

Acquiring Hepatitis-C Viral Infection during Maintenance Hemodialysis Patients at DHQ Hospital Sheikhpura: A Cross Sectional Study

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Abstract:

Background: End stage kidney disease (ESKD) is one of the end results of chronic kidney disease. In center hemodialysis is the most common renal replacement therapy (RRT) for these patients used in Pakistan. It is associated with increased risk of health care-related infections. Hepatitis-C is the frequent blood born viral infection in hemodialysis center. Its frequency is very high in hemodialysis patients as compared to general and even to thalassemia population.

Purpose of the study: To assess the gravity of Hepatitis-C viral infection in hemodialysis patients.

Methods: A retrospective cross-sectional study done in dialysis center of DHQ hospital Sheikhpura, Punjab, Pakistan in January 2018. All the patients who had started hemodialysis with HCV negative status and had remained on hemodialysis for more than three months were included in the study. Patients with Hepatitis-C positive status, acute kidney disease and on dialysis less than three months were excluded. All patients were tested by enzymes linked immune-sorbent assay (ELISA) method for HCV status.

Results: Out of 153 Hepatitis-C negative patients at the time of initiation of dialysis, 60 (39.21 %) converted positive while 93 (60.78 %) were still HCV negative by ELISA method at the time of study. Number of dialysis were having significant p value.

Conclusion: Most of the patients had acquired Hepatitis-C infection during in-center hemodialysis. This emphasizes the importance of stringent infection prevention and control practices.

Key words: *Hepatitis-C; hemodialysis; nephrologist, reuse, dialyzer, HCV seroconversion, blood transfusion, isolation.*

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Introduction:

Life cannot be sustained in End stage kidney disease (ESKD) without renal replacement therapy (RRT) including, hemodialysis (HD), peritoneal dialysis (PD) and renal transplant (RT).¹ Chronic kidney disease (CKD) is one of chronic diseases which have high prevalence (12.5% -25.6%) in Pakistani population (Jessani et al., 2014) , (Imran et al., 2015).^{2,3} Maintenance hemodialysis is the frequently opted to sustain life on dialysis twice or thrice weekly. Each session of hemodialysis is from three to six hours with four hours session for most of the patients. During each session patient's blood is exposed to extracorporeal circuit. At this time patient are at risk for healthcare-associated infections (HAIs) especially Hepatitis-C and causes huge burden on health, finance and society.^{4,5}

Hepatitis-C virus is a member of flaviviride family spreading via blood, blood products and sexual contacts. Risks factors for HAIs are cross-contamination of instruments/medications, inadequate disinfection of dialysis equipment, failure to use proper hand hygiene, failure to adhere to infection prevention and control (IPC) standard practices.⁶ Prevalence of HCV is 6.8 % in general population in Pakistan, much higher as compared to global prevalence of 2.5 % in general population.⁷ Prevalence in hemodialysis is variable ranges from 13.5%

(range 2.6%-22.9%) depending upon geographic area and center of study and risk factors including frequent blood transfusion.⁸ In addition to these, they have to undergo recurrent surgeries for access formation and have more frequent extra-corporeal blood exposure.

In Pakistan it is common practice to dialyze such patients on separate dedicated machines with separate area and separate staff yet HCV prevalence of 16.4%- 61.8 % has been reported from Pakistan.⁹⁻¹⁵ Most of the studies and reviews do not agree with these recommendations, however, in unison recommend universal precautions to control infections.^{6,8} Continuous education of dialysis staff for universal infection prevention strategies including hand washing techniques and needle handling with proper disinfection of machines are the only way to curtail the spread of the disease. This study was undertaken to highlight the high seroconversion rate among incident hemodialysis patients at our center.

Materials and Methods:

A cross sectional study was conducted at Dialysis center of DHQ hospital, Sheikhpura, Punjab, Pakistan in January 2018. All the patients who initiated hemodialysis with HCV negative status and remained on hemodialysis for more than three months were included in the study. A total of 153 patients, from 16 to 75 years old patients were included in our study.

Exclusion Criteria: Patients with Acute kidney injury (AKI), patients with ESKD who came to center for short time period (less than 3 months), Co-infection with HIV or hepatitis B and Patients with age <15 or >75 were excluded from study.

All patients were on maintenance dialysis, twice per week, each session of four hours. There was no isolation for HCV positive or negative patients. Dedicated machines were reserved for seropositive patients on same floor, and the area was separated by a small brick wall.

Each dialyzer was being reused three times for dialysis and then discarded. Chemical disinfection of dialyzer with Peracetic acid was done after each hemodialysis session and with proper labeling and stored separately for HCV positive and negative patients. Before next session of hemodialysis cross checking of name for each patient was ensured.

All patients fulfilling the study criteria were enrolled in the study. Demographic data of the patient's (age, gender, occupation and marital state) was collected by direct interview. Viral status, duration on HD, history of blood transfusion(s), attending more than one HD center and type of vascular access for HD (arterio-venous fistula, double lumen catheter, permanent catheter) number of blood transfusions per month was taken from record and noted in preformed Performa. Blood samples were collected pre-dialysis and sent to laboratory for ELISA.

Statistical analysis:

Data were stored and analyzed using SPSS-IBM version 23.0, count and percentages were reported for qualitative variables like age group, gender, education, employment etc, mean and standard deviation was given for quantitative biochemical parameters, Pearson chi square test was done to see the association of viral infection with baseline and clinical parameters, independent sample t-test was used to compare the mean of biochemical parameters, binary logistic regression was done to estimate the odds with 95% confidence interval for HCV positive, p-values less than 0.05 were considered significant.

Results:

Total 153 patients were enrolled in this study. Baseline characteristics are presented in Table 1. Majority 104(68.0%) were aged above 40 years and 86 (56.2%) were male. Most (79.0%) were un-employed and were living in rural areas of district Sheikhpura. Major cause of ESKD were diabetes mellitus [(DM) 47.0%], hypertension [(HTN) 41.0%], Table 1. Most of the patients (88.2%) initiated dialysis with double lumen catheter. Almost all patients (99%) were being dialyzed twice weekly. Number of dialysis and history of blood transfusion is also shown in Table 1. All patients were receiving erythropoietin 4000 IU twice weekly. Out of the 153 surveyed patients, 93 were negative for HCV and 60 had seroconverted to HCV at the time of the study; the point prevalence of HCV infection was 39.22%.

Chi square analysis revealed blood transfusion and number of dialysis as significant factor for seroconversion, Table 2.

Discussion:

The current study shows a high seroconversion among incident dialysis patients at our center similar to others reported locally and internationally.^{8,13-15} In the recent literature reviewed over the last decade from Pakistan, HCV status was found to be positive among 16.4% to as high as 61.8 % of hemodialysis patients surveyed. This is alarming since free dialysis facilities are available at governmental levels in Pakistan with many times unsupervised units run by technicians and non-nephrologists outside the main cities. It is further of concern for increasing health care cost on the budget for government as well as for self-paying patients since HCV is associated with increased risk of morbidity and mortality including cirrhosis and hepatocellular carcinoma. (Fabrizi and Messa, 2015).¹⁶ The death risk may increase

to 1.57 times in this population. The HCV prevalence (39.21%) in our population is too high as compared to other countries like neighboring India (7.44%) and U.K (1.2 %).¹⁷

Table I: Baseline and clinical Characteristics of 153 maintenance hemodialysis patients.

Characteristics		Number (%)	p-value
Age group	≤40 Years	49 (32.0%)	0.48
	>40 Years	104 (68.0%)	
Gender	Male	86 (56.2 %)	0.35
	Female	67 (43.8 %)	
Education	Literate	90 (58.80 %)	0.36
	Illiterate	63 (41.2 %)	
Employment status	Employed	32 (20.9 %)	0.72
	Unemployed	121 (79.0%)	
Address	Urban	75 (49.0 %)	0.40
	Rural	78 (51.0 %)	
Cause of ESKD	DM	72 (47.0 %)	0.76
	HTN	63 (41.0 %)	
	Stone disease	5 (3.2 %)	
	chronic GN	5 (3.3 %)	
	cystic disease	5 (3.3%)	
	Other	3 (2.0 %)	
Dialysis Access at Initiation	AVF	18 (11.8 %)	<0.01*
	Double lumen catheter	135 (88.2 %)	
Number of dialysis	>25<50	29 (18.95 %)	0.006*
	51-100	44 (28.75 %)	
	>100	80 (52.28 %)	
Need for transfusion	Yes	112 (73.2%)	0.156
	No	41 (26.8%)	
Blood transfusion required	<2 times per month	98 (64.0 %)	0.075
	2-4 times per month	40 (26.1 %)	
	more than 4 times per month	15 (9.8 %)	

*p<0.05 was considered significant

Risk factors for HCV infection in dialysis are considered to be multiple.¹⁸ Blood transfusion, chronic hemodialysis, surgical procedures, multiple needle pricks, organ transplantation, occupational exposure among health workers and unprotected sexual contact and socioeconomic status are important risk factors.^{12,19,20}

In our study and other recent local studies, most of the patients are from younger age group [40 years, n=104(68%)] which is quite younger than ESRD patients in developed countries 62.8 years.^{10,12,14,21} This is a very sad fact that younger patients are getting both ESRD and HCV infection at relatively younger age. Since males make up majority percentage of dialysis patients among our dialysis units, similarly the prevalence of HCV was also higher among them.

Major causes of ESRD were Diabetes mellitus [72(47 %)] and hypertension [63(41%)] same as in other parts of world.²¹ Blood transfusion is considered as one of the major risk factor for transmission of HCV viral infection as shown in 480 hemodialysis patients by Ali et.al.¹³ In our study we were however unable to find any significant association of blood transfusion and HCV infection.

Intervention for arteriovenous access is important risk for HCV infection. In our center majority of the patients started dialysis via temporary dialysis catheter as usual in a developing country like Pakistan and reported by Sabir et.al.²² Most of the HCV positive patients were also from this group suggesting relative risk of HCV infection with interventions compared to already placed arteriovenous fistula at the initiation of dialysis.

Acquiring HCV during maintenance hemodialysis

All HCV positive patients were being dialyzed on same floor in a restricted area on dedicated machines with dedicated staff. Although HCV positive patients are being dialyzed in a separate designated area in most of the centers in Pakistan, nevertheless, physical separation may be a hanging curtain or just open area with a short distance from the negative side and in our center a low height brick wall. This cannot be considered as true separation of positive patients and frequent movement of staff and patients and attendants is observed in the unit. Time and again the controversy has appeared whether HCV patients should be dialyzed in a separate area, internationally still universal precautions is advised with no separation of HCV positive patients.⁸

Table-2: HCV status of 153 maintenance hemodialysis and significance of factors on seroconversion.

Characteristics Of patients	Group of patients	HCV Status		P value
		Positive n(%)	Negative n(%)	
Age	≤ 40 years	21(42.85 %)	28 (57.14 %)	0.48
	>40 years	39 (37.50 %)	65 (62.50 %)	
Gender	Male	34 (39.53 %)	52 (60.46 %)	0.35
	Female	26 (38.80 %)	41 (61.19 %)	
Address	Urban	29 (38.6 %)	46 (61.13 %)	0.40
	Rural	30 (38.46 %)	48 (61.14 %)	
Dialysis started via	AVF	7 (38.88 %)	11 (61.12 %)	<0.01*
	Catheter	52 (38.51 %)	83 (61.48 %)	
Number of dialysis	>25-50	11 (37.93 %)	18 (62.06 %)	<0.01*
	51-100	19 (37.25 %)	32 (62.74 %)	
	>100	31 (38.75 %)	49 (61.25 %)	
Need for blood transfusion	Yes	43 (38.39 %)	69 (61.60 %)	0.156
	No	16 (39.02 %)	25 (60.97 %)	
Blood transfusion required	<2 times per month	38 (38.77 %)	60 (61.22%)	0.075
	2-4 times per month	15 (37.55 %)	25 (62.55 %)	
	>4 times per month	6 (40.0 %)	9 (60.0 %)	

*p<0.05 was considered significant using Pearson Chi Square test.

In our center dialyzer was being reused three times before being discarded. Peracetic acid solution was used for sterilization and reprocessed dialyzers were kept in separate areas for HCV and negative patients before being used on the next session. Although all care was taken still could be one possible source of transmission. This reuse of dialyzer might be the source of infection but in previous studies dialyzer reuse was not considered as significant risk factor HCV infection. It has been suggested that overall rate of transmission is not high among centers reprocessing the dialyzers, nevertheless, separate reprocessing room and storage and; Renalin as sterilant had even less chances of transmission.²³ Considering our circumstances in implementation of universal precautions for infection control, most of the centers in the country are not in favor of reuse of dialyzer.

Conclusion:

In conclusion HCV seroconversion was high among maintenance hemodialysis patients at our center. This emphasizes the importance of well-established infection prevention and control practices outlined in guidelines to prevent the significant morbidity and mortality associated with seroconversion of HCV among maintenance hemodialysis patients with HCV infection with seroconversion.

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Conflict of interest: none Declared

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