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Anti-HCV seropositivity in dialysis patients

ABSTRACT

This cross-sectional study evaluated the prevalence of anti-hepatitis antibodies and associated factors in dialysis patients. Data were collected from records of all patients receiving dialysis treatment [n=1,261] in the city of Porto Alegre, in Southern Brazil, from August to December 2003. The statistical analyses used were Chi-square and the linear tendency test. Prevalence ratios were also calculated. Multiple logistic regression analysis was performed through Cox regression. The prevalence of anti-hepatitis antibodies was of 29.1%, and was higher among patients treated by hemodialysis where there was no segregation of seropositive and seronegative patients and where dialyzers were reused. This association remained even when controlling for confounding factors. Patients who received blood transfusions had a linear increase in the prevalence of anti-hepatitis antibodies. The duration of dialysis treatment showed a dose-response curve with the prevalence of anti-hepatitis antibodies.

KEYWORDS: Hepatitis C, epidemiology. Hepatitis C antibodies, diagnostic use. Renal dialysis. Risk factors. Seroepidemiologic studies.

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INTRODUCTION

The global prevalence of HCV carriers is estimated by the World Health Organization to be 180 million.

The estimated frequency of carriers of antibodies to the Hepatitis Virus (anti-HCV) in Brazil is of 1.5%,[2] this being higher among dialysis patients.[1,3-5] Anti-HCV exams are administered monthly in dialysis centers, as mandated by regulation n. 82/00 of the Brazilian Ministry of Health (MS). Detection of anti-HCV is undertaken through simple serology tests. The means of Hepatitis C transmission are not fully understood, which has contributed to a global health problem.

The present study sought to evaluate the prevalence of anti-HCV positive dialysis patients and study factors associated with seropositivity.

METHODS

The study population was comprised of 1,261 dialysis patients in 16 dialysis centers in the municipality of Porto Alegre, RS, from August to December 2003. Patients suffered from chronic renal deficiency.

The data analyzed were collected from patient records. Variables studied were: laboratory exam results for anti-HCV serology; age; gender; whether clinics segregated anti-HCV positive patients from negatives by room, by machine, or by nursing team; duration of dialysis; type of dialysis treatment and whether hemodialysis was undertaken; transfusion records and reuse of dialyzer.

The frequencies of anti-HCV were evaluated as well as their association with other risk factors. These statistical analyses were undertaken using the Chi-square test for categorical data and the linear tendency test for ordinal variables. The prevalence ratio (PR) was calculated as a measure of association. Multiple regression was also undertaken through Cox regression with the following variables: age, duration of dialysis, transfusion record, reuse of dialyzer and segregation of seropositive patients.

RESULTS

Of the patients analyzed, 539 (42.7%) were women and an average age of 54.3 years (SD=16.3). The serological prevalence for anti-HCV seropositivity was of 29.1%. There was no association of anti-HCV with gender or age.

When the dialyzer was reused, the prevalence of anti-HCV was 2.7 times higher than when it was not (95% CI: 1.11-6.48).

Anti-HCV seroprevalence in dialysis centers that segregated patients, either by room, by machine, or by clinical team was of 26.6% compared to 51.6% in centers that did not segregate. This association was statistically significant (PR=1.9; 95% CI: 1.48-2.54).

An association was observed between dialysis treatment by hemodialysis and seropositivity to anti-HCV.

The frequency of blood transfusion seems elevated (44.1%), although only 515 patients had adequate records of the total number of transfusions. The prevalence of anti-HCV in multi-transfusion patients increases proportionally in relation to the units of blood

Table - Factors associated with positive anti-HCV in dialysis patients. Porto Alegre, Southern Brazil, 2003.

Variable	N	Anti-HCV + (%)	PR_{crude}	$PR_{adjusted}$	95% CI PR	p
Age (years)						
0 a 40	247	26.3	1.0			
41 a 60	528	32.2	1.2	0.8	0.50 to 1.32	0.401
61 +	486	27.2	1.0	1.0	0.72 to 1.42	0.937
Duration of dialysis (years)						
<1	315	13.3	1.0			
1 to 5	604	24.7	1.9	1.9	1.11 to 3.34	0.020
5.1 to 10	227	42.3	3.2	3.1	1.71 to 5.51	0.000
10.1 +	115	69.6	5.2	5.1	2.77 to 9.35	0.000
Transfusion record						
One unit	92	25.0	1.0			
Two to three units	174	27.6	1.1	1.0	0.61 to 1.66	0.981
More than three units	249	36.5	1.5	1.4	0.89 to 2.24	0.139
Reuse of dialyzer						
No	45	11.1	1.0			
Yes	1216	29.8	2.7	1.6	0.40 to 6.64	0.499
Segregation of anti-HCV+ patients						
Yes	1137	26.6	1.0			
No	124	51.6	1.9	1.8	1.12 to 2.90	0.016
Was hemodialysis performed*						
No	56	3.6	1.0			
Yes	1205	30.3	8.5	-	-	-

*Was not included in the multiple regression analysis due to the 95% CI (2.11-34.04)
PR: Prevalence ratio

received. The prevalence of anti-HCV also increases with the duration of dialysis.

The Table shows the prevalence ratios among factors in the study and anti-HCV seropositivity.

Multiple regression analysis through Cox regression revealed that the variables dialysis duration and segregation of seropositive patients remained associated with the condition, even after control. The effect of dialysis duration on anti-HCV prevalence showed a dose-response relationship in both simple and multiple regressions, when compared to patients having been treated for less than one year. Patients treated in clinics where there was no segregation of seropositives had nearly double the frequency of anti-HCV (PR=1.8; 95% CI: 1.12-2.90; p=0.016).

DISCUSSION

Anti-HCV seropositivity is high among patient populations with chronic renal deficiency undergoing dialysis treatment in Brazil. The seroprevalence found in the present research was of 29.1%, similar to that observed by Karohl et al[3] (1995) and Dotta et al[1] (2003) also in Porto Alegre,[1,3] but lower than studies in Goiânia[5] (39%) and Fortaleza[4] (52%).

Several studies show variable anti-HCV seroprevalence values in different dialysis centers worldwide.[5]

One of the risk factors for HCV transmission during hemodialysis may be dialyzer reuse,[4] a potential that was supported by the present study (Table). In the simple regression analysis, an association was found between anti-HCV seropositivity and the reuse of the dialyzer. This practice, regulated by MS regulation 82/00, is of up to twelve uses. It should be noted that dialysis centers 2, 3, and 16, which did not reuse dialyzers, have no history of seroconversion; seropositive patients in these units were transferred from other institutions. These centers only admit patients from the private health network. The association disappeared in the multiple analysis probably because *dialysis duration* was a confounding factor. The longer the dialysis treatment, the more times the dialyzer is reused (a maximum of 12 times) and also the greater the exposure to biosecurity errors. This can occur either through sharing of machines, environmental aerosols, droplets contaminated with the virus or during emergency situations when protective gloves are not replaces by technical teams.[2-5]

Both the sharing of hemodialysis machines of nursing teams has been associated to high incidence of HCV infection. Contamination, in such cases, may be related to the methodology used in the dialysis process, such as through technical errors in biosecurity.[2-5] The patient may also be in an immunological window whilst sharing a room, machine or nursing team with negative patients.

The higher prevalence of anti-HCV in patients that were or had been in hemodialysis treatment results from their higher susceptibility to accidents and higher potential for contamination through biosecurity failures.

The lack of association between anti-HCV and the number of transfusion units in the multiple regression analysis may be a result of the low number of patients for which this information was available (n=515).

The dose-response association between anti-HCV seropositivity and *dialysis duration* supports results from other studies.[1-5]

In conclusion, results suggest that transmissibility of HCV in dialysis centers does not occur exclusively through transfusion of contaminated blood.[4] Other factors predominate, such as longer duration of dialysis and the non-segregation of seropositive patients, which are questions of biosecurity.[5]

To promote more efficient biosecurity controls, quality programs must be implanted in dialysis centers addressing methodology training of technical teams and constant monitoring by epidemiological authorities.

It is recommended that hemodialysis patients be monitored in order to determine the full risk factors for HCV contamination.

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REFERENCES

1. Dotta MA, Chequer H, Pereira JP, Schimitt VM, Krug L, Saitovitch D. Métodos molecular e imunológico no diagnóstico de hepatite C em pacientes em hemodiálise. *J Bras Nefrol*. 2003;25(2):86-94.

2. Focaccia R, Baraldo D, Souza F. Epidemiologia. In: Focaccia R, editor. Tratado de hepatites virais. São Paulo: Atheneu; 2003. p. 221-9.

3. Karohl C, Manfro RC, Gonçalves LF. Prevalência de anticorpos anti-vírus da hepatite C em pacientes em hemodiálise crônica de Porto Alegre. *J Bras Nefrol*. 1995;17:40-6.

4. Medeiros MT, Lima JM, Lima JW, Campos HH, Medeiros MM, Coelho Filho JM. Prevalência e fatores associados à hepatite C em pacientes de hemodiálise. *Rev Saúde Pública*. 2004;38:187-93.

5. Naghettini AV, Daher RR, Martin RMB, Doles J, Vanderborght B, Yoshida CFT, et al. Soroprevalência do vírus da hepatite C na população em diálise de Goiânia, GO. *Rev Soc Bras Med Trop*. 1997;30:113-7.

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