HEPATITIS C VIRUS SEROCONVERSION IN PATIENTS UNDERGOING HEMODIALYSIS AT A TERTIARY CARE HOSPITAL

Shad Mohammad[1], Muhammad Ikram[1], Sartaj Alam[1] , Farooq Ahmed[2], Afnan Amjad[1], Noor Mohammad[1]

ABSTRACT

Objective: To find the frequency of seroconversion of Hepatitis C virus among patients undergoing Hemodialysis at a tertiary care hospital.

Material and Method: This is a descriptive review of data of patients who have undergone hemodialysis(HD) at nephrology unit, Lady Reading Hospital, Peshawar; from June 2015 to June 2017. Data of all the patients who were on regular twice a week HD for complete 2 years were included in this study. While patients who were either Hepatitis B positive, Hepatitis C virus positive, chronic liver disease, acute hepatitis and congenital coagulation disorder were excluded. All the data was searched and those patients who became HCV positive while on HD during these years were documented on a printed proforma and risk factors for the acquisition of Hepatitis C virus were looked for and documented. The data was analyzed through SPSS version 23.

Results: After two years of regular hemodialysis of 136 patients, 28(20.5%) patients became HCV +ve. Repeated blood transfusions for maintaining hemoglobin concentration was the most important cause present in 24(85.7%) patients. Hypertension remains the most frequent cause of ESRD.

Conclusion: In conclusion, patients on maintenance HD have a high incidence and prevalence of HCV infection. The factors associated with HCV infection are highly suggestive of nosocomial transmission with in HD units. Urgent action is required to improve infection control measures in HD centers and to reduce dependence on blood transfusions for the treatment of anemia.

Key words: Hemodialysis, Hepatitis C virus, seroconversion.

INTRODUCTION

Prevalence of anti-HCV antibodies in HD population is remarkably high and is approximately up to 25 times as high than in the general population[1]. Hepatitis C virus (HCV) is a significant cause of morbidity and mortality among chronic renal failure(CRF) patients due to their inability to clear the virus efficiently[2].

Patients on HD are dependent on blood transfusion instead of erythropoietin(EPO) to reverse anemia are at particular risk of acquiring HCV as it is easily transmissible through blood and blood product[3]. Other factors reported to favor HCV acquisition among patients on HD include cross infections from the sharing of dialysis machines and the dialysis equipment, the reprocessing of dialyzers and blood lines[4]. Studies have reported a significant association between the dialytic age and anti-HCV positivity[5]. Furthermore, although repeated dialysis increases the risk of contracting HCV, there is no risk through the equipment used in dialysis[6].

Globally the prevalence of HCV among patients receiving HD varies from as low as 6.1% in Germany[14] to as high as 76% in Casablanca[15]. In general North Africa and the Middle East have high prevalence both in general population and HD patients[16]. Previous studies from these areas have reported a prevalence of anti-HCV antibodies in HD patients of 50% in Saudi Arabia[17], 42% in Tunisia[18], 20.2% in Turkey[19] and 21% in Jordan[20]. In general, the prevalence and incidence of HCV infections in HD patients reflects the prevalence of infection in the general population, the quality of healthcare services in a community and the standards of infection control practices in HD units.

The prevalence of HCV antibody was 15% in Nigeria and 31.1% in Libya, risk factors were history of blood transfusion and duration of session of HD; the risk increased with increased with the number of blood transfusion and sessions of hemodialysis[11,12]. While in India, the overall prevalence of HCV infection was 32%[13]. In Pakistan a study done at Sheikh Zayd Hospital Lahore, in this regard showed the sero-positivity of 4.5%, 22.6%, 46.3%, 66%, 74.1% and 89.5% after 6 months, 1 year, 2 years, 3 years, 4 years and 5 years of hemodialysis respectively. Annual rate of seroconversion was found to be 32.2%, 28.4% and 34.4% in years 2000, 2001 and 2002 respectively[8]. At another center

1 Department of Nephrology, MTI, LRH.
2 Department of Medical Education Khyber Medical College, Peshawar.

Address for correspondence:
Dr. Muhammad Ikram
Assistant Prof Nephrology ward, MTI, LRH
Contact:092-333-9354462
E-mail: mikramakhunzada@gmail.com

in Pakistan showed 23.7% positivity of anti-HCV and history of dialysis over more than 2 years was noted to be a significant risk factor for acquisition of infection in these patients[9]. Incident of Hepatitis C Infection during hemodialysis showed an increasing trend with the number of years on HD. 7.69% tested positive for Hepatitis C at the end of second year, 15.15% at third year and 23.07% at the end of fourth year on HD[10].

HCV is less prevalent in developed countries due to socioeconomic factors, better infection control measures, use of EPO instead of blood transfusion to treat anemia[7]. The prevalence of hepatitis C virus infection is expected to be high in developing countries among patients on hemodialysis. Unfortunately, information on the risk factors of HCV among renal failure patients is sparse in our setup. To the best of our knowledge, only a few studies have reported the risk factors associated with HCV acquisition among HD patient in our environment. We therefore set out to determine the risk factors associated with contracting HCV among patients on Hemodialysis receiving care at a dialysis center attached to tertiary health institution.

MATERIAL AND METHODS

This is a descriptive review of data of patients who have undergone hemodialysis at nephrology unit, Lady Reading Hospital, Peshawar; from June 2015 to June 2017. Data of all the patients who were on regular twice a week hemodialysis for complete 2 years were included in this study. While patients who were either Hepatitis B positive, Hepatitis C virus positive, chronic liver disease, acute hepatitis and congenital coagulation disorder were excluded. All the data was searched and those patients who became HCV positive while on hemodialysis during these years were documented on a printed proforma and risk factors for the acquisition of Hepatitis C virus were looked for and documented. The data was analyzed through SPSS version 23

RESULTS

A total of 136 patients were studied. Out of which 88(65%) were male and 48(35%) were female. Mean age was 46.6± 12.5years. Male to female ratio…….. as shown in Fig 1. Total patients who became HCV positive after 2 years of regular HD were 28(20.5%). Among which 18 were male and 10 were female. Among patient who became HCV +ve while on HD; 6(21.4%) patients had a family history of HCV positivity, while 11(38.2%) patients have strong history of shaving at different barber shops as shown in Fig 2. Among these 28 patients who became HCV positive; 24(85.7%) has a history of repeated blood transfusions for maintaining their hemoglobin(Hb) concentration while they remain on HD.

For maintaining Hb concertation among 136 patients; 90(66%) have used blood transfusions, EPO, oral and IV iron therapy. 17(12%) patients have used

Table 1: Sources used for maintaining Hemoglobin concentration

1.	All (Blood transfusion, EPO, Oral and IV Iron)	90 (66%)
2.	EPO, Oral iron tab	17 (12%)
3.	EPO	16 (12%)
4.	Oral iron tab	13 (10%)

Table 2: Causes of ESRD

1	Hypertension	36 (26%)
2	Glomerulonephritis	32 (24%)
3	Diabetes	25 (18%)
4	Stone Disease	18 (14%)
5	Any other cause	17(12%)
6	Obstructive Nephropathy	8 (6%)

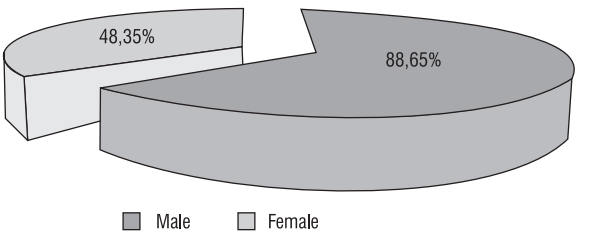

Fig 1: Total Patients=136(Mean Age 46.64

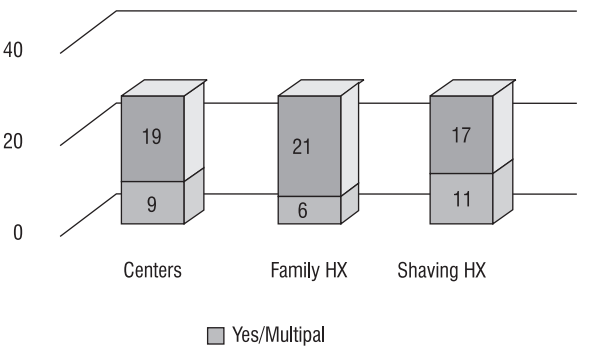

Fig 2: Total HCV patients become positive after Dialysis (n=28)

EPO, oral iron and IV iron but not blood transfusion, 16(12%) patients have used EPO only and 13(10%) patients have used oral iron only as shown in Table 1. The most common cause of ESRD in these patients was hypertension shown in Table 2.

DISCUSSION

HD patients are at high risk for viral hepatitis infections across the world compared to general population. International studies have shown that there is a wide difference across different countries from as low as

6.1% in Germany[14] to 76% in Casablanca[15]. In general, North Africa and the Middle East have high prevalence both in general population and HD patients[16]. Some studies from these areas have reported a prevalence of anti-HCV antibodies in HD patients of 50% in Saudi Arabia[17], 42% in Tunisia[18], 20.2% in Turkey[19] and 21% in Jordan[20]. In Mexico, its prevalence is between 8 and 10%. There is a particular concern because of the high risk for chronic liver disease, complications in renal transplantation, and death in these patients[25]. All these international studies from different geographical location, ethical behaviors and different standards of sterilization have almost similar frequencies to our study.

In Pakistan, our results are easily comparable to other studies across the country. One study showed 23.7% positivity of anti-HCV[9] while another study showed 7.69%, 15.15% and 23.07% at the end of second, third and fourth year of HD [9]. Frequency of sero-positivity was found to be 4.5%, 22.6%, 46.3%, 66%, 74.1% and 89.5% after 6 months, 1 year, 2 years, 3 years, 4 years and 5 years of HD respectively [8]. The history of dialysis over more than 2 years was noted to be a significant risk factor for acquisition of infection in these patients. This is in accordance with our reports. Maiduguri in Nigeria identified the association between increased sessions of HD with risk of HCV[22]. While our data did t show the effect of duration of HD on the seroconversion. This can be documented later on in follow-up studies.

Several studies have identified transfusion of blood and blood product as a significant risk factor for acquisition of HCV[21,26,27]. Prevalence of HCV among HD population is much higher in patients who maintain their Hb concentration with blood transfusion. This is clearly evident from our study that out of 28 patients who turned HCV positive while on HD; 24 had under gone repeated blood transfusions for maintaining Hb concentration. We suggest, use of recombinant EPO to correct renal anemia in HD patients which may result in a significant reduction in blood transfusions. Previous studies have shown that de novo infections may still occur in the absence of other parenteral risk factors[24]. It has been suggested that infection could be transmitted from patient to patient in the hospital, and there is now indirect evidence that HCV infection occurs among HD patients during repeated dialysis procedures, but not through the equipment, probably due to procedural errors[6].

Studies have shown that contamination of the ultrafiltrate, fluid that is removed from the blood during the dialysis procedure might constitute a potential risk for HCV transmission. It is possible that HCV infection could be transmitted from patient to patient in hemodialysis units, in fact epidemics have been reported in some hemodialysis units. It shows that increase in HCV positive patients starting HD at a center may increase the chance of seroconversion of HCV negative patients to become positive. Thus, increasing the overall prevalence of that particular center and that may be the reason that our prevalence may be higher than other centers in comparison. Also, a breach of the safety devices on the hemodialysis machine could lead to transmission of infection[23].

The observed high prevalence of HCV antibody among patients on hemodialysis reflect the quality of healthcare services and the standards of infection control practices in our HD units. Routine screening for HCV should be done before blood transfusion. Safety measures should be taken in our hemodialysis units to prevent cross infection among patients and staffs. These safety measures include; reducing the trend of repeated blood transfusions for maintaining Hb level, discarding syringes, needles, gloves, bloodlines and dialysers after single use, and the use of sterile dressings on each patient visit.

REFERENCES

1. Elzouki A, Esmeo M, Samod M, Abonaja A, Alagi B, Daw M: Prevalence of hepatitis B, C and HIV infection in Libya: a population-based nation-wide sero-epidemiological study. Liver Int 2006, 26:20.
2. Pol S, Vallet-Pichard A, Corouge M, Mallet VO. Hepatitis C: epidemiology, diagnosis, natural history and therapy. Contrib Nephrol. 2012; 176:1–9.
3. Alashek WA, McIntyre CW, Taal MW. Hepatitis B and C infection in hemodialysis patients in Libya: prevalence, incidence and risk factors. BMC Infect Dis. 2012 Oct 20; 12:265.
4. Salama G, Rostaing L, Sandres K, Izopet J. Hepatitis C virus infection in French hemodialysis units: a multicenter study. J Med Virol. 2000 May;61(1):44–51.
5. Hardy NM, Sandroni S, Danielson S, Wilson WJ. Antibody to hepatitis C virus increases with time on hemodialysis. Clin Nephrol. 1992 Jul;38(1):44–8.
6. Okuda K, Hayashi H, Kobayashi S, Irie Y. Mode of hepatitis C infection not associated with blood transfusion among chronic hemodialysis patients. J Hepatol. 1995 Jul;23(1):28–31.
7. Kalantar-Zadeh K, McAllister CJ, Miller LG. Clinical characteristics and mortality in hepatitis C-positive haemodialysis patients: a population-based study. Nephrol Dial Transplant. 2005 Aug;20(8):1662–9.
8. Salman T Shall, Rizwanul Haq, Tahir Shafi. Prevalence and rate of seroconversion of Hepatitis C in hemodialysis patients. Proceeding Shaikh Zayed Postgrad Med Inst Jun 2003;17(1):19-22.
9. Nasir Khokhar, Ali Yawar Alam, Farah Naz, Syed Nayer Mahmud. Risk factors for Hepatitis C virus infection in patients on long-term hemodialysis. J Coll Physicians Surg Pak Jun 2005;15(6):326-8.
10. Fuad Shafiq, Sameena Akram, Naheed Hashmat. Prevalance of Hepatits C in patients with Endstage Renal Disease before and during Hemodialysis. Pak

J Gastroenterol Mar 2002;16(1):17-20.

11. Ibrahim Ummate, Ballah Akawu Denue, Ibrahim Musa Kida,Onah Joseph Ohioma, David Bukbuk Baba, and Waru Goni. Risk factors for hepatitis C virus sero-positivity among haemodialysis patients receiving care at Kidney Centre in a tertiary health facility in Maiduguri, Nigeria Pan Afr Med J. 2014; 19: 305.

12. Wiam A Alashek, Christopher W McIntyre, and Maarten W Taal. Hepatitis B and C infection in haemodialysis patients in Libya: prevalence, incidence and risk factors. BMC Infect Dis. 2012; 12: 265.

13. Neerja Jindal, Divya Soin, Pragati Grover, Renu Bansal, Rubina Malhotra, Seema Singh, and Charu Singh. Hepatitis C Virus (HCV) Infection among Seronegative Patients undergoing Haemodialysis in a Remotely Located Tertiary Care Hospital of Northern India: Value of HCV-RNA and Genotypes. J Clin Diagn Res. 2015 Dec; 9(12): DC10–DC12.

14. Hinrichsen H, Leimenstoll G, Stegen G, Schrader H, Folsch UR, Schmidt WE: Prevalence and risk factors of hepatitis C virus infection in haemodialysis patients: a multicentre study in 2796 patients. Gut 2002, 51(3):429–433.

15. Boulaajaj K, Elomari Y, Elmaliki B, Madkouri B, Zaid D, Benchemsi N: Prevalence of hepatitis C, hepatitis B and HIV infection among haemodialysis patients in Ibn-rochd university hospital, casablanca. Nephrol Ther 2005, 1(5):274–284.

16. WHO: Global surveillance and control of hepatitis C. Report of a WHO consultation organized in collaboration with the viral hepatitis prevention board, antwerp, belgium. J Viral Hepat 1999, 6(1):35–47.

17. Souqiyyeh MZ, Al-Attar MB, Zakaria H, Shaheen FA: Dialysis centers in the kingdom of saudi arabia. Saudi J Kidney Dis Transpl 2001, 12(3):293–304.

18. Jemni S, Ikbel K, Kortas M, Mahjoub J, Ghachem L, Bidet JM, Boukef K: Seropositivity to hepatitis C virus in Tunisian haemodialysis patients. Nouv Rev Fr Hematol 1994, 36(5):349–351.

19. Yakaryilmaz F, Gurbuz OA, Guliter S, Mert A, Songur Y, Karakan T, Keles H: Prevalence of occult hepatitis B and hepatitis C virus infections in Turkish hemodialysis patients. Ren Fail 2006, 28(8):729–735.

20. Batieha A, Abdallah S, Maghaireh M, Awad Z, Al-Akash N, Batieneh A, Ajlouni KA: Epidemiology and cost of haemodialysis in Jordan. East Mediterr Health J 2007, 13(3):654–663.

21. Hardy NM, Sandroni S, Danielson S, Wilson WJ. Antibody to hepatitis C virus increases with time on hemodialysis. Clin Nephrol. 1992 Jul;38(1):44–8.

22. Ibrahim Ummate, Ballah Akawu Denue, & Ibrahim Musa Kida, Onah Joseph Ohioma, David Bukbuk Baba, and Waru Goni. Risk factors for hepatitis C virus sero-positivity among haemodialysis patients receiving care at Kidney Centre in a tertiary health facility in Maiduguri, Nigeria. Pan Afr Med J. 2014; 19: 305.

23. Schlipköter U, Gladziwa U, Cholmakov K, Weise A, Rasshofer R, Lorbeer B, Luz N, Deinhardt F, Roggendorf M. Prevalence of hepatitis C virus infections in dialysis patients and their contacts using a second generation enzymed-linked immunosorbent assay. Med Microbiol Immunol. 1992;181(3):173–80.

24. Fabrizi, F., P. Martin, V. Dixit, M. Brezina, M. J. Cole, S. Vinson, M. Mousa, and G. Gitnick. 2000. Biological dynamics of viral load in hemodialysis patients with hepatitis C virus. Am. J. Kidney Dis.35:122-129.

25. Nahum Méndez-Sánchez, Daniel Motola-Kuba, Norberto C. Chavez-Tapia, Jesús Bahena, Ricardo Correa-Rotter, and Misael Uribe. Prevalence of Hepatitis C Virus Infection among Hemodialysis Patients at a Tertiary-Care Hospital in Mexico City, Mexico. J Clin Microbiol. 2004 Sep; 42(9): 4321–4322.

26. Meyers C.M., Seeff L.B., Stehman-Breen C.O., Hoofnagle J.H. Hepatitis C and renal disease: an update. Am J Kidney Dis. 2003;42(4):631–657.

27. Fabrizi F., de Vecchi A.F., Como G., Lunghi G., Martin P. De novo HCV infection among dialysis patients: a prospective study by HCV core antigen ELISA assay. Aliment Pharmacol Ther. 2005;21(7):861–869.