

## Hepatitis C Risk Factor for Patients Submitted to Dialysis

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**This article reports the results of the research which has evaluated the prevalence and factors associated to the presence of Hepatitis C in patients submitted to dialysis at the Clínica de Doenças Renais (Clinic of Renal Diseases) in Tubarao city (CRDT), Santa Catarina State, Brazil, in the period between January 1<sup>st</sup>, 2004 to December 31<sup>st</sup> in the same year. The prevalence of 16.8% of Hepatitis C in the studied population and the time-length of dialysis as significant risk factor have become evident. The non-correlation of seropositivity of the followings factors is also indicated: age, gender, base diseases, infrastructures, the type of clinic machines, the type of dialyser, used membranes, the machine sterilisation and substances for this process as well as the number of times of the dialyser reutilization. The data represented in this project suggest that the Hepatitis C presents high prevalence in patients in dialysis and the time-length of the treatment is a risky factor to acquire the infection.**

**Key Words:** Dialysis, hepatitis C, nosocomial infection.

The patients under dialysis are constantly exposed to the contamination due to the invasive procedures to which they are submitted and to the exposition to other infected patients [1,2]. Currently, the infection through the virus type C is considered the main cause of chronic hepatic disease for patients in dialysis and for those who experienced renal transplantation; approximately 85% of infected patients are involved with the chronicity, being the cirrhosis the third cause of death (long term) for the renal transplanted people [3].

Although the Hepatitis C rate after blood transfusion varies distinctly worldwide, this disease can be considered endemic. The increase of prevalence varies from an average of 12% of patients under dialytic treatment for less than five years to 37% of patients under treatment for more than five years [3]. The higher the time of dialysis, the more the seropositivity prevalence for the Hepatitis virus [1,4,5].

The infection caused by the Hepatitis C virus is a problem which concerns the world public health. Data from the World Health Organization (WHO) estimates that this virus [6] would infect approximately 3% of the Brazilian population.

The prevalence of HCV host (patients) in the chronic uremic population in dialysis treatment varies from 1% to 68% in different series, representing a severe problem in the dialysis units [7].

Factors as blood transfusion, partial immunosuppression, and parental interventions are factors associated to the increase of infection risk. The duration of the dialysis treatment and the virus nosomial transmission possibility were suggested as contributors [1].

Despite the implantation of several control initiatives to avoid virus C (HCV) transmission in the centres of dialysis, the hepatic viral disease is still a serious problem at the dialytic units [7], even with the decrease of the incidence

and prevalence among patients in the last years. Among the nations which are members of the European Association of Dialysis and Transplantations, the prevalence of HCV diminished from 21% in 1992 to 17.7% in 1993. However, the incidence of HCV positivity from 0.4 to 15% at dialysis units is still worrying [8].

The difficulties regarding the formulation of policies concerning the HCV infection at dialytic units increases with the highest prevalence of the infection. On the other hand, the test limitations that identify these patients and the doubts related to the ways of transmission within the dialytic units [5] highlight the importance and need of determination of the risky factors and the characteristics of the infected patients related to this comorbidity.

This project aims at the determination of the Hepatitis C prevalence and the verification of the factors associated to the infection through the Hepatitis C virus in patients submitted to dialysis at the Clínica de Doenças Renais (Renal Diseases Clinic) in Tubarão city, Santa Catarina State, Brazil in the period between January 1<sup>st</sup>, 2004 to December 31<sup>st</sup> in the same year.

### Materials and Methods

The aimed results were obtained through a transversal observational analytic study with the collection of the retrospective data from the patients medical handbooks. All patients older than 15 years old that were under dialysis at the *Clínica de Doenças Renais* (Clinic of Renal Diseases) of Tubarão, Santa Catarina State, Brazil (CDRT) in the period between January 1<sup>st</sup>, 2004 to December 31<sup>st</sup> in the same year had their data recorded in a previously established study protocol for the investigation of the age, gender, base disease and viral serology.

In the Clinic where the project was carried out, the type of machine used for dialysis is the proportionating one. The frequency of sterilization of the machines happens on a daily basis and the sterilization happens between the shifts of the clinic. All patients used the following dialytic solutions: basic solution (sodium bicarbonate) acid solution (sodium chloride, potassium chloride, and associations) through discardable

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needles for puncture of the venoarterial fistula. The re-utilization of the suture and dialysers were practiced for all (in the maximum of 12 times). The types of capillary membranes of the dialysers are made of cellulose acetate, diacetate and policifona. The substance for the sterilization is the peracetic acid at 3.5% in all dialysis machines.

The recorded exams at CDRT were all performed by the laboratory of the Universidade do Sul de Santa Catarina (UNISUL) (Southern Santa Catarina University), which uses Microparticles Enzyme immunoassay (MEIA), AxSYM® HCV systematically [9].

The software EpiInfo 2002 processed the data obtained through the study protocol, being used the chi-squared test, Student t test and the  $\nu$  test (degree of freedom). There were statistically significant values of  $p < 0.05$ . The present project was submitted to the Ethic Research Committee of UNISUL (CEP-UNISUL), which has transmitted a favourable opinion.

**Results**

There were analysed one hundred ninety one handbooks of patients submitted to dialysis at Dialysis Clinic in Tubarão (CDRT); from these, 36.6% died in the period between 200 and 2004, not being relevant the cause of death for this research. From the total, 56.5% of the patients were males. The age of these patients varied between 25 and 95 years old, presenting an average of 56 years old.

In relation to the base disease of the patients, we found the hypertensive renal disease (40.3%) and diabetic nephropathy as the most frequent diseases and the non-determined chronic renal insufficiency (34.6%), polycystic kidneys and others such glomerunephritis as less frequent diseases, shown in the Figure 1.

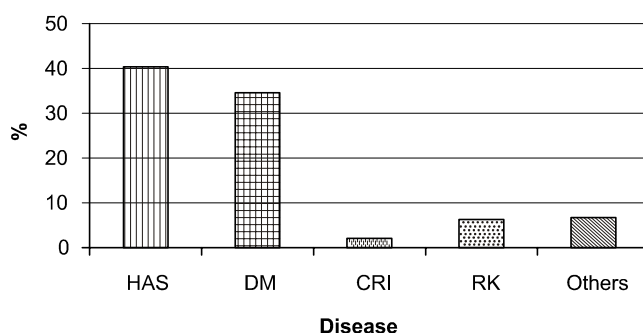
The indication of renal transplant was done for 60.2% of the patients. The mean time of dialysis was 25.8 months and the mean number of sessions was 2.9 times per week.

Out of 191 studied patients, 16.8% (32) patients were host of positive serology for HCV found in frequency of 19 (59.4%), males, and 13 (40.6%) females without statistic significance when relating the gender with the presence of Hepatitis C.

In terms of the base disease of these patients, we found the hypertensive renal disease – 13 (40.6%), secondary disruption related to diabetes mellitus – 8 (25%), non-specified chronic renal insufficiency – 8 (25%) and polycystic kidneys, 1 (3.1%) similar to general analysis of the patients not showing the statistic significance among the Hepatitis C infection and the base disease as shown in the Figure 2.

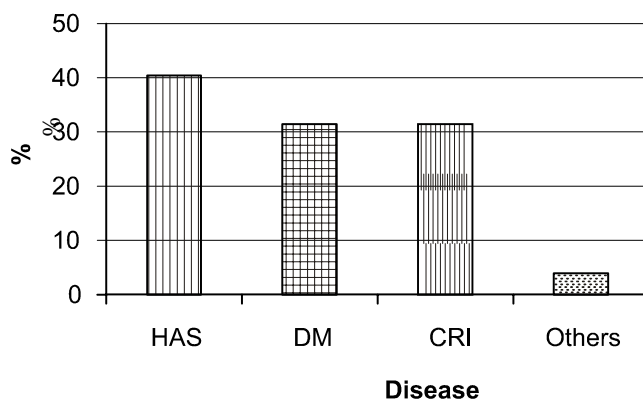
The mean time of dialysis of patients with positive serology for hepatitis C virus was 52.4 months. For patients with negative serology (HCV-), the mean time was 25.8. Applying the Student t test and  $\nu$  (degrees of freedom) for comparisons of mean of unequal populations with unequal and unknown variances, it was concluded that the means among both samples, that is, HCV (+) and HCV (-) patients have a statistic difference with  $p$  smaller than 0.001 ( $p < 0.01$ ), being  $p$  approximately equal to zero. The number of weekly sessions

**Figure 1.** Diagnosis of base disease in dialysed patients of CDRT, 2000-2004.

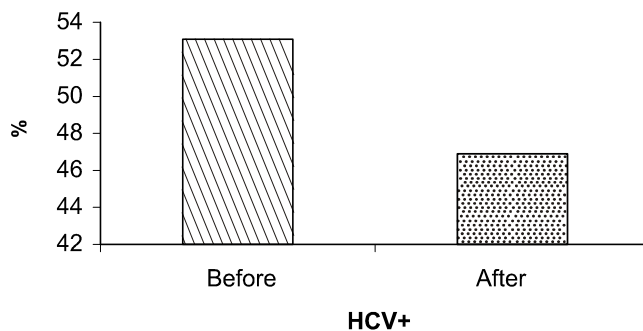


HRD = hypertensive renal disease; DM = diabetes mellitus; CRI = chronic renal insufficiency; PK = polycystic kidneys.

**Figure 2.** Diagnosis of base disease in dialysed, HCV seropositive patients of CDRT, 2000-2004.



**Figure 3.** Percentage of HCV seropositive patients before and after the commencement of dialysis at CDRT, 2000-2004.



of HCV (+) patients was 2.9 times per week making equal to the rest of the sample.

Comparing the HCV positive patients before and after the dialysis, we found 53.1% of them positive before the session, not finding association between the Hepatitis C presence

and contamination before or after the dialytic process according to Figure 3.

### Discussion

The importance of the infection caused by HCV in population of patients submitted to dialysis has been frequently reported in the international literature. Pinto and colleagues have detected, when performing multicentric study in Portugal by *Portuguese Society of Nephrology*, small incidence of HCV in units that used individualized machines or isolated the positive HCV patients in separate rooms for dialysis or reprocessing of their dialysers [10]. Similarly, Seeme and colleagues concluded in 1997 using the molecular epidemiologic method that the HCV dissemination in dialytic units was mistakenly nosocomial and that the improvement of severe policies of hygiene and the introduction of separate dialytic rooms and individualized machine for HCV infected patients are important measures for the effective infection control [11].

Several projects performed in Brazil between 1992 and 2004 point a HCV frequency varying from 23.5% to 65% [7,12-16]. Data from Santa Catarina State indicate the occurrence of the infection by HCV at the dialysis clinics in 33.4% [17]. In our study, we found an inferior value to the ones verified in the Brazilian studies as well as the ones from Santa Catarina State with 16.8% of the cases of hepatitis C, despite being low, it is still worrying. The found value may be due to a decrease in the Hepatitis C prevalence already observed in other studies or it refers to reduction of the HCV infection after blood transfusion as consequence of the introduction of control measures to prevent the nosocomial transmission [18,19].

In our research, we verified a high frequency of male patients of 59%, corroborating with other projects in the literature [8,19-21] that also demonstrate the absence of association between the gender, age, and the infection of HCV in dialysed patients [17]. As in other studies, we did not find association between the base disease and the frequency of infection by the hepatitis C virus [16,17].

The risk of acquiring the infection by HCV in dialysis is well known and the higher the dialysis duration, the higher the seropositivity risk for hepatitis C [1,4,5]. In this study performed in Tubarao, Santa Catarina State, we found a direct association between the dialysis duration and the seropositivity for hepatitis C ( $p < 0,001$ ), what corroborate with the idea that the long-term dialysis treatment involving hospital procedures may contribute with the infection dissemination [22].

In terms of the dialysis, the contamination risk might be related to the procedure itself, through horizontal transmission, through percutane pathway during the fistula punction, accident of the dialysis with bleeding and contact with the contaminated material [12]. These facts are used as argument to explain the association between the HCV infection with the dialysis treatment [15].

We must be concerned about the rising number of chronic uremic patients with positive serology for hepatitis C virus under dialysis, as many of them are in the list for renal transplantation and a large percentage of these patients may evolve to the chronic hepatic disease, cirrhosis, and even hepatocellular carcinoma. In our study, we have observed that 65.5% of the patients diagnosed with Hepatitis C had indication of renal transplantation. The impact of hepatitis C in the morbidity and survival of these patients in dialysis and in the period after transplantation is not clear [7].

The isolation of patients that react to anti-HCV does not eliminate the nosocomial transmission risk. Studies show that the separation may enhance the risk of super-infection with different genotypes of HCV and the prognostic of these patients are not clear yet [17,23,24]. In the clinic where our study was conducted, the HCV (+) patients are not placed in different rooms, but in separate sides attempting, therefore, to reduce the nosocomial transmission chance. The individualization of dialysis machinery is not recommended; however, there suggested strict measures for universal precaution, in addition to the extreme attention to the sterilization of the dialysis machinery [25-28], as according to the literature, the cross-infection by HCV is due to the disregard to the universal precautions and the absence of severe standardization that meets the specifications of each situation.

There are numerous risk factors identified among the patients in the dialysis, including the nosocomial transmission and their individual characteristics. However, the significance of these risk factors varies substantially depending on the geographic regions and the year of investigation [29].

In the present study, we concluded that the time-length of dialysis was the main risk factor for the infection by the Hepatitis C virus ( $p$  smaller than 0.001), the Hepatitis C frequency in the patients submitted to dialysis at *Clínica de Doenças Reais* (Clinic of Renal Diseases) of Tubarao, Santa Catarina State, Brazil, in the period between 2000 and 2004 was 16.8%, demonstrating that the dialysed population present high risk for the infection by the hepatitis C virus. We have also shown that other factors such age, gender, base disease, infra-structures, the types of the Clinic's machinery, type of dialysers, used membranes, frequency of sterilization of the machinery and substances for this process, and the number of times of reutilization of the dialyser were not relevant for the increase of the presence of Hepatitis C in patients submitted to dialysis.

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