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BRIEF COMMUNICATION

HEPATITIS C VIRUS INFECTION IN HEMODIALYSIS PATIENTS IN MARACAIBO, VENEZUELA

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SUMMARY

Over a two year period, the incidence of hepatitis C virus (HCV) infection was evaluated in 29 hemodialysis patients, aged between 15 and 75 years (mean ± SD: 45 ± 39.5 years), from the University Hospital Hemodyalisis Unit, Maracaibo, Zulia State, Venezuela. Anti-HCV antibodies were determined using a fourth generation ELISA (Innotest HCV Ab IV) kit and positive blood samples were tested using a recombinant assay kit (Inno-LIA HCV Ab III), both kits from Innogenetics N.V., Belgium. The findings indicate a lack of HCV seroconversion in the hemodialysis patients over the study period, confirmed by the recombinant assay. Risk factors for HCV infection were 0.3270 (95% confidence interval: 0.01323-8.080) in patients undergoing hemodialysis. The findings suggest a lack of significant sources for HCV infection due to the preventive measures to avoid its transmission in the hemodialysis unit.

KEYWORDS: Hepatitis C; Incidence; Hemodialysis.

It is generally accepted that the parenteral route is the main transmission mechanism for infection of hepatitis C virus (HCV). Risk factors for HCV infection include blood transfusion and blood products from non-tested blood donors; organ transplantation from infected donors, administration of drugs with contaminated syringes, hemodialysis, occupational exposure to blood, perinatal infection and sexual transmission[2,4,13,14,18]. Moreover, due to the great variety of human activities with potential exposure to blood, several possible biologic transmission models exist, such as from tattoos, piercings, barber shops, scarification rituals, circumcisions and acupuncture[7].

Among the different risk factors, the most common include blood transfusion, intravenous drug use and invasive therapies with contaminated equipment[2,4]. However, a significant variation in the importance of each of those factors in disease transmission was observed over time in each region[1]. The transmission of HCV in hemodialysis units merits special attention since it can occur by several routes[11,16].

The prevalence of HCV infection in patients undergoing dialysis is greater than that in the general population, suggesting that patients on dialysis may be at higher risk of acquiring HCV infection. This is predominantly because these patients are more exposed to risk factors for the acquisition of this infection and also because they are monitored monthly by laboratory examinations that permit an early diagnosis of the infection[19]. The prevalence of HCV infection in hemodialysis patients can vary from 7% up to 70% in some countries[11,16]. Among the factors associated with higher HCV infection rates in hemodialysis patients are the time of dialysis and demographic region. Hepatitis C virus transmission among hemodialysis patients is mainly nosocomial. Possible risk factors include sharing hemodialysis equipment and instruments and the lack of adhesion to standard precaution measures and equipment sterilization[7,11]. More than 15 years ago, the prevalence of HCV infection among hemodialysis patients in Venezuela was between 25% and 71%[3,12]. However, in recent years, HCV infection in hemodialysis patients has not been observed and its prevalence in other populations is no higher than 1%, suggesting the low prevalence of anti-HCV in the country[8-10].

The aim of this study was to establish the incidence of HCV in a longitudinal study of patients undergoing hemodialysis in one unit of the University Hospital, Maracaibo, Zulia State, Venezuela. Over a two year period, 2007-2009, 29 patients aged between 15 and 75 years (mean ± DS: 45 ± 39.5 years), who began dialysis treatment at the Maracaibo University Hospital were monitored. Baseline blood samples were taken at the start of dialysis treatment to rule out past infection. Subsequent samples were taken every three months.

The patients enrolled were required to have not received a blood transfusion during the study period and to be seronegative to HCV antibodies. Eight mL of venous blood was withdrawn from each patient before, during and after hemodialysis procedure. The samples were centrifuged to obtain the sera, which were refrigerated at -20 ºC until

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processing. From the clinical records of the patients, data including medical history and risk factors for HCV were obtained. Consent from the patients was obtained before enrollment in the study. The ethical aspects of the study follow the principles outlined in the Declaration of Helsinki (October 2001).

Anti-HCV antibodies were determined using a fourth generation enzyme-linked immunosorbent assay (ELISA) kit (Innotest HCV Ab IV from Innogenetics N.V., Belgium). The specificity of the anti-HCV antibodies was evaluated using the third generation recombinant immunoblot kit (Innolia HCV Ab III, Innogenetics N.V.). The results were submitted for statistical analysis. The data are presented in frequency distribution tables and correlations among the variables examined were established by Pearson's correlation analysis. The risk factors for HCV infection in patients undergoing hemodialysis were determined as indicated by FERNANDEZ *et al*. (1997)[5].

These results indicate a lack of anti-HCV antibodies and no HCV seroconversion was observed in the 29 patients on dialysis over the study period. The risk factors for HCV infection established for the dialysis patients were 1 to 3 blood transfusions before the study in 51.7%, several sexual partners in 24.1%, intravenous drugs in 3.4% and previous surgery in 38% (Table 1). Risk factors for acquiring HCV infection / HCV seroconversion were 0.3270 (95% CI: 0.01323, 8.080) for the hemodialysis patients. A limitation of the present work is that some of the patients with chronic renal disease using immunosuppressant drugs sometimes do not produce antibodies.

Table 1
Risk factors for hepatitis C virus infection in patients undergoing hemodialysis, 2007-2009, in one of the dialysis units at the university hospital. Maracaibo, Venezuela

Risk factors	No.	(%)
Hemodialysis patients (29)		
Transfusions		
No	7	24.1
1-3	15	51.7
4-9	5	17.2
> 10	2	6.9
Number of sexual partners		
No/One	22	75.8
Several	7	24.1
Use of injected drugs		
No	28	96.5
Yes	1	3.4
Other medical procedures		
No	18	62.0
Yes (Minor, and major surgeries)	11	38.0

These findings could be attributed to the preventive measures taken by the dialysis unit, including the recommended universal infection-control precautions, designed to control the spread of HCV. This dialysis unit is currently equipped with instruments that use disposable dialyzers. In between the two sessions, the machines are subjected to strict cleaning, disinfection and sterilization protocols. Patients who are seropositive for hepatitis B and C viruses and human immunodeficiency virus (HIV) infections at the beginning of treatment are assigned to a separate room with different machines and nursing personnel to those used for seronegative patients.

The results obtained are quite different from those observed in previous years when the prevalence of HCV among patients on hemodialysis in Venezuela was as high as 71.3%[12]. Other authors[6,17] who detected a low seroconversion rate in populations of dialyzed patients before preventive measures were adopted, concluded that prevention was the main factor for reducing anti-HCV seroconversion, particularly in units with an originally high prevalence. The low estimated incidence of 0.5% of new HCV infections/year obtained by SAUNÉ *et al*. (2011)[15] emphasizes the importance of adhering to the recommended universal infection-control precautions.

The transmission of HCV is probably not associated with the dialysis procedure itself, but rather with a lack of knowledge regarding the application of preventative methods, including universal precautions. In conclusion, the low prevalence of HCV virus in the dialysis unit of the University Hospital of Maracaibo, suggests the lack of significant sources for nosocomial infections in this environment. In hemodialysis patients, it is likely that the preventive measures implemented in the dialysis unit have contributed to the control of the transmission of HCV infection.

RESUMO

Infecção pelo vírus da Hepatite C em pacientes em hemodiálise em Maracaibo, Venezuela

Durante período de 2 anos, estudamos a incidência da infecção pelo vírus da hepatite C (VHC) em 29 pacientes em tratamento de diálise, com idades entre 15 e 75 anos (χ ± DS; 45 ± 39,5 anos), procedentes da unidade de hemodiálise do Hospital Universitário de Maracaibo, Estado Zulia, Venezuela. Para a detecção dos anticorpos contra o VHC (anti-VHC) utilizamos a técnica de imunoensaio enzimático (ELISA, Innotest HCV Ab IV) e em amostras reativas por ELISA, utilizamos o método de immunoblot recombinante de terceira geração (Inno-LIA HCV Ab III), ambos da casa comercial Innogenetics N.V., Bélgica. Os resultados demonstram ausência de soroconversão ao VHC nos pacientes hemodializados durante o período estudado, o que foi confirmado pelo método de imunoblot recombinante. Os fatores de risco ao VHC foram 0,327 (95% CI: 0,01323 - 8,080) nos pacientes submetidos ao tratamento de diálise. Nossos resultados sugerem ausência de fontes de infecção neste centro de hemodiálise e que as medidas universais de controle de infecção são cumpridas.

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