Prevalence of hepatitis C in adult users of the public health service of São José dos Pinhais – Paraná

Prevalência da hepatite viral C em adultos usuários de serviço público de saúde do município de São José dos Pinhais – Paraná

Abstract

Objectives: We aimed to investigate the prevalence of Hepatitis C in adult users of the Public Health Services of São José dos Pinhais – Paraná. **Methods**: We performed an epidemiological survey with a probabilistic sample of 5,017 volunteers who answered a questionnaire and were submitted to an anti-HCV quick test. Data were organized using Epi-info 3.5.1. The association between the presence of the disease and the factors of interest in the study were evaluated by the Chi-square test. We used a Logistic Regression Adjusted Model for risk factor analysis and the Wald test for decision making on the importance of the risk factors. **Results**: The absolute frequency of positive anti-HCV was 13, with a prevalence of 0.30%, (IC = 0.12% - 0.40%). A higher probability of the disease was reported in males ($p = 0.008$) and in single, separated and widowed subjects ($p = 0.045$); in subjects with prior HCV symptoms ($p < 0.001$) and a previous blood transfusion ($p < 0.001$); and with the presence of a tattoo ($p = 0.033$). Drug abuse, blood transfusion and age > 40 years increased the risk for disease, regardless of sex, age and marital status. **Conclusion**: We found a low prevalence of Hepatitis C, albeit expected for Southern Brazil. Our results did not differ from other studies as to contamination risks. The study may contribute to highlight the importance of Hepatitis C, the need to implement strategies to cope with it, and stimulate better understanding of Hepatitis C.

Keywords: Hepatitis C. Prevalence. Risk factors.

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Resumo

Objetivos: Investigar a prevalência da Hepatite Viral C em adultos usuários de serviço público de saúde do município de São José dos Pinhais, Paraná. **Método**: Inquérito epidemiológico com amostra probabilística e estratificada de 5.017 pessoas voluntárias, submetidas a questionário e teste rápido anti-HCV. Os dados foram organizados no programa Epi-info 3.5.1. A associação entre a presença ou não da doença e os fatores de interesse foram avaliados pelo teste Qui-quadrado. Para análise conjunta dos fatores de risco ajustou-se um modelo de Regressão Logística e considerou-se o teste de Wald para a tomada de decisão sobre a importância dos fatores. **Resultados**: A frequência absoluta foi de 13 positivos, com prevalência de 0,30%, (IC = 0,12% - 0,40%). A maior probabilidade da doença foi no sexo masculino (p = 0,008) e no estado civil solteiros, separados ou viúvos (p = 0,045); com história de manifestação prévia de sintomas (p < 0,001) e de hemotransfusão (p < 0,001); e com presença de tatuagem (p = 0,033). Independente de sexo, idade e estado civil, uso de drogas, hemotransfusão e idade superior a 40 anos aumentou o risco à doença. **Conclusão**: Encontrou-se baixa prevalência, entretanto, esperada para a região sul do país. Os resultados não diferiram de outros estudos quanto aos riscos de contaminação. Este estudo poderá contribuir para alertar sobre a importância do agravo, a necessidade de implementação de estratégias de enfrentamento e o estímulo para melhor compreensão da Hepatite C.

Palavras-chave: Hepatite C. Prevalência. Fatores de risco.

Introduction

The viral hepatitides are infectious diseases transmissible between humans, with acute or chronic evolution that, due to their high universal morbidity, constitute a major public health problem[1]. Among them, hepatitis C represents one of the main problems to worldwide public health due to its severity, being today the most common cause of liver transplant indication[1,2]. Its evolution is slow, it possesses a high rate of chronicity and is potentially fatal, characterizing itself as the main causer of deaths among all the types of hepatitides[3].The virus was identified in 1989 from a pool of chimpanzee plasmas experimentally infected with sera from patients with chronic non-A, non-B hepatitis (NANBH) and visualized with immuno-electron microscopy as particles 30-38 nm in diameter. . Speculative projections and morphology classified it as belonging to the family "*Flaviviridae*" and the genus "*Hepacivirus*"[4].

Knowledge of the viral behavior and the introduction of diagnostic tests with higher sensitivity and specificity in the 1990's made it possible to understand the epidemiological situation of hepatitis C better. Epidemiological studies on the disease are under construction, however, are faced with some limitations, such as those of an economic nature, which prevent the adequate provision of testing and, the fact that the majority of infections evolve asymptomatically, which limits the early detection of clinical cases. Additionally the case notification system is still flawed in the majority of the healthcare systems[3]. According to the World Health Organization (WHO), approximately 170 million people of the global population are infected with chronic hepatitis C[5]. Chronic liver disease is the disease most responsible for cirrhosis in Brazil and for liver transplants in the western world[3]. Approximately two to three million people are infected and, of the new cases, only 50% are symptomatic, with about 18,000 to 30,000 new chronic infections produced annually[1].

Few epidemiological population-based studies have been conducted, with a large part of the research related to the prevalence of the infection in specific groups or those of greater risk of contagion, which does not allow the results to be generalized to the general population[3].In Brazil, a study published in 1998, reported a seroepidemiological survey conducted in the municipality of São Paulo[3], in which a prevalence of 1.42% positivity for anti-VHC was found. The highest prevalence was observed in individuals over 30 years, with 2.7%, and in the 50 and 59 years age group, with a peak of 3.8%. Another population-based study, conducted in Salvador, obtained a prevalence in 3.2% through the use of the ELISA (*Enzyme-Linked Immunosorbent Assay*) test and 1.5% with a confirmatory test, the RIBA 3.0 (*Recombinant Immunoblot Assay*)[6]. It is worth mentioning a population-based study in the state of São Paulo, which reports a prevalence of 8.8%, with increased concentration in the over 55 years age group(20.2%) and in males (13, 1%)[7].

Investigations based on blood banks, present prevalence between 1.4% and 2.3%, using the second generation ELISA for screening, with a reduction of 10% to 30% after the application of confirmatory tests, such as the Immunoblot method and/or the Polymerase Chain Reaction[3]. However, a multicenter study conducted in Sao Paulo, Salvador and Manaus, showed a prevalence of 0.97% in women and 0.38% in men, with an Odds Ratio of 2.49[8].In relation to specific groups, studies with pregnant women in Mato Grosso do Sul presented a prevalence of 0.2%, in the period 2002-2005[9] and 1.7% in the period 2005-2007[10]. In patients undergoing hemodialysis in a clinic in Minas Gerais, the prevalence of chronic hepatitis was 10.6%[11].

Hepatitis C gives rise to considerable financial loss to the Government, for example the costs associated with the medication. It is one of the conditions that require more spending on pharmaceuticals from the Drug Dispensation Program for Exceptional Circumstance, of the Ministry of Health of Brazil, as well as on Chronic Renal Failure treatment and transplantes[12]. In the scenario related to public policy, the Ministry of Health recognizes the problem and, since 2002, has been coordinating a National Program for the Prevention and Control of Viral Hepatitis, developed in an integral manner with the State, Municipality and Federal District Secretariats of Health. This program was formalized with the Regulation No. 2080 of October 31, 2003, which proposes the involvement of activities related to prevention, surveillance and assistance to patients with viral Hepatitis, in all the levels of care[13].

Given this context, plus the increase in the search, by users of health services, for knowledge of their serology regarding hepatitis C, this study aimed to investigate the prevalence of viral hepatitis C in the population of adult users of public health service of São José dos Pinhais – Paraná. Its specific aims were: to identify risk factors for the patients with Hepatitis C; to specify the history of contact with the virus; and to verify the association between biological, socioeconomic and epidemiological risk factors.

Method

This is an epidemiological, observational, cross-sectional study characterized as an inquiry, where the research universe was the population of the municipality of São José dos Pinhais, Paraná. In 2007, according to projections by the Brazilian Institute of Geography and Statistics (IBGE) the population of the municipality was approximately 270,000 inhabitants. The reason for the choice of this municipality was that, from 2000, there was a process of industrialization with the establishment of large industries, particularly those of the automotive sector, causing the migration of people in search of work which resulted in an almost doubling of its population. If, from one perspective, this growth has brought positive aspects such as an increase in tax revenue, placing the municipality

third in the state; the improvement of the educational institutions; the development of trade and services; it has also brought various problems such as increased crime; domestic violence; unemployment; robberies; homicides; road traffic accidents; work related accidents; and the abuse of alcohol and drugs, which leads to a greater demand for healthcare services with a consequent increase in the care and diagnosis of diseases.

The sample universe was stratified probabilistic, based on a range of prevalence of 1.42% to 3.8% of the populations[2,3,6,8,]. The prevalence of 3% was used, being close to the highest prevalence, resulting primarily in 8,090 people. The inclusion criterion was to be aged between 19 and 69 years. All individuals known to be carriers of the hepatitis C virus were excluded from the study (because they are theoretically monitored by health services and recorded in the official calculations of prevalence of the municipality) along with HIV positive individuals (because they had been previously tested for Hepatitis C in the municipal HIV/AIDS program, therefore, had also been recorded in the municipal prevalence). Thus, the sample total was 5,017 participants.For the sample selection the city was divided into regions that correspondedto the urban division of neighborhoods and the distribution of the 28 Healthcare Units. Of this amount, two were excluded due to their odontological and child specialty characteristics. Thus the sample was divided into 26 Healthcare Units, in order to preserve the prevalence of 3% in each territorial division.The total sample was initially distributed among the Units that work with ascribed territory and to complete the quantitative sample, the population difference was equally divided between the municipal coverage Units, which have no territorial basis.

The study participants were recruited by open invitation, in the waiting room of the Healthcare Units, on a random and voluntary basis, until the quota for each sample collection site was fulfilled. Individuals were selected of both sexes who accessed the Healthcare Units for any reason between Monday and Friday. The total length of sample collection was seven months. After selection, the participants underwent the following steps:

a) approach, called the pre-test, in which the counseling premises contained in the Handbook of Viral Hepatitis Counseling of the Ministry of Health[13] was used;
b) explanation of the study and signing of the Terms of Free Prior Informed Consent;
c) rapid anti-VHC serological test, through the collection of capillary blood by finger puncture, with the processing of the result occurring within five to 20 minutes; VHC antibodies were evaluated as positive or negative using the Bioeasy VHC Rapid Test (made for Bioeasy Diagnostic Ltda. by S.D. Inc. - Korea), which is a qualitative immunoassay for the detection of anti VHC antibodies, with 100% sensitivity and 99.4% specificity;
d) response to a form, adapted from the Study of Population-Based Prevalence of Infection by the Hepatitis A, B and C Viruses in the Capital Cities of Brasil[14];
e) examination results, called post-test, the moment the researchers had the opportunity to clarify any doubts;
f) after a negative result, this was noted on the completed form and the participants were released with a copy of the printed report;
g) in the event of the occurrence of a positive result the subjects were immediately scheduled in the Municipal STD/AIDS and Hepatitis Program to confirm the diagnosis and for subsequent treatment according to the clinical criteria proposed by the Clinical Protocol and Therapeutic Guidelines for Viral Hepatitis C, Regulation No. 34 of September 28, 2007, of the Secretariat of Health Surveillance of the Ministry of Health[15]. This last step is justified by the fact that rapid tests are screening tests and require confirmation[16]. In this study, confirmation was made by means of the third generation enzyme immunoassay (EIA), or ELISA-

-III, which detects antibodies directed against several epitopes of the C virus located in the capsid.

The collection was made by healthcare professionals of the Units or by previously selected and trained students of the League of Scientific Initiation (LINC) of the medical course at the Pontifical Catholic University of Paraná (PUCPR). The whole process was conducted in the consulting room environment ensuring confidentiality and the people were identified in coded form, in order to maintain anonymity.

Five variables were used to collect personal data, three variables to know the socioeconomic conditions and 25 variables grouped for the data analysis of the history of contact.For each of these, the null hypothesis that the probability of positive serology is equal for the two classifications of the variable was tested, as well as the alternative hypothesis of different probabilities.After the collection, the data were processed and organized using the Epi-Info version 3.5.1 program. There were two reviews in search of inconsistencies, and only after this verification was the database used for analysis. Considering the small number of serological positive cases, for the statistical analyzes, it was necessary to group the classifications of the variables: age (up to 40 years and over 40 years); race (white and nonwhite); schooling (up to four years and more than four years), marital status (married/cohabiting and single/separated/widowed); share cutting objects (yes at home/salon and no), use condoms (do not use/use sporadically and use regularly). The results are expressed as percentages and frequencies. In the bivariate analysis, the association between various factors and serological result for hepatitis C were evaluated using the Chi-square test. For the multivariate analysis of the study variables, a logistic regression model was adjusted and the Wald test for decision making was applied regarding the importance of each variable in relation to the probability of a positive result for Hepatitis C. From the adjusted values the odds ratio (OR) and respective 95% CI were estimated. The p values <0.05 were considered statistically significant. The data were analyzed using the SPSS v.14.0 program.

The study that led to this article was approved by the Research Ethics Committee of the Pontifical Catholic University (CEP/PUCPR), with Protocol No. 3543/2009. The researchers attest to the absence of any conflicts of interest.

Results

The study sample consisted of 5,017 individuals, including 472 (9.4%) drug users and 287 (5.7%) healthcare professionals. A total of 1,586 males (31.6%) and 3,431 (68.4%) females were evaluated. The mean age was 40 years, ranging from 18 to 70 years. Regarding race, 4,012 (80.0%) reported themselves as being white. A total of 3,320 (66.2%) individuals were married or in a stable or consensual relationship and 1,973 (39%) individuals had between 8 and 11 years of schooling. Those that reported themselves as employed or self-employed totaled 2,864 (57.10%) and 2,903 (57.9%) had incomes below the minimum wage. Of the 5,017 study participants, 13 presented positive serology results, corresponding to 0.3% (95% CI: 0.12% to 0.40%). Of these, the majority were males (69.2%), over 40 years of age (69.2%), white (76.9%), single, separated or widowed (61.6%), without income or up to one minimum wage of income (61.9%) and with more than four years of schooling (61.5%).

When comparing the genders in the probability of positivity for hepatitis C, the results indicated that males are more likely to have the disease (p=0.008, OR: 4.9 with 95% CI: 1.5 to 16.0). Another factor that was significantly associated with positive results for hepatitis C was marital status. Unmarried, divorced or widowed individuals have a greater probability of having hepatitis than married individuals or those living in consensual relationships (p=0.045, OR: 4.9 with 95% CI: 1.03 to 9.6). For the other sociodemographic factors examined,

no significant associations with VHC infection were found (Table 1).

In addition to sociodemographic factors, environmental variables were considered, such as habits, exposure to medical and odontological procedures and those related to the individual's history of contact with hepatitis C. The vast the majority of the individuals (92.3%) reported never having shown any symptoms related to hepatitis in general. Regarding dental treatment, 95.5% had been subjected to some kind of dental treatment in their lives and 56.2% in the last 12 months. Concerning the clinical variables, 63% of the individuals have already undergone some type of surgical intervention, 9.4% received blood transfusion and 0.2% had undergone transplants. Individuals on dialysis accounted for 0.1% of the cases and 33.9% had been subjected to endoscopy.

The presence of piercings and tattoos was observed, respectively, in 8.8% and 11.8% of the individuals and sharing toothbrushes was reported by 15.3% of the participants. Drug use was reported in 11.7% of cases. The most commonly used drug was alcohol (46.2%), followed by cannabis and crack (38.5%), cocaine (30.8%) injectable cocaine (15.4%) and amphetamines (7.7%). The vast majority practiced (or had practiced) sexual activity (96.2%) and 13.4% reported using condoms. Only 11% of the individuals evaluated worked in healthcare services.

In the bivariate analysis of factors related to the contact history and habits, a significant association between previous hepatitis and a positive result in the test performed ($p<0.001$). Individuals who had a history of manifestation of symptoms of hepatitis had a significantly higher probability of having a positive result (OR: 7.57; 95% CI: 2.46 to 23.24). Similarly, individuals with a history of blood transfusion had a higher probability of having a positive result for hepatitis C ($p<0.001$, OR: 6.10; 95% CI: 1.99 to 18.73). The presence of tattoos and drug use were also significantly associated with a higher probability of a positive result for

Table 1 – Bivariate analysis of the association between sociodemographic factors and HCV test results.
Tabela 1 *– Avaliação da associação entre fatores sociodemográficos e o resultado do teste HCV (análise bivariada).*

Variable	Classification	n	FA (+) Freq (%)	P value *	OR (95% CI)
Age (years)	≤ 40 (ref)	2585	4 (0.15)		
	> 40	2432	9 (0.37)	0.146	2.40 (0.74 - 7.79)
Gender	Male	1586	9 (0.57)		
	Female (ref)	3431	4 (0.12)	0.008	4.89 (1.51 - 15.87)
Race	Non-white	1005	3 (0.30)		
	White (ref)	4012	10 (0.25)	0.784	1.23 (0.33 – 4.36)
Schooling (years)	≤ 4	1427	5 (0.35)		
	> 4 (ref)	3590	8 (0.22)	0.426	1.57 (0.51 - 4.82)
Professional status	Employed/self-employed	2864	5 (0.17)		
	Other (ref) †	2153	8 (0.37)	0.174	2.13 (0.70 – 6.53)
Income	Up to 1 m.w.	2903	8 (0.28)		
	More than 1 m.w. (ref)	2114	5 (0.24)	0.788	1.17 (0.38 – 3.57)
Marital status	Married/cohabiting (ref)	3320	5 (0.15)		
	Separated/Single/widowed	1697	8 (0.47)	0.045	3.14 (1.03 - 9.60)

Fonte: São José dos Pinhais, 2010[15] / *Source: São José dos Pinhais, 2010[15]*
† Outros: desempregado, do lar, aposentado, estudante / † *Others: unemployed, housewife, retired, student.*
*Teste de Qui-quadrado, $p < 0.05$ / **Chi-square test, $p < 0.05$*

VHC (p=0.033 and p<0.001). The results concerning the contact history, environmental conditions, habits, exposure to medical/odontological treatment and adverse behavior which, in theory, could increase the probability of the occurrence of hepatitis C, are presented in Table 2.

For the multivariate analysis a logistic regression model was adjusted including age (≤ 40 or > 40 years), gender, marital status, drug use and blood transfusion. The presence of tattoos was significantly associated with drug use and, therefore, even though having presented the association as a result of the test in the bivariate analysis, it was not included in the model. The results indicated that, regardless of the age, gender and marital status of the individual, drug use significantly increases the probability of a positive result for hepatitis C (p=0.001, OR: 9.34; 95% CI: 2.57 to 34.03). Having a history of blood transfusion was also significantly associated with a positive result (p=0.003, OR: 5.62; 95% CI: 1.77 to 17.79). Individuals over 40 years of age tended to have a higher probability of a positive result (p=0.055) and in the presence of the other variables included in the multivariate model, gender was not statistically significant (p=0.179).

Discussion

The 0.3% prevalence of hepatitis C in this population is less than expected for the state of Paraná, which is 0.7%[17]. It differs from the results found in population-based studies[3,6,7], and departs significantly from studies of hemodialysis users[11] and the prison population[18]. However it approaches the results presented in a multicentric study[8] and those with populations of pregnant women[9,10]. Although the majority of the people tested in the study were female, a fact related to the presence of a greater number of women healthcare service users[19], the incidence of hepatitis C was higher in the males (69.2%), with no evidence showing increased susceptibility to infection for this gender. This variable behaved differently in the multivariate analysis because it did not show statistical significance.

Regarding the racial distribution of patients infected with hepatitis C, there is little information available in literature. What may in part explain the absence of this variable in studies is the limitation of indicators able to classify the individual according to race, considering the process of miscegenation of the country[20], plus the fact of this being self-reference information. In this study, white people constitute the majority of those infected, although not statistically significant, which is contrary to other studies[21,22], which indicate higher rates of incidence and prevalence in non-white ethnic groups. The disagreement with the results encountered in the literature may be related to the European colonization of the municipality of São José dos Pinhais.

The higher prevalence of positive cases found in the intermediate age groups, corroborates studies that affirm that hepatitis C affects people of all ages, but has a peak incidence between 20 and 39 years of age and a higher prevalence rate among ages 30 to 49 years[23]. The multivariate analysis showed being over 40 years of age as a risk factor, which deserves further investigation. Regarding education, it is argued that access to formal study, with consequent knowledge about the risks of infection by the disease, acts to prevent risks. A study aimed at HIV infection, highlights a direct relationship between education and knowledge, however, this relationship was verified in the cases of knowledge about the forms of transmission and was not verified in the cases of knowledge about the forms of non-transmission[24]. Analyzing the role of educational formation in the prevention of VHC infection and considering that the majority of the HIV-positive population have more than four years of study, it is clear that, despite having access to formal education it was not an impediment to infection, however, this variable showed no statistical significance.

Concerning the marital status of those seropositive for VHC, studies indicate a reduced intra-household transmission between monogamous couples and highlight the low risk of acquiring the virus

Table 2 - Bivariate analysis of the association between history of contact factors and habits, and HCV test results.
Tabela 2 *– Avaliação da associação entre fatores relacionados à história de contato e hábitos com o resultado do teste HCV (análise bivariada).*

Variable	Classification	n	FA (+) Freq (%)	P value *	OR (95% CI)
Previous hepatitis	No (ref)	4560	8 (0.18)		
	Yes	381	5 (1.31)	<0.001	7.57 (2.46 – 23.24)
Dental treatment	No	248	2 (0.81)		
	Yes (ref)	4769	11 (0.23)	0.082	3.52 (0.78 – 15.95)
Surgery	No (ref)	1855	3 (0.16)		
	Yes	3158	10 (0.32)	0.300	1.96 (0.54 – 7.13)
Blood transfusion	No (ref)	4539	8 (0.18)		
	Yes	469	5 (1.07)	<0.001	6.10 (1.99 – 18.73)
Transplant	No	4994	13 (0.26)		
	Yes	10	0 (0)	0.872	-
Hemodialysis	No	4997	13 (0.26)		
	Yes	6	0 (0)	0.901	-
Endoscopy	No (ref)	3311	7 (0.21)		
	Yes	1698	6 (0.35)	0.350	1.67 (0.56 – 4.99)
Tattoo	No (ref)	4423	9 (0.20)		
	Yes	590	4 (0.68)	0.033	3.35 (1.03 – 10.91)
Piercing	No	4568	13 (0.28)		
	Yes	441	0 (0)	0.262	-
Shares toothbrush	No (ref)	4248	11 (0.26)		
	Yes	768	2 (0.26)	0.994	1.01 (0.22 – 4.55)
Shares sharp objects	No (ref)	1898	7 (0.37)		
	Yes	3113	6 (0.19)	0.235	0.52 (0.18 – 1.55)
Drug use	No (ref)	4427	5 (0.11)		
	Yes	589	8 (1.36)	<0.001	7.61(2.85-20.36)
Initiated sexual life	No (ref)	4465	11 (0.25)		
	Yes	551	2 (0.36)	0.611	1.48 (0.33-6.67)
Uses a condom	No/sporadically	3633	7 (0.19)		
	Yes (ref)	673	2 (0.30)	0.586	0.65 (0.13-3.12)
Works in healthcare services	No (ref)	4465	11 (0.25)		
	Yes	551	2 (0.36)	0.611	1.48 (0.33-6.67)

Fonte: São José dos Pinhais, 2010[15] / *Source: São José dos Pinhais, 2010[15]*
*Teste de Qui-quadrado, p < 0,05 / **Chi-square test, p < 0.05*

from infected individuals in stable sexual partnerships, where the risk is between 0% and 0.6% during the year, while the presence of multiple partners increases this risk to between 0.4% and 1.8%[25,26]. This data is corroborated by the findings of the present study. This study found people with low purchasing power affected by the Hepatitis C virus, in agreement with a study conducted in the United States[27]. However, possible interference in this variable must be considered, because the population in question consists of users of the Healthcare Units directly connected to the Brazilian Public Health System (SUS).

Regarding the presence of self-referenced symptoms related to hepatitis, there was agreement with studies that claim that in the majority of patients the infection progresses asymptomatically, being occasionally detected[2,28], although, in the present investigation there was evidence indicating that the previous signs and symptoms of any form of hepatitis may be connected to positivity for Hepatitis C. The majority of seropositive individuals had undergone some kind of dental treatment in their lives. It should be noted that the National Health Surveillance Agency – ANVISA has, since 2006, indicated control procedures for infection from odontological consultations, listed in the Manual of Prevention and Control of Risks in the Healthcare Services[29], which should reduce the link between infection and dental treatment. However, there is a high risk of parenteral transmission, considered to be the main route of VHC infection. Several studies demonstrate a significant association between infection and a history of blood transfusion, especially before 1992, when there was no government control over blood banks[30]. This fact was also verified by the results presented here.

Although having a borderline value, the tattoo variable can not be ignored, especially when associated with others, such as drug use and incarceration[31]. Sharing razors, manicure and pedicure materials, and procedures performed in aesthetic centers, have been suggested as ways of transmitting the virus[32,33], however, the present study found no statistical significance for these variables. They are potential emerging risk factors under investigation, which are known as unapparent parenteral transmission, as there is a significant percentage of VHC seropositive individuals who do not report or exhibit apparent risk. Included in these factors are the sharing of potentially contaminated personal care items such as razors or other non-disposable cutting or perforating materials of shared-use; cuticle clippers; tattooing, piercing and acupuncture needles; dental materials not properly sterilized; toothbrushes; and contaminated invasive medical examination instruments, such as aseptic endoscopies[34].

Professionals working in healthcare services are considered a group at increased risk for VHC infection due to the possibility of accidents with piercing-cutting materials. Dental surgeons, nursing assistants and technicians, nurses, physicians, biochemists and those who work with blood collection, and cleaning staff are people who are at risk of accidents with contaminated material[35,36,67]. The occurrence of VHC among healthcare professionals ranges from 2% to 10%, with the risk of contagion associated with the length of service, performance of invasive procedures and occurrence of percutaneous accidents. This variation in incidence may be related to the methods used for diagnosis, especially in accidents involving VHC positive patients[38]. Statistical significance regarding the healthcare workers was not found in the results of this study.

Several studies show that drug use is one of the most important risk factors for VHC transmission, accounting for a large number of new cases. High prevalence is attributed to sharing needles and contaminated syringes[21]. However, the risk of using non-injected illicit drugs also draws attention. The sharing of other objects such as pipes for crack use or straws for the inhalation of cocaine can injure both the nasal and labial mucosa, so that even a small amount of blood, visible or not, may contain sufficient quantities of virus to cause infection[39,40,41].

The results of this study indicate drug use as the factor of greatest significance, both in the bivariate analysis, and in the presence of other variables.

Among the seropositive individuals, 30.8% reported having had a sexually transmitted disease and 7.7% said their sexual partners presented some type of sexually transmitted disease (STD), with the exception of any type of hepatitis. Although not presenting statistical significance, there have been references to the presence of viral RNA in bodily fluids such as saliva and semen, albeit with low infectivity[42]. However, this takes into consideration some sexual behavior considered high risk, such as multiple sexual partners, the presence of STDs, such as syphilis and AIDS, and wounds or injuries occurring on the genitalia during the sexual act that could explain the continuity in the skin[25].

Final Considerations

The study showed a low prevalence of hepatitis C in the study population, predominantly in males, single, divorced or widowed individuals, with a history of previous manifestation of symptoms; with a history of blood transfusion; with the presence of tattoos; and the use of drugs. The multivariate analysis suggested that being over 40 years of age increases the risk of infection, however, the gender variable was not statistically significant. It was verified that regardless of the age, gender and marital status of the individual, drug use increased the probability of a positive result, as well as a history of blood transfusion.The result did not differ from other epidemiologic studies on the risks of contamination, which indicated drug use and transfusion of blood and blood products as the main factors for infection.Therefore, this study contributes to alert the health authorities to the importance of the disease and the need to implement coping strategies, while simultaneously it stimulates the performance of further studies to better comprehend the situation.

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