ORIGINAL ARTICLE

FREQUENCY OF HEPATITIS C SEROCONVERSION IN CHRONIC KIDNEY DISEASE PATIENTS ON HAEMODIALYSIS

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Background: Haemodialysis increases Hepatitis-C seroconversion risk adversely affecting Chronic Kidney Disease (CKD) prognosis. This study aimed to determine the frequency of Hepatitis C seroconversion in chronic kidney disease patients on haemodialysis. **Method:** This cross-sectional study was conducted at Dialysis Unit of Ayub Teaching Hospital, Abbottabad from March 2016 to January 2019. A pre-designed proforma was used for data collection. A sample of 121 patients of dialysis dependent CKD was enrolled for the study through non-probability consecutive sampling. The Glomerular Filtration Rate (GFR) was re-estimated from serum creatinine to confirm the diagnosis using Modification of Diet in Renal Disease (MDRD) study equation. Patients who were Hepatitis C virus (HCV) negative at the start of dialysis, and became positive 3 months post-dialysis were considered having undergone seroconversion. Data were analysed using SPSS-16. **Results:** Out of 121 participants, 80 (66.1%) were male and 41 (33.8%) were female. The mean age of the patients was 51.0±6.22 years with range from 41 to 61 years. Hepatitis C seropositivity was recorded in 40 (33.06%) of the study participants during the study period. Statistically significant (p<0.05) associations were observed between HCV seropositivity and age and gender of the patients. **Conclusion:** Hepatitis C infection is a common complication of haemodialysis. Rigorous screening of patients for Hepatitis C and separate machines for Hepatitis C patients can lead to a decrease in the burden of this disease.

Keywords: Hepatitis C, Chronic Kidney Disease, Haemodialysis, Seroconversion, Renal Replacement Therapy

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INTRODUCTION

Chronic kidney disease (CKD) is defined as an irreversible, significant and long-standing loss of kidney function.[1] Chronic kidney disease is a growing public health problem. Its prevalence is estimated to be 8–16% globally. The complications consist of increased all-cause and cardiovascular mortality, renal disease progression, anaemia, cognitive decline, mineral and bone disorders and pathological fractures.[2] Patients with CKD are at a higher risk of death from cardiovascular disease than the general population.[3] The proper treatment of CKD patients is to have renal transplant but due to lack of donors, issues of immunosuppression, and cost associated with renal transplant leaves haemodialysis a more acceptable modality of treatment.

Hepatitis C is a liver disease caused by Hepatitis C virus which can cause both acute and chronic liver infection. The infection ranges in severity from a mild illness lasting a few weeks (acute hepatitis) to a serious lifelong illness (chronic hepatitis) leading to cirrhosis and hepatocellular cancer.[4] Hepatitis C infection is a public health problem, with an estimated worldwide prevalence of 3%, affecting approximately 180 million carriers. About 4 million people get infected annually. The prevalence of hepatitis C infection in dialysis patients is in general much higher than general population. Studies conducted in dialysis centres from different countries show that prevalence of Hepatitis C ranges from 1% to 84.6% and this is of particular concern because chronic Hepatitis C infection accounts for significant morbidity and mortality in patients undergoing hemodialysis.[5]

Currently, in Pakistan, around 10 million people are suffering from hepatitis C which accounts for 6% of total population of Pakistan. A higher prevalence of Hepatitis C antibodies (38% weighted average) has been attributed to patients undergoing chronic haemodialysis in Pakistan.[6] Numerous risk factors have been identified for Hepatitis C infection among patients undergoing haemodialysis and these include number of prior blood transfusions, period of chronic kidney disease, type and duration of dialysis, concurrent prevalence of Hepatitis C in the dialysis unit[7] and adherence to universal infection control practices.[8–10]

The aim of this study was to determine the causes associated with high frequency of hepatitis C infection among patients undergoing haemodialysis. This study will generate local data which will help in proposing suggestions to reduce the associated risk of transmission of virus, thus helping in alleviation of morbidity and mortality associated with concurrent liver disease due to Hepatitis C infection in CKD patients.

METHODOLOGY

This cross-sectional study was conducted at Dialysis Unit of Ayub Teaching Hospital Abbottabad, from Mar 2016 to Jan 2019. The sample size was calculated for population proportion estimation with the specified absolute precision with World Health Organization software for sample size determination in health studies. Keeping the prevalence of Hepatitis C in dialysis patients from Khyber Pakhtunkhwa to be 28%[11], an absolute precision of 8% and confidence level of 95%, the sample size was estimated to be 121. The sampling technique was non-probability consecutive sampling.

Patients aged 18–60 years with chronic kidney disease who were receiving haemodialysis from Ayub Teaching Hospital Abbottabad and those who tested positive for HCV after 3 months of dialysis were included in the study irrespective of gender discrimination. Patients who tested positive for HCV before the start of haemodialysis were excluded from the study. A patient was declared having Hepatitis C infection if serum/plasma of the subjects tested positive for anti-hepatitis C antibodies (IgG, IgM and IgA) by HCV-Ab rapid test cassette.

After obtaining approval from the Hospital Ethical Committee, the study commenced with obtaining an informed consent from patients followed by data collection. The information was recorded on a pre-designed proforma. After recording the biographical data, presence of CKD was confirmed by checking previous medical records. The GFR was re-estimated from serum creatinine by the Modification of Diet in Renal Disease (MDRD) study by the equation given below:

$$\text{GFR (mL/min/1.73 m}^2\text{)} = 175\ (\text{S. Cr})^{-1.154} \times (\text{Age})^{-0.203} \times (0.742 \text{ for females}) (1.212 \text{ for blacks})$$

Hepatitis C status of patients was confirmed using HCV-Ab rapid test cassette in use at the Ayub Teaching Hospital microbiology laboratory for screening of CKD patients before starting haemodialysis. A detailed history regarding the risk factors for transmission of Hepatitis C was taken from the patients. Patients were specifically asked about the dis-infective measures taken by the staff during hemodiaysis.[12]

The data was analysed using SPSS-16. Quantitative variables such as age, GFR, number of blood transfusions and duration of haemodialysis were described as Mean±SD. Qualitative variables such as gender, HCV seropositivity and adoption of dis-infective measures were described as percentages and frequencies. Data were stratified by age, gender, number of blood transfusions, duration of dialysis and adoption of dis-infective measures with respect to outcome variable. Chi-square test was applied to see the significance of difference by age, gender, number of blood transfusions, duration of dialysis and dis-infective measures with respect to outcome variable, i.e., seropositivity for Hepatitis C virus.

RESULTS

This cross-sectional study enrolled 121 patients (80, 66.12% males; 41, 33.88% females) with dialysis-dependent chronic kidney disease. The mean age of the patients was 51.02±6.22 years ranging from 41 to 61 years. The descriptive statistics of the study population are given in Table-1.

Hepatitis C seropositivity was recorded in 40 (33.06%) of study participants during the study period as given in Table-2.

When the outcome variable, i.e., HCV seropositivity was cross-tabulated with gender, age, adoption of dis-infective measures, number of blood transfusions and duration of dialysis dependent chronic kidney disease, statistically significant associations were observed between HCV seropositivity and age and gender of study participants (p<0.05) (Table-3).

Table-1: Descriptive statistics of study population

Variable	Mean±SD	Min	Max
Age of patients (Years)	51.02±6.22	41	61
Blood transfusions	5.57±1.75	3	8
Duration of dialysis dependent CKD (Months)	6.48±1.78	4	9
Glomerular Filtration Rate (mL/min)	36.87±7.02	25	48

Table-2: HCV seropositivity in study population

HCV Seropositivity	Frequency	Percentage
Yes	40	33.06
No	81	66.94

Table-3: Cross-tabulation of HCV seropositivity with study parameters (p<0.05)

HCV Seropositivity	Gender of patients			Age of patients (Yrs)			Adoption of dis-infective measures			Number of blood transfusions			Duration of Dialysis dependent CKD (months)		
	Male	Female	Total	≤50	≥51	Total	Yes	No	Total	Up to 5	>5	Total	Up to 6	>6	Total
Yes	33	7	40	27	13	40	38	2	40	16	24	40	25	15	40
No	47	34	81	39	42	81	75	6	81	46	35	81	36	45	81

DISCUSSION

The prevalence of Hepatitis C infection among patients with dialysis dependent kidney disease is much higher than general population. A variable prevalence of Hepatitis C seropositivity has been reported, reaching up as high as 84.6%.[5]

The frequency of Hepatitis C seropositivity in this study was quite high. Recently a considerably high prevalence of Hepatitis C in patients with chronic kidney disease who are not on renal replacement therapy has been reported by Shafi, *et al*[13]. They reported that of all patients with CKD, 49 (27.2%) had Hepatitis C test positive by ELISA.

Our results are in agreement with a study from India[14] which reported that 33.5% of dialysis dependent patient population was positive for Hepatitis C. The authors conducted a retrospective hospital record based study and included records of dialysis dependent chronic kidney disease patients for a period of two years. They observed that out of the total 262 patients who underwent haemodialysis for chronic kidney disease during this period, 88 (33.5%) were found to be positive for HCV infection. Out of these 88 HCV positive patients, 59 were males and 29 were females. The highest prevalence was found in the age group of 41–60 years (43.18%) and lowest prevalence was observed in the age group of <20 years (2.27%) and >80 years (1.17%).[14] Our results are also in concordance with the study done by Stuyver *et al*[15] in which 25 (36.7%) out of 68 haemodialysis patients seroconverted to HCV. Our results are also in agreement with Khalaf *et al*[16].

A study by Ashuntantang *et al*[17] reported a 25% seroconversion rate for Hepatitis C in dialysis dependent chronic kidney disease patients. These results are slightly lower than the results of our study probably because of small sample size of 40 patients in that study.[17] A study by Bhaumik and Debnath reported frequency of new Hepatitis C infections in dialysis dependent chronic kidney disease patients as 10.9%.[18] They reported male predominance among their study population, and 100% history of blood transfusion in newly acquired Hepatitis B and C infections.

A study from Vietnam identified increased blood transfusions and frequency of haemodialysis among a number of risk factors for acquiring Hepatitis C.[19] That study reported 6% seroprevalence of Hepatitis C. Ismail *et al*[20] found HCV seroconversion rate of as 48.9 %. That seroconversion rate is somewhat higher as compared to our study probably because of a slightly higher number of patients enrolled in that study.

Further large-scale studies are required to generate more data on the frequency of hepatitis C seroconversion in chronic kidney disease patients during haemodialysis.

LIMITATIONS

This was a single centred small study and its results cannot be generalized. Number of haemodialysis sessions completed before Hepatitis C seroconversion was not recorded. Infection with HBV either alone or concomitant with Hepatitis C was not recorded. Other possible sources of Hepatitis C transmission were not studied.

CONCLUSION

Dialysis dependent chronic kidney disease patients are at a higher risk of acquiring Hepatitis C infection which is a preventable cause of morbidity and mortality. Rigorous implementation of Hepatitis C screening before starting haemodialysis, and separate haemodialysis of Hepatitis C positive dialysis dependent patients can effectively reduce the rates of Hepatitis C seroconversion.

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