

## Hepatitis C virus infection in dialysis centers of Tabriz, Iran: a multicenter study

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### ABSTRACT

**Background:** Hepatitis C virus (HCV) is a major cause of chronic liver diseases among chronic renal failure (CRF) patients undergoing maintenance hemodialysis. The aim of this study was to identify the hepatitis C virus infection in patients under dialysis therapy from Tabriz, northwest Iran and estimate the risk factors.

**Materials and methods:** Sera of 462 chronic renal failure patients from five dialysis units were screened for hepatitis C antibody and HCV RNA. The mean age of patients was  $52.7 \pm 16.5$  years and 55% were male.

**Results:** Totally, 69 patients (14.9%) were found to be HCV seropositive by ELISA 3 assay and 64 were HCV RNA positive giving an overall prevalence of 10.2%. History of blood transfusion seems to be a significant risk factor. Drug abusers (6.5%), patients with a history of surgical interventions (78.3%) or renal transplantation (32.6%) had a higher risk for infection with HCV while patients who had received peritoneal dialysis (14.4%) had a low infection rate.

**Conclusion:** This study gives added evidence of increased risk for HCV infection of CRF patients under dialysis with the duration and frequency of hemodialysis, which may be reduced by early transplantation. Considering the immune insufficiency in such patients who receive several interventions, serious education about sanitation to patients and medical staff will be of assistance.

**Keywords:** *Hepatitis C, Chronic renal failure, Dialysis.*

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### INTRODUCTION

Hepatitis C virus (HCV) is a major cause of chronic liver diseases among chronic renal failure (CRF) patients undergoing maintenance hemodialysis (1) which have a depressed immune system as well. HCV infection may be followed by higher morbidity and mortality in end stage renal disease patients after receiving a renal transplantation, which may affect graft survival as well (2). Death over follow-up and the frequency

of deaths as a result of liver disease was reported to be significantly higher in anti-HCV- positive than negative patients (3). Epidemiological studies regarding HCV infection among hemodialysis (HD) patients in Iran reported a prevalence of 5.5% to 55.9% in different cities (4-6) many of whom display normal liver function tests, while it seems that the whole population prevalence is less than 1% in Iran (7). Nosocomial transmission of HCV has been reported to be the major route of HCV infection in dialysis units (8).

The aim of this study was to estimate the prevalence of HCV infection in patients under

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dialysis treatment in Tabriz, northwest Iran, where consistent data is seriously lacking. We also evaluated the risk factors which may facilitate the development of an effective strategy to minimizing HCV spread among these vulnerable patients.

## PATIENTS and METHODS

This study was carried out in five dialysis units in Tabriz located in northwest Iran. Between January and March 2006, all 462 patients including 397 on hemodialysis and 65 on continuous ambulatory peritoneal dialysis treatment, were asked to take part in this survey. An informed consent was signed by all patients.

The studied population ranged in age from 9 to 89 years (mean  $52.7 \pm 16.5$  years). 208 (45%) were females and 254 (55%) were males. The etiology of chronic renal failure was diabetic nephropathy (n=116), hypertension (n=119), chronic glomerulonephritis (n=52), polycystic kidney disease (n=21), nephrolithiasis (n=33), pyelonephritis (n=8), renal diseases of unknown etiology (n=108), and others (Systemic Lupus Erythematosus, Alport syndrome, drug induced) (n=15).

A standardized form was used to collect sociodemographic data including number of previous blood transfusions, length of time on dialysis, kidney transplantation, war injury, tattooing, intravenous drug use (by an interview and physical examination), surgical interventions (including minor interventions and dentistry procedures), multiple sex partners, and possible household contact with hepatitis. The duration of hemodialysis treatment was grouped in less than 12, 12-36 and more than 36 months.

The diagnosis of chronic hepatitis C was verified on the basis of the presence of anti HCV antibodies in both sera detected by third-generation enzyme-linked immunosorbent assay (ELISA) kits (Abbott Laboratories, Chicago, US) confirmed by RIBA second generation and for

HCV RNA as tested qualitative PT-PCR amplification of 5'-UTR with nested primers (STRP, HCV Detection kit Cina Gen Inc.). Patients with both ELISA and RNA positive reports were considered to be infected with HCV and then were evaluated for presence of HCV RNA.

Prevalence was calculated. Data were analyzed by SPSS for Windows (version 13.0, USA) and chi-square test, Fisher's exact test, and a logistic regression model were used, when appropriate.

## RESULTS

Sixty nine patients (14.9%) were found to be HCV seropositive by ELISA-3 assay. All of the cases were explored for HCV RNA among whom 46 were confirmed as being HCV positive, so an overall prevalence of 10.2% was calculated, which varied between 4% and 12.8%, depending on the dialysis centers. The difference of infection rate between dialysis centers was not significant. Imam and Sina hospitals had the highest rates (12.8%), followed by Amir hospital (8.1%), peritoneal dialysis center (7.7%) and Pediatrics hospital (4%).

Infected patients included 20 (43.5%) men and 26 (56.5%) women. Table 1 shows the characteristics of studied population according to age, sex, and possible source of infection. Etiology of chronic renal failure was not associated with HCV infection in our patients, however, the prevalence of HCV RNA in HD patients was associated with the duration of treatment ( $p < 0.005$ ).

Patients with history of blood transfusion were at a significantly higher risk of infection with hepatitis C ( $p = 0.001$ , OR=0.243, 95%CI=0.085-0.694). Furthermore, receiving higher amounts of transfused blood was associated with increased risk of HCV infection ( $p = 0.004$ , OR=0.0186, 95%CI=0.099-0.370). Drug abusers ( $p = 0.003$ , OR=28.95, 95%CI=2.95-284.45), patient with a history of surgical interventions ( $p = 0.006$ , OR=2.66, 95%CI=1.22-5.51) or a renal transplantation ( $p < 0.005$ ,

OR=0.15, 95%CI=0.07-0.31) had a higher risk for HCV infection while patients who had received peritoneal dialysis had a lower infection rate ( $p=0.03$ ).

**Table 1.** Characteristics of patients under dialysis in Tabriz according to hepatitis C virus infection

Factor	HCV positive	HCV negative
No. of patients (male/female)	46(0.76)	416(1.28)
Mean age ( $\pm$ SD)	48.6 $\pm$ 15.0	53.2 $\pm$ 16.6
Married patients	36(78.3%)	362(87%)
<b>Possible way of transmission</b>		
Sexual	1(2.2%)	1(0.2%)
IVDU*	3(6.5%)	1(0.2%)
Hemodialysis*	41(89.1%)	356(85.6%)
War injury	1(2.2%)	5(1.2%)
Tattooing	0	12(2.9%)
Surgical intervention*	36(78.3%)	239(57.5%)
<b>Duration of dialysis (month)*</b>		
Less than 12	0	132(31.7%)
12-36	7(4.9%)	136(95.1%)
More than 36	39(20.9%)	148(79.1%)
<b>No. dialysis sessions per week*</b>		
One	4(8.7%)	25(6.0%)
Two	14(30.4%)	237(57.0%)
Three	28(60.9%)	94(22.6%)
<b>No. of blood transfusion*</b>		
Never	4(3.3%)	116(96.7%)
1-5 units	15(7.9%)	176(92.1%)
More than 5 units	27(17.9%)	124(82.1%)
<b>History of renal transplantation*</b>		
Never	31(67.4%)	388(93.3%)
One time	14(30.4%)	24(5.8%)
Two or three times	1(2.2%)	4(1.0%)

HCV: hepatitis C virus; IVDU: intravenous drug user; HBV: hepatitis B virus. \*  $p$  value < 0.05

Multivariate analysis by a logistic regression model showed the duration ( $p < 0.005$ ) and frequency ( $p = 0.034$ ) of hemodialysis therapy to be predictive factors for infection with hepatitis C virus. Center of hemodialysis, etiology of CRF,

war injury, tattooing, surgical interventions, multiple sex partners, and possible household contact with hepatitis were not good predictors ( $P = NS$ ).

## DISCUSSION

Studies on prevalence of HCV infection in different communities have focused either on the mechanism or avoidance of spread of the virus. The rate of infection varies worldwide from 3% in Netherlands (9) to 76% in Indonesia (10). The high prevalence of anti HCV antibodies in CRF patients from Tabriz is consistent with studies from other countries. Although worldwide data suggest an anti-HCV prevalence in <5% to 68% of CRF subjects, this rate among our CRF patients seems to be high when compared with HCV infection among blood donors in Iran (0.12%) (11).

Similar studies from Iran are scanty. The most recent studies from Iran report the prevalence of HCV in CRF patients to be 24.8% in Gilan province in year 2005 (12) and 13.2% in Tehran, in 2003 (6). Nosocomial transmission was reported to be the main source of infection in Gilan and separate dialysis system was suggested to be used for seropositive HCV patients while early transplantation and avoidance of blood transfusion was recommended because of the association between history of blood transfusion and higher infection rate in Tehran.

Blood transfusion was not an independent risk factor for infection with HCV in dialysis patients of our region. Although screening of blood donors which has been executed since 1996 in Iran, may still require serious attention in these patients who are at higher risk of parenterally transmissible hepatitis B, C, and D viruses. Kidney transplantation failed to play an important role for infection in logistic regression modeling.

Although the use of erythropoietin for treatment of anemia has reduced the number of blood transfusions, the frequency of HCV infection has

not declined in hemodialysis units. This issue seems to be a result of nosocomial infection in these units. Undoubtedly, patient isolation and use of dedicated dialysis machines for seropositive patients could decrease the transmission of HCV infection in hemodialysis units (13). Isolation is reported as the most prominent independent factor in reducing seroconversion of anti-HCV (14).

Serologic screening of CRF patients before the dialysis course and regularly thereafter in order to discover infected patients will facilitate management of the disease. Our results indicate the importance of infection control measures in dialysis units. Because of further use of home therapy, which reduces the risk of environmental contamination, peritoneal dialysis is considered to be an important strategy for prevention of hepatitis in end-stage renal disease patients.

Intensive hygienic situate dialysis centers, prevention of patient-to-patient contamination and the non-reuse of dialysers for HCV seropositive patients will have power over spread of the infection in such patients who receive several medical interventions.

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