HEPATITIS C SEROCONVERSION RATES IN PATIENTS ON HEMODIALYSIS IN TERTIARY CARE HOSPITALS: A MULTICENTER CROSS SECTIONAL STUDY

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ABSTRACT

Objective: To determine the rates of HCV seroconversion in patients undergoing hemodialysis (HD) in dialysis units of tertiary care hospitals.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: Dialysis units of three tertiary care hospitals, from Feb to Jul 2018.

Methodology: Three hundred and sixty four (364) patients on hemodialysis for more than six months were included based on inclusion criteria. All these patients were HCV negative at the initiation of dialysis. All those patients who were HCV positive at the baseline or sero-converted within six months were excluded. Patients who became HCV positive later after six months were labeled sero-converted. Data about demographics, time since initiation of HD and time to HCV seroconversion was collected through a structured questionnaire and retrieved retrospectively from patients medical record. Descriptive statistics were used to identify rate of HCV seroconversion and binary logistic regression used to estimate its determinants.

Results: Of the total, 222 (61%) were males and 142 (39%) were females. The mean age (SD) of the participants was 43.76 years ± 15.86 (Range: 14-80 years). Mean (SD) duration since initiation of HD was 26.80 ± 27.99 months. Of the total, 145 (39.8%) seroconverted whereas 219 (60.2%) remained HCV negative. The mean (SD) time taken for seroconversion was 14.84 ± 11.58 (range: 6-60 months). Duration since initiation of HD was strongly associated with seroconversion (p<0.001).

Conclusion: Our hemodialysis units have very high rates of HCV seroconversion and duration since initiation of HD is significantly associated with seroconversion.

Keywords: HCV, Hemodialysis, Seroconversion.

INTRODUCTION

Hepatitis C virus (HCV) causes a potentially life-threatening infection associated with significant morbidity and mortality[1]. Global seroprevalence of HCV is about 3% affecting around 170 million people[1,2]. It becomes chronic in 80-90% cases and progresses to cirrhosis in 20-25% cases over a period of 25 years, which can be complicated by liver failure and hepatocellular carcinoma[3]. It causes over one million deaths per year from decompensated cirrhosis and hepatocellular carcinoma[3]. In Pakistan, sero-prevalence of HCV is 6.7% affecting around 10 million people and about 5.8% adults have active viral replication (viremia)[4].

HCV is the most common chronic blood-borne infection and blood inoculation is the most common route of HCV transmission[5]. Non parenteral transmission can also occur like perinatal transmission and transmission after sexual exposure. High risk groups include intravenous drug users, patients receiving blood or blood products and dialysis dependent patients[6].

Dialysis dependent patients have higher prevalence of HCV infection than general population. This can be partially explained by impaired cellular immunity in these patients which makes them susceptible for contracting infections[5]. Prolonged vascular access, exposure to contaminated equipment, frequent transfusions, hospitalization and surgeries are additional risk factors[5,7]. HCV

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causes significant morbidity and mortality in these patients even after they have received renal transplant[5]. Treatment in this subgroup is particularly challenging due to higher incidence of adverse events and concerns regarding safety of antiviral drugs.

It is common for HCV negative patients undergoing dialysis to seroconvert after initiation of dialysis[8]. Different studies have identified male gender, increased number of blood transfusions, increased duration on dialysis and poor adherence to infection control measures by health care providers, as common risk factors associated with seroconversion[8-10]. Locally few single centre based studies have been conducted to see HCV seroconversion in HD patients[1,7,8]. In the view of limited data, this study was conducted to determine the rates of HCV seroconversion in patients undergoing hemodialysis in tertiary care hospitals.

METHODOLOGY

This cross sectional study was conducted at dialysis units of three tertiary care hospitals of Pakistan, namely Pak Emirates Military Hospital Rawalpindi, Khyber Teaching Hospital Peshawar and Nephrology Division of Institute of Kidney Diseases Hayatabad Peshawar. The study was completed over time period of six months, from February 2018 to July 2018. Ethics approval was obtained from the Ethics Review Board of the PEMH Rawalpindi (Letter No A/28/Jan 2018). With the help of WHO Sample Size Calculator, at confidence level 95%, absolute precision 5% and anticipated population proportion 59.74%[11], the minimally required sample size was calculated to be 363 patients however 364 patient's data were collected.

Baseline HCV status was determined by serology at the initiation of dialysis. Patients on dialysis for more than six months and HCV negative at the baseline were enrolled in the study. All those patients who were HCV positive before/diagnosed at the initiation of dialysis or became HCV positive within six months were excluded from the study. The last group was excluded because the incubation period of HCV is 2 weeks to 6 months and those sero-converting within 6 months might have acquired the infection before initiating dialysis. Patients, who were HCV negative at the baseline and became HCV positive after 6 months, were labeled sero-converted.

Data about demographics, HCV status, duration since initiation of dialysis and time to HCV seroconversion was collected through a structured questionnaire. Data collected were confirmed from patients' medical record. Informed written consent was taken after explaining the objectives of the study. Statistical analysis was done using the Statistical Package for Social Science (SPSS) version 22.0. Descriptive statistics were used to identify rate of HCV seroconversion and binary logistic regression was used to determine its determinants. HCV seroconversion was taken as dependent variable while gender, age and duration since initiation of dialysis were taken as independent variables. Female gender, age ≥50 years and duration of dialysis >60 months were taken as reference values. Results were presented as unadjusted odds ratio and *p*-value of ≤0.05 was considered statistically significant.

RESULTS

Of the total, 222 (61%) were males and 142 (39%) were females. Mean (SD) age of the participants was 43.76 ± 15.86 years (Range: 14-80). Patients of age ≥ 50 years contributed maximally to the sample size (42.3%). Mean (SD) duration

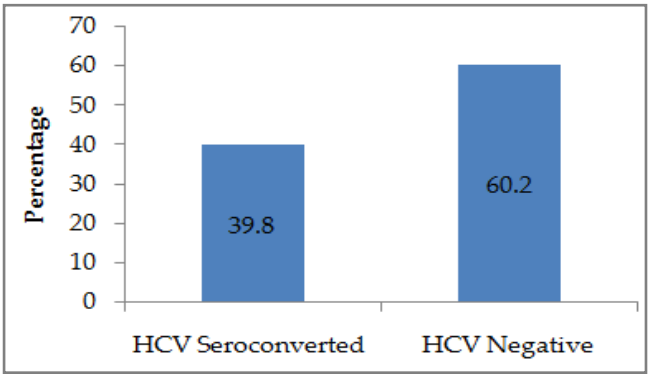

Figure: Proportion of patients who seroconverted to HCV.

since initiation of hemodialysis was 26.80 ± 27.99 months (range 06-226) as shown in table-I.

Of the total, 145 (39.8%) patients seroconverted whereas 219 (60.2%) patients did not seroconvert as shown in fig-1. Mean (SD) time taken for seroconversion, since initiation of dialysis was 14.84 ± 11.58 months (range 06-60). Compared to females, males were 1.25 times more likely to seroconvert but this difference was statistically non-significant (unadjusted OR [95% CI] = 0.801 (0.519-1.24), p=0.317. There was no statistically significant association between age and rate of seroconversion. The duration of dialysis in months was found to be significantly associated with rate of seroconversion, for 12-60 month (unadjusted OR [95% CI] = 0.093 (0.027-0.319), p<0.001) and for <12 months (unadjusted OR [95% CI] = 0.042 (0.011-0.155), p<0.001) as shown in table-II.

Table-I: General characteristics of the patients (n=364).

Variable	Frequency (%)
Gender	
Male	222 (61%)
Female	142 (39%)
Age group (years)	
Mean (SD) age	43.76 ± 15.86
<20	23 (6.3%)
20-29	55 (15.1%)
30-39	68 (18.7%)
40-49	64 (17.6%)
≥ 50	154 (42.3%)
Duration since initiation of dialysis (months)	
Mean duration (SD)	26.8± 27.99
<12 months	85 (23.4)
12-60 month	254 (69.8)
>60month	25 (6.8)
Seroconversion status	
Yes	145 (39.8%)
No	219 (60.2%)
Mean time to HCV seroconversion (months)	14.84 ± 11.58

DISCUSSION

In our country HCV has high prevalence and causes significant morbidity and mortality[1,6,7]. Its course can be complicated by cirrhosis and hepatocellular carcinoma. HCV is common in high risk groups including patients on hemodialysis. The prevalence of HCV among dialysis patients varies from country to country and among different dialysis centers within a single country. In hemodialysis dependent patients, HCV prevalence is much higher in developing countries compared to the developed world[7,12,13].

In this study, 39.8% patients seroconverted, rate lower than reported by previous local study (48.9%)[8]. Compared to our results, studies from Iran, Egypt and Africa have shown significantly lower seroconversion rates of 3.95%[14], 14%[15] and 25%[16] respectively. The higher rate of seroconversion may be attributed to high prevalence of hepatitis C in general population, poor adherence to infection control measures by health care providers, high number of intravenous medications use in patients with chronic diseases (like dialysis dependent patients)and frequent blood transfusions in dialysis patients.

Table-II: Association of factors associated with HCV Seroconversion in hemodialysis patients.

Variable	HCV Seroconversion, n (%)	Unadjusted odds ratio	p-value
Gender			
Male	93/222 (41.89)	1	0.317
Female	52/142 (36.62)	0.801	
Age group (years)			
<20	05/23 (21.73)	0.447	0.130
20–29	26/55 (47.27)	1.444	0.247
30–39	24/68 (35.29)	0.878	0.668
40–49	31/64 (48.44)	1.513	0.168
≥ 50	59/154 (38.31)	1	
Duration since initiation of dialysis (in months)			
<12	20/85 (23.5)	0.042	<0.001
12-60	103/254 (40.6)	0.93	<0.001
>60	22/25 (88)	1	

Male Gender, Age ≥50 and duration of dialysis >60 months reference values

Mean time taken for seroconversion (since initiation of dialysis) was 14.84 months. Ismail *et al* reported mean duration of dialysis to HCV seroconversion of 18.04 months which is higher compared to our results[8]. Duration of dialysis was found to be a major determinant of HCV seroconversion which is consistent with results of the Dialysis Outcome and Practice Pattern study (DOPPS)[5,17].

In this study, the frequency of HCV seroconversion was 1.25 times higher in males than in females but this difference was not statistically significant. This is in accordance with results of one study from Pakistan 8 and two studies from Egypt[5,15]. In a study carried out by Liu *et al*, the prevalence of hepatitis C in hemodialysis patients was more among men as compared to women[9]. This high risk in male may be explained by their exposure to other concomitant risk factors for HCV particularly barber community and multiple sexual partners[7-19].

In our study, the risk of seroconversion was not associated with increasing age. This was in accordance with a study from Egypt[5] and a study carried out in Tabriz, Iran which showed no statistically significant association between HCV seroconversion and age[14]. However this was not in agreement with other studies which showed higher seroconversion rates with increasing age[8,20,21].

The strength of our study is that it is multi centered study involving large number of patients. However some limitations in our study may affect the interpretation of our findings. In our study possible risk factors for HCV acquisition (like blood transfusions, history of dental and surgical procedures, sexual patterns, family history of HCV, intravenous drug use and shaving habits of patients etc.) were not considered which may overestimate the frequency of HCV attributable to HD. But we are hopeful that this study will highlight this important issue and will provide base for future research to find out the exact source of HCV seroconversion in HD patients.

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CONCLUSION

The proportion of HCV seroconversion is very high in our hemodialysis units. Patients who were on dialysis for longer duration were more likely to seroconvert.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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