enrolled for the study.

The most common kind of renal replacement therapy (Dialysis) in our province was HD and from 1117 ESRD patients received dialysis, 1056 patients (94.53%) were on HD and only 61 patients (5.46%) were on PD.

Our HD centers were not used segregation of dialysis rooms and machines for anti-HCV positive patients. In addition the program of reprocessing of hemodialyzers for reuse was not practical in our centers.

To prevent nosocomial transmission, Standard precautionary measures and using personal protective equipment specific to hemodialysis units like, washing hands and wearing gloves when contacting potentially infectious surface or material, using gown and wearing it when exposure to blood or body fluids was expected, were mandatory for staff and nurses.

The prevalence of anti-HCV was 3.4 % (38 patients, 20 males with Mean age of 45.29 years and 18 females with Mean age of 45.6 years, all of them were on HD). There was no association between mean age of anti-HCV positive and negative patients ($P = 0.59$). In addition we did not find any association between both sexes among anti-HCV positive patients ($P = 0.06$). There also was no association between kind of dialysis, CAPD versus HD ($P = 0.09$)

The most common Cause of ESRD in anti-HCV positive patients was high blood pressure in 45.4%, followed by, DM in 28.7%, and unknown in 13.9% , Cystic Kidney Disease in 11.7% and Obstructive Uropathy in 0.3%. There was a significant association between high blood pressure as cause of ESRD with anti-HCV positivity (0.033).

4. Discussion

Liver disease caused by HCV causes significant morbidity and mortality among HD or PD patients and therefore this virus is one of the most important infection in patients with end stage renal disease (ESRD). In ESRD patients, it is a distinct clinical problem in view of the natural history of HCV infection among such patients, the immunosuppressive effect of renal failure, the susceptibility for de novo infection and nosocomial transmission, the significant and long-term effects on morbidity and mortality, and the change in clinical course of kidney transplant patients.(8-11)

Although, it seems that the incidence and prevalence of HCV infection among patients on dialysis has decreased in recent years, however in comparison of general population the majority of ESRD patients have HCV infection and therefore it continues to be a cause for concern.(12-15)

There are some risk factors for HCV infection among these patients such as the number of blood products transfusions, the kind of renal replacement therapy (PD or HD), the duration of ESRD, and the prevalence of HCV infection in the dialysis unit.

ESRD patients that they received more units of blood products, those with longer duration of ESRD, HD patients compared to CAPD patients and Patients treated in HD units with a high prevalence of HCV infection are at higher risk for acquiring infection.(16-20)

According to the present study 3.4% of ESRD patients living in the province of Khuzestan, Iran have anti-HCV antibody and therefore it remains as a significant cause of viral hepatitis among these patients.

Unfortunately, we did not find a study to investigate this issue in general population and nearly all of studies have been conducted on healthy blood donors. It appears that determination of HCV in blood donors can underesti-

mate its prevalence in general population due to exclusion of high risk group such as persons with history of jaundice, intravenous drug abuse, and high-risk sexual behavior from pool of donation.(21, 22)

The prevalence of HCV infection among healthy blood donors in Iran is less than 1% that significantly lowers than the result of our study. As an example its prevalence is 0.3% in the study of Rezvan et al in 1994 in Tehran, 0.59% in the study of Ghavanini et al in 2000 in Shiraz and 0.5% in the study of Ansar et al in 2002 in Rasht.(17, 23, 24)

There are few studies that provide epidemiological aspects of HCV infection among ESRD patients in different cities of Iran.(25-27) In a recent study in 2009, Jaleleddin Hamissi et al evaluated the prevalence of HBS Antigen and HCV Antibody among 195 ESRD patients in the three HD centers in the province of Qazvin, Iran. In this study 13 patients (6.7%) were positive for HCV Antibody.(26)

In another study, Somi et al investigated this issue between January and March 2006 in Tabriz province among 462 chronic renal failure patients from five dialysis units and it was 14.9% and 10.2% by check of HCV antibody and HCV RNA respectively.(27)

In a systemic review, Alavian et al by investigation of eighteen studies from 12 provinces of Iran from April 2001 to March 2008, have estimated that the prevalence of HCV infection in Iranian HD patients is 7.61% (95% confidence interval: 6.06–9.16%).(25)

Fortunately, the prevalence of HCV infection in our study is lower than the results of these studies and also another study from our province in a few years ago and is suggested that the rate of infection has declined.(28) In this cross-sectional study from March 2005 to August 2006, Assarehzadegan et al evaluated the prevalence of hepatitis C and B infection and HCV genotypes

among 214 hemodialysis patients of the Central hemodialysis unit in Khuzestan province and they reported that 34 patients (7.9%, 95% CI: 4.32-11.56) were positive for anti-HCV.(28)

Other studies in developed and developing countries are showed decline of the incidence and prevalence of HCV infection among patients on dialysis. for example, in the report of European Dialysis and Transplant Association, its declined from 21 percent in 1992 to 12.5 percent in 1999.(14, 15)

In addition to the introduction of rigorous infection-control strategies to prevent exposure to blood borne microorganisms, it seems that this decline was initially due to the reduction in post-transfusion HCV infection; Fortunately, since the introduction of erythropoietin, the need of ESRD patients for transfusion of the blood products significantly decreased and therefore the risk of HCV infection has also significantly declined.(16)

Introduction of rigorous infection control measures (such as standard barrier precautions to prevent exposure to blood borne microorganisms and universal precautions), reduced need for transfusion after the advent of erythropoietin, routine screening of patients and staff for HBsAg and anti-HBs antibody and hepatitis B vaccination in susceptible patients and staff, don't use of reprocessing of hemodialyzers for reuse in both HbsAg positive and negative patients in some of countries and prohibition of dialyzer reuse in HBsAg positive patients in other countries and segregation of dialysis rooms and machines for HbsAg positive patients.(18, 20-22)

5. Conclusion

HCV infection is one of the most important infections in patients with end stage renal disease and it has significant effects on morbidity and mortality of these patients. ESRD patients that they received more units of blood products and those with longer duration of

ESRD are at higher risk for acquiring of this infection.

Fortunately, in comparison of last decades, the prevalence of HCV infection among patients on dialysis has decreased in recent years, however in comparison of general population the important percent of ESRD patients have HCV infection. According to the present study, the prevalence of HCV infection among ESRD patients living in the province of Khuzestan, Iran is 3.4% and therefore it remains as a significant cause of viral hepatitis and it

continues to be a cause for concern among these patients.

Acknowledgements

This paper is issued from thesis of Seyed Mohammad Salehi Behbehani and financial support was provided by Research Institute for Infectious Diseases of Digestive system and Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. The authors would like to express our appreciation to the division head and the staff of HD and PD centers in the province of Khuzestan, Iran, for their help.

References

1. Farzadegan H, Harbour C, Ala F. The prevalence of hepatitis B surface antigen and its antibody in blood donors and high risk groups in Iran. *Vox sanguinis*. 1979;37(3):182-6.
2. Tokars JI, Alter MJ, Favero MS, Moyer LA, Bland LA. National surveillance of hemodialysis associated diseases in the United States, 1990. *ASAIO journal (American Society for Artificial Internal Organs: 1992)*. 1993;39(1):71.
3. Control measures for hepatitis B in dialysis centers. *Viral hepatitis Investigations and Control Series Centers for Disease Control and Prevention*. 1977.
4. DaRoza G, Loewen A, Djurdjev O, Love J, Kempston C, Burnett S, et al. Stage of chronic kidney disease predicts seroconversion after hepatitis B immunization: earlier is better. *American journal of kidney diseases*. 2003;42(6):1184-92.
5. Kellerman S, Alter MJ. Preventing hepatitis B and hepatitis C virus infections in end-stage renal disease patients: Back to basics. *Hepatology*. 1999;29(1):291-3.
6. Miller ER, Alter MJ, Tokars JI. Control measures for hepatitis B in dialysis centers. *Viral hepatitis Investigations and Control Series*. *American journal of kidney diseases*. 1997;33(2):356-60.
7. Tokars JI, Miller ER, Alter MJ, Arduino MJ. National surveillance of dialysis associated diseases in the United States, 1995. *ASAIO journal (American Society for Artificial Internal Organs: 1992)*. 1998;44(1):98.
8. Fabrizi F, Martin P, Dixit V, Bunnapradist S, Dulai G. Meta-analysis: effect of hepatitis C virus infection on mortality in dialysis. *Alimentary pharmacology & therapeutics*. 2004;20(11-12):1271-7.
9. Fabrizi F, Martin P, Lunghi G, Locatelli F. Membrane compatibility, flux and HCV infection in dialysis patients: newer evidence. *The International journal of artificial organs*. 2000;23(5):296.
10. Marcelli D, Stannard D, Conte F, Held PJ, Locatelli F, Port FK. ESRD patient mortality with adjustment for comorbid conditions in Lombardy (Italy) versus the United States. *Kidney international*. 1996;50(3):1013-8.
11. Terrault NA, Adey DB. The kidney transplant recipient with hepatitis C infection: pre-and posttransplantation treatment. *Clinical Journal of the American Society of Nephrology*. 2007;2(3):563-75.
12. Espinosa M, Martín-Malo A, Ojeda R, Santamaria R, Soriano S, Aguera M, et al. Marked reduction in the prevalence of hepatitis C virus infection in hemodialysis patients: causes and consequences. *American journal of kidney diseases*. 2004;43(4):685-9.
13. Geerlings W, Tufveson G, Ehrlich J, Jones E, Landais P, Loirat C, et al. Report on management of renal failure in Europe. XXIII. *Nephrology, dialysis, transplantation*. 1994;9:6-25.
14. Jadoul M, Poinet JL, Geddes C, Locatelli F, Medin C, Krajewska M, et al. The changing epidemiology of hepatitis C virus (HCV) infection in haemodialysis: European multicentre study. *Nephrology Dialysis Transplantation*. 2004;19(4):904-9.
15. Valderrabano F, Jones E, Mallick N. Report on management of renal failure in Europe, XXIV, 1993. *Nephrology Dialysis Transplantation*. 1995;10(supp5):1-25.
16. Donahue JG, Muñoz A, Ness PM, Brown Jr DE, Yawn DH, McAllister Jr HA, et al.

- The declining risk of post-transfusion hepatitis C virus infection. *New England journal of medicine*. 1992;327(6):369-73.
17. Rezvan H, Ahmadi J, Farhadi M, Taroyan S. A preliminary study on the prevalence of anti-HCV amongst healthy blood donors in Iran. *Vox Sang*. 1994;67(2 Suppl):100.
 18. Neto MC, Draibe S, Silva A, Ferraz M, Granato C, Pereira C, et al. Incidence of and risk factors for hepatitis B virus and hepatitis C virus infection among haemodialysis and CAPD patients: evidence for environmental transmission. *Nephrology Dialysis Transplantation*. 1995;10(2):240-6.
 19. Natov SN, Lau J, Bouthot BA, Murthy B, Ruthazer R, Schmid CH, et al. Serologic and virologic profiles of hepatitis C infection in renal transplant candidates. *New England Organ Bank Hepatitis C Study Group. American journal of kidney diseases*. 1998;31(6):920-7.
 20. Weinstein T, Tur-Kaspa R, Chagnac A, Korzets A, Ori Y, Zevin D, et al. Hepatitis C infection in dialysis patients in Israel. *The Israel Medical Association journal: IMAJ*. 2001;3(3):174.
 21. Abou ah, kheirkhahi m, hosseini sm. Survey of the reasons for the deferral of blood donors in tehran blood tranfusion center. *Hakim*. 2002.
 22. Saneie-Moghadam E, Khosravi S, Salehi M, Khaleghi-Moghadam M, Ghasri M, Yaghoobnejad-Moghadam Z, editors. Studying RPR, anti-HIV, and HBsAg in rejected blood donors with history of cupping (Hajamat). 2003.
 23. Ansar M, Kooloobandi A. Prevalence of hepatitis C virus infection in thalassemia and haemodialysis patients in north Iran-Rasht. *Journal of viral hepatitis*. 2002;9(5):390-2.
 24. Ghavanini A, Sabri M. Hepatitis B surface antigen and anti-hepatitis C antibodies among blood donors in the Islamic Republic of Iran. *Eastern Mediterranean Health Journal*. 2000;6:1114-6.
 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. *Hemodialysis international*. 2010;14(3):253-62.
 26. Hamissi J, Hamissi H. Occurrence of hepatitis B and C infection among hemodialyzed patients with chronic renal failure in Qazvin, Iran: A preliminary study. *Journal of Collaborative Research on Internal Medicine & Public Health*. 2011;3:89-96.
 27. Somi MH, Ardalan MR, Sokhanvar H, Farhang S, Pouri A. Hepatitis C virus infection in dialysis centers of Tabriz, Iran: a multicenter study. *Iranian Journal of Clinical Infectious Diseases*. 2008;2(1).
 28. Assarehzadegan M, Shakerinejad G, Noroozkohnejad R, Amini A, SA RR. Prevalence of hepatitis C and B infection and HC V genotypes among hemodialysis patients in Khuzestan province, Southwest Iran. *Saudi Journal of Kidney Diseases and Transplantation*. 2009;20(4):681.