



## EPIDEMIOLOGICAL MAPPING OF HOSPITAL HEPATITES

### *Mapeamento epidemiológico das hepatites hospitalares*

### *Mapeo epidemiológico de las hepatitis hospitalarias*

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#### ABSTRACT

**Objective:** To analyze the sociodemographic and epidemiological aspects of patients with hepatitis B and/or C treated at a university hospital in Northeastern Brazil. **Methods:** This descriptive and analytical cross-sectional study was conducted at the Piauí University Hospital with 98 patients diagnosed with hepatitis B and/or C between July 2014 to December 2017. Data were collected from viral hepatitis investigation sheets and analyzed using the SPSS. **Results:** Most participants were over 60 years old (48.0%, n=47), male (67.3%, n=66), pardos (Mixed-race Brazilians) (77.6%, n=76), had completed primary education or less (58.1%, n=57), and were originally from urban areas (88.8%, n=87) and retired (28.6%, n=28). In all, 58.2% (n=57) did not get hepatitis B vaccination and genotypes 1 and 3 were prevalent among carriers of virus C. Chronic hepatitis was present in 75.5% (n=74) of the cases and the most frequent sources of infection were transfusion, sex and drug use. Virus B was significantly associated with: patients aged 40 to 59 years, other municipalities, urban area and sexual transmission. Virus C was significantly associated with: older adults, the city of Teresina, urban area, chronic form of the disease and transfusion. **Conclusion:** There was a higher prevalence of hospital viral hepatitis in older patients, male patients, patients with low levels of education, and patients who already had the chronic form of the disease, the most common being virus C.

**Descriptors:** Hepatitis B; Hepatitis C; Epidemiology; Disease Notification.

#### RESUMO

**Objetivo:** Analisar os aspectos sociodemográficos e epidemiológicos de pacientes com hepatite B e/ou C atendidos em um hospital universitário do Nordeste brasileiro. **Métodos:** Estudo transversal, descritivo e analítico, realizado no Hospital Universitário do Piauí com 98 pacientes diagnosticados com hepatite B e/ou C de julho/2014 a dezembro/2017. Os dados foram coletados a partir das fichas de investigação de hepatites virais e analisados através do SPSS. **Resultados:** A maioria dos participantes tinha mais de 60 anos (48,0%, n=47), era do sexo masculino (67,3%, n=66), de cor parda (77,6%, n=76), com ensino fundamental completo ou menos (58,1%, n=57), procedente da zona urbana (88,8%, n=87) e aposentado (28,6%, n=28). Verificou-se que 58,2% (n=57) não possuía vacinação contra hepatite B e, entre os portadores do vírus C, prevaleceram os genótipos 1 e 3. A hepatite crônica se fez presente em 75,5% (n=74) dos casos e como fontes mais frequentes de infecção predominaram a via transfusional e sexual e o uso de drogas. Identificou-se associação estatística significativa para o vírus B entre: pacientes com idade de 40 a 59 anos, procedentes de outros municípios, de zona urbana e transmissão sexual; e, para o vírus C, entre: idosos, procedentes de Teresina, de zona urbana, forma crônica da doença e transmissão transfusional. **Conclusão:** Constatou-se uma



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maior prevalência das hepatites virais hospitalares em pacientes idosos, do sexo masculino e com baixa escolaridade, que já se apresentava na forma crônica da doença, sendo o vírus C o mais frequente.

**Descritores:** Hepatite B; Hepatite C; Epidemiologia; Notificação de Doenças.

## RESUMEN

**Objetivo:** Analizar los aspectos sociodemográficos y epidemiológicos de pacientes con la hepatitis B y/o C asistidos en un hospital del Noreste brasileño. **Métodos:** Estudio transversal, descriptivo y analítico realizado en el Hospital Universitario de Piauí con 98 pacientes con el diagnóstico de hepatitis B y/o C entre julio/2014 y diciembre/2017. Se recogieron los datos de las fichas de investigación de hepatitis virales y se les han analizados por el SPSS. **Resultados:** La mayoría de los participantes tenía más de 60 años (48,0%, n=47), era del sexo masculino (67,3%, n=66), de color pardo (77,6%, n=76), con educación primaria completa o menos (58,1%, n=57), de la zona urbana (88,8%, n=87) y jubilado (28,6%, n=28). Se verificó que el 58,2% (n=57) no se había vacunado contra la hepatitis B y entre los portadores del virus C han prevalecido los genotipos 1 y 3. La hepatitis crónica estuvo presente en el 75,5% (n=74) de los casos y la vía transfusional, y la sexual y el uso de drogas han sido las fuentes más frecuentes de infección. Se identificó una asociación estadística significativa para el virus B entre los pacientes de edad entre 40 y 59 años que eran de otros municipios, de la zona urbana y por transmisión sexual; y para el virus C entre mayores que venían de Teresina, de la zona urbana, con la forma crónica de la enfermedad y transmisión transfusional. **Conclusión:** Se ha constatado una mayor prevalencia de las hepatitis virales hospitalarias en pacientes mayores, del sexo masculino y de baja escolaridad que ya tenía la forma crónica de la enfermedad y el virus C como el más frecuente.

**Descriptor:** Hepatitis B; Hepatitis C; Epidemiología; Notificación de Enfermedades.

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## INTRODUCTION

Hepatitis B and C are infections that impact global public health. They are transmitted in different ways and have specific clinical, laboratory and epidemiological characteristics. Its prevalence and magnitude vary across regions. The impact of these infections is directly related to the increase in the number of people with hepatitis B and C and the possibility of chronic illness, with consequent loss of the patient's quality of life<sup>(1,2)</sup>.

Viral hepatitis present high morbidity and mortality rates, which are mainly related to the progression of the disease, which can go from asymptomatic to acute forms to chronic forms. They are responsible for about 1.4 million deaths worldwide annually, mainly due to complications arising from the chronic decompensated form or hepatocarcinoma<sup>(3)</sup>. This is often due to factors such as socioeconomic heterogeneity, uneven distribution of health services, and unequal incorporation of technologies for early and appropriate diagnosis and treatment<sup>(4)</sup>.

In Brazil and worldwide, the behavior of viral hepatitis has gone through big changes in recent years. Improvements in the hygiene and basic sanitation conditions of the population, hepatitis B vaccination and new molecular techniques for the diagnosis of hepatitis C are important factors linked to changes in the profile of these diseases<sup>(5)</sup>.

Epidemiological surveillance of these diseases in the country is based on compulsory reporting of suspected cases since 1996. Between 1999 and 2017, 587,821 confirmed cases of viral hepatitis in Brazil were reported, according to the Notifiable Disease Information System (*Sistema de Informação de Agravos de Notificação - SINAN*). Of these, 218,257 (37.1%) were cases of hepatitis B and 200,839 (34.2%) were cases of hepatitis C. From 2000 to 2016, 66,196 deaths associated with viral hepatitis were identified in Brazil by the Mortality Information System: 21.4% corresponded to hepatitis B and 75.8% corresponded to hepatitis C<sup>(6)</sup>.

In compliance with the operational axes of the National Health Promotion Policy<sup>(7)</sup>, surveillance seeks to control viral hepatitis by monitoring its behavior and its conditioning and determining factors with the purpose of recommending and adopting prevention and control measures and assessing its impact.

The epidemiology of hepatitis B is not homogeneous in the national scene and areas where access to health services is difficult to achieve are disproportionately affected. It is a disease caused by a resistant virus that survives seven days in the external environment under normal conditions. Additionally, in case of contact with blood, there is a risk of infection of 5.0% to 40.0% of unvaccinated people. About 50.0% of fulminant hepatitis cases are related to hepatitis B infection<sup>(8)</sup>.

Hepatitis C has a significant impact on public health due to the progression of the disease and its complications. It presents silent progression, late diagnosis and, in advanced stages, the patient may progress to death. Hepatitis C is estimated to be responsible for approximately 700,000 annual deaths worldwide<sup>(9)</sup>.

Given the relevance and impact of these diseases, this study aimed to analyze the sociodemographic and epidemiological aspects of patients with hepatitis B and/or C treated at a university hospital in Northeastern Brazil.

## METHODS

This retrospective, descriptive and analytical cross-sectional study was carried out at the University Hospital of the Federal University of Piauí (*Hospital Universitário da Universidade Federal do Piauí - HU-UFPI*) in 2018. The HU-UFPI is located in Teresina, Piauí, Brazil and provides high and medium complexity services to the population aged over 18 years. It also offers outpatient care in various medical specialties, such as gastroenterology, which regularly assists and accompanies patients with viral hepatitis, and which has made the HU-UFPI a reference center for the treatment of this disease. Chronic hepatitis cases that require clinical in-hospital follow-up are also commonly hospitalized in this institution.

Referral of patients to outpatient services is regulated by the Municipal Health Secretariat and is scheduled by the Unified Health System (*Sistema Único de Saúde - SUS*) appointment scheduling center. The regulation of patients requiring hospitalization is the responsibility of the State Regulatory Office and occurs according to the availability of vacancies, which is informed daily to the office.

Health Surveillance within the HU-UFPI is carried out by a team of physicians, nurses and nursing technicians. It is the sector responsible for reporting suspected/confirmed cases of viral hepatitis; monitoring the performance of specific laboratory tests and the release of results; forwarding the notification forms to the municipal epidemiology service for later entry into SINAN; and filing a notification form for sector control and organization.

In this context, the study population was composed of patients diagnosed with hepatitis B and/or C from July 2014 to December 2017. Data were collected from the SINAN viral hepatitis forms of the reported cases available in the Health Surveillance Sector at HU-UFPI.

Inclusion criteria were: patients treated at the outpatient clinic or hospitalized at the HU-UFPI who were notified/screened for viral hepatitis at the facility and who presented confirmatory serological test results for hepatitis B and/or C.

Data were collected using a form containing sociodemographic and epidemiological characteristics of the notified patients based on information from the SINAN viral hepatitis form.

A statistical, descriptive and analytical study of the sample was carried out to characterize the population using absolute (n) and relative (%) frequencies. The chi-squared test of independence ( $\chi^2$ ) and Fisher's exact test were used to check if the variables involved were independent or if there was any association between them.

Data were tabulated in a Microsoft Office Excel spreadsheet and analyzed using the Statistical Package for the Social Sciences version 20.0. The significance threshold was set at  $\alpha = 0.05$ . The results were presented in tables.

The study was approved by the Research Ethics Committee of HU-UFPI (Approval No. 2.413.579) and complied with the ethical and legal principles of research involving human beings provided for in Resolution 466/2012 of the National Health Council.

## RESULTS

The sample comprised 98 cases of patients with hepatitis B/C. Most participants were over 60 years old (48.0%), men (67.3%), *pardos* (mixed-race Brazilians) (77.6%), and had completed primary education or less (58.1%). Almost 100.0% lived in Piauí, and the majority came from urban areas (88.8%), especially the capital Teresina (57.1%). The most common occupation was retiree (28.6%) (Table I).

With regard to the distribution of epidemiological antecedents, 95.9% of the patients had suspected hepatitis B/C, more than half were not vaccinated against hepatitis B (58.2%), and almost 96.0% had no other associated sexually transmitted infections (STI). As for risk factors, the most frequent exposures were injectable drugs (78.6%), dental treatment (72.4%), surgical treatment (61.2%), three or more sexual partners (49.0%) and blood transfusion (26.5%) (Table II).

Table I - Distribution of sociodemographic data of hepatitis B/C patients (n=98). Teresina, Piauí, 2018.

Variables	n	%
<b>Age</b>		
20-39 years	12	12.2
40-59 years	39	39.8
> 60 years	47	48.0
<b>Sex</b>		
Men	66	67.3
Women	32	32.7
<b>Color/race</b>		
White	8	8.2
Black	13	13.3
<i>Pardo</i>	76	77.6
Yellow	1	1.0
<b>Education</b>		
Illiterate	17	17.3
Incomplete/complete primary education	40	40.8
Incomplete/complete secondary education	32	32.7
Incomplete/complete higher education	9	9.2
<b>State of Residence</b>		
Piauí	95	97.0
Other	3	3.0
<b>Origin</b>		
Teresina	56	57.1
Other	42	42.9
<b>Area</b>		
Rural	11	11.2
Urban	87	88.8
<b>Occupation</b>		
Retiree	28	28.6
Farmer	16	16.3
Self-employed	6	6.1
Unemployed	6	6.1
Homemaker	5	5.1
Ignored	4	4.1
Salesperson	3	3.1
Other	30	30.6

Source: Viral hepatitis screening forms, HU-UFPI, 2014-2017

Table II - Distribution of the epidemiological antecedents of hepatitis B/C patients (n=98). Teresina, Piauí, 2018.

Variables	n	%
<b>Suspected</b>		
Hepatitis B/C	94	95.9
Unspecified	4	4.1
<b>Immunization against hepatitis B</b>		
Complete	12	12.2
Incomplete	10	10.2
Not vaccinated	57	58.2
Ignored	19	19.4
<b>Associated diseases</b>		
Other STI	4	4.1
<b>Patient subjected to</b>		
Injectable Medicines	77	78.6
Dental treatment	71	72.4
Surgical treatment	60	61.2
Three or more sexual partners	48	49.0
Blood/blood derivatives transfusion	26	26.5
Contaminated Water/Food	23	23.5
Inhalable drugs or crack	10	10.2
Injectable drugs	10	10.2
Hemodialysis	5	5.1
Tattoo/Piercing	5	5.1
Transplant	1	1.0
Others	5	5.1

STI: sexually transmitted infections. Source: Viral hepatitis screening forms, HU-UFPI, 2014-2017

Table III shows that the carriers of hepatitis C virus (HCV) presented genotypes 1, 2 and 3. Most of the cases corresponded to genotype 1 (26.5%), followed by genotype 3 (20.4%). Regarding the clinical form of hepatitis B and C, 75.5% of the cases were classified as chronic hepatitis/asymptomatic carrier and the virus C was the most frequent (55.1%). There is also a case of a patient with viruses B and C. In cases of patients in which it was possible to define the probable mechanism of infection (n=30), the most frequent sources of infection were transfusion (10.2%), followed by sex (8.2%) and drug use (5.1%).

Table III - Distribution of hepatitis C virus (HCV) genotype, clinical form, etiological classification and probable source of infection of hepatitis B/C patients (n=98). Teresina, Piauí, 2018.

Variables	n	%
<b>HCV Genotype</b>		
Genotype 1	26	26.5
Genotype 2	3	3.1
Genotype 3	20	20.4
Ignored	6	6.1
<b>Clinical form</b>		
Acute hepatitis	24	24.5
Chronic hepatitis/asymptomatic carrier	74	75.5
<b>Etiological classification</b>		
B Virus	43	43.9
C Virus	54	55.1
B and C Viruses	1	1.0
<b>Probable source/mechanism of Infection</b>		
Transfusion	10	10.2
Sex	8	8.2
Drug use	5	5.1
Surgical treatment	4	4.1
Vertical	3	3.1
Other	2	2.0
Ignored	66	67.3

Source: Viral hepatitis screening forms, HU-UFPI, 2014-2017

The data in Table IV show that patients aged 40 to 59 years were more likely to be infected with virus B ( $p < 0.001$ ) while older people were more often infected with virus C ( $p < 0.001$ ). There was also a statistically significant association between patients from another municipality and a positive result for hepatitis B ( $p = 0.044$ ), whereas hepatitis C was more frequent among patients from Teresina ( $p = 0.011$ ). Living in urban areas was statistically associated with B and C virus infections.

Table V shows that there was a significant statistical association between patients with C virus and chronic form of the disease ( $p < 0.002$ ). As for the probable sources or mechanisms of infection, sex, vertical transmission and surgical treatment were significantly associated with hepatitis B ( $p = 0.008$ ). In addition, C virus infection was significantly associated with transmission via transfusion, drug use, surgical treatment and sex ( $p = 0.015$ ).

Table IV - Association of HBsAg and Anti-HCV with sociodemographic data of hepatitis B/C patients (n=98). Teresina, Piauí, 2018.

	HBsAg			Anti-HCV		
	Positive	Negative	p-value	Positive	Negative	p-value
	n (%)	n (%)		n (%)	n (%)	
<b>Age</b>						
20-39 years	11 (25.0)	1 (2.7)	<0.001 <sup>a</sup>	1 (1.8)	7 (24.1)	<0.001 <sup>a</sup>
40-59 years	22 (50.0)	11 (29.7)		17 (30.9)	15 (51.7)	
> 60 years	11 (25.0)	25 (67.6)		37 (67.3)	7 (24.1)	
<b>Sex</b>						
Men	32 (72.7)	22 (59.5)	0.305 <sup>a</sup>	35 (63.6)	22 (75.9)	0.371 <sup>a</sup>
Women	12 (27.3)	15 (40.5)		20 (36.4)	7 (24.1)	
<b>Cor/raça</b>						
White	3 (6.8)	2 (5.4)	0.956 <sup>b</sup>	5 (9.1)	2 (6.9)	0.601 <sup>b</sup>
Black	7 (15.9)	5 (13.5)		6 (10.9)	4 (13.8)	
<i>Pardo</i>	33 (75.0)	30 (81.1)		44 (80.0)	22 (75.9)	
Yellow	1 (2.3)	-		-	1 (3.4)	
<b>Education</b>						
Illiterate	9 (20.5)	6 (16.2)	0.405 <sup>b</sup>	8 (14.5)	8 (27.6)	0.344 <sup>b</sup>
Incomplete/complete primary education	18 (40.9)	14 (37.8)		23 (41.8)	12 (41.4)	
Incomplete/complete secondary education	15 (34.1)	11 (29.7)		17 (30.9)	8 (27.6)	
Incomplete/complete higher education	2 (4.5)	6 (16.2)		7 (12.7)	1 (3.4)	
<b>State of residence</b>						
Piauí	42 (95.5)	37 (100.0)	0.497 <sup>b</sup>	53.2 (96.4)	29 (100.0)	0.542 <sup>b</sup>
Other	2 (4.5)	-		2 (3.6)	-	
<b>Origin</b>						
Teresina	18 (40.9)	24 (64.9)	0.044 <sup>a</sup>	38 (69.1)	11 (37.9)	0.011 <sup>a</sup>
Other	26 (58.1)	13 (35.1)		17 (30.9)	18 (62.1)	
<b>Area of residence</b>						
Rural	9 (20.5)	1 (2.7)	0.018 <sup>a</sup>	2 (3.6)	5 (17.2)	0.045 <sup>b</sup>
Urban	35 (79.5)	36 (97.3)		53 (96.4)	24 (82.8)	

<sup>a</sup>:Chi-squared test; <sup>b</sup>:Fisher's Exact test; Source: Viral hepatitis screening forms, HU-UFPI, 2014-2017. HBsAg: Hepatitis B surface antigen. Indicates current infection with hepatitis B; Anti-HCV: detects hepatitis C

Table V - Association of HBsAg and Anti-HCV with clinical form and probable source of infections in hepatitis B/C infection (n=98). Teresina, Piauí, 2018.

	HBsAg			Anti HCV		
	Positive	Negative	p-value	Positive	Negative	p-value
	n (%)	n (%)		n (%)	n (%)	
<b>Clinical form</b>						
Acute hepatitis	16 (36.0)	8 (22.0)	0.229 <sup>a</sup>	8 (15.0)	14 (48.0)	0.002 <sup>a</sup>
Chronic hepatitis/asymptomatic carrier	28 (64.0)	29 (78.0)		47 (85.0)	15 (52.0)	
<b>Probable source/mechanism of infection</b>						
Sex	4 (50.0)	3 (19.0)	0.008 <sup>b</sup>	4 (16.0)	3 (75.0)	0.015 <sup>b</sup>
Transfusion	-	6 (38.0)		10 (40.0)	-	
Drug use	-	4 (25.0)		5 (24.0)	-	
Vertical	3 (38.0)	-		-	1 (25.0)	
Surgical treatment	1 (12.0)	2 (13.0)		4 (16.0)	-	
Other	-	1 (6.0)		2 (33.0)	-	

<sup>a</sup>:Chi-squared test; <sup>b</sup>:Fisher's Exact test; Source: Viral hepatitis screening forms, HU-UFPI, 2014-2017. HBsAg: Hepatitis B surface antigen. Indicates current infection with hepatitis B; Anti-HCV: detects hepatitis C

## DISCUSSION

In the present study, the analysis largely ratified the sociodemographic and epidemiological profile of hepatitis B and C already described in the national and international literature. There was predominance of people aged over 60 years and infection was also pronounced in people aged 40 to 59 years. According to an analysis of hepatitis B virus (HBV) carried out in Rio Grande do Norte<sup>(10)</sup>, it has been associated with increasing age as transmission mechanisms involve behavioral aspects acquired throughout life, such as risky sexual activity, use of injectable drugs, and exposure to blood and blood products, the association of which can generate a cumulative risk of acquiring HBV. It should be noted that these conditions also apply to HCV transmission.

As in the present study, an analysis conducted with individuals infected with hepatitis B virus<sup>(4)</sup> found that 55.1% (n=462) of them were men. A study on the sociodemographic profile of hepatitis B<sup>(11)</sup> highlighted that the considerable amount of HBV cases among men occurs due to the greater susceptibility to risk behaviors, such as multiple partners, unprotected sex and lack of due attention that should be paid to the importance of vaccination. These factors should be considered when seeking to promote health actions aimed at controlling communicable diseases such as viral hepatitis.

Regarding race/color, there was a predominance of *pardo* (mixed-race) patients. According to the national viral hepatitis registry<sup>(6)</sup>, the *pardo* population accounted for 41.2% and 31.8% of the cases of hepatitis B and C, respectively, in 2017. Additionally, the rates of reported cases among these people are on the rise when compared with reported cases among White people, which has decreased in the period from 1999 to 2017.

As for education, most individuals in the present study had completed primary education or less, which corroborates the study conducted in Bahia, where the population infected with viruses B and C had low or no education<sup>(12)</sup>.

Also in Bahia<sup>(13)</sup>, there was a significant percentage (91.39%) of individuals with hepatitis C residing in urban areas. These findings are similar to the findings of this study. It is believed that this condition is associated with the easy access to health services and diagnosis and treatment of hepatitis B and C.

With regard to occupation, most cases reported in this study were related to retirees, a fact that may be related to the predominance of older patients. A study on the epidemiological profile of HCV patients identified a higher percentage in retired individuals (37.84%) and in individuals older than 60 year. The population belonging to this age group may have been exposed to some type of surgical procedure with improperly sterilized syringes and blood transfusion until 1993, when there was no screening for hepatitis C in blood banks<sup>(14)</sup>.



In Brazil, hepatitis B vaccination was implemented from 1989 onwards by the National Immunization Program. This led to the consequent reduction in the endemicity of the disease from the 1990s and the vaccine was the main measure to prevent HBV infection. As it is a vaccine-preventable disease whose vaccine is widely available in health services to all age groups, it is worrying to note in this study the number of patients who did not start the vaccination scheme. The lack of knowledge about the pathology, the perceived low susceptibility related to the disease and the low level of education are factors that cause low adherence to hepatitis B vaccine<sup>(11)</sup>.

It can also be observed that 4.1% of the patients had other STIs associated with hepatitis B/C. Having an STI is known to be a risk factor for this co-infection as these individuals often have unprotected sex, multiple partners, and use injectable drugs, thus exposing themselves to the risk of becoming ill from sexually transmitted infections<sup>(15)</sup>.

In the present study, 78.6% of the participants had used injectable drugs, but there were no studies associating the use of these drugs with hepatitis B and C because when this route of administration is used the drugs are carefully handled using disposable syringes and needles. In contrast, sharing injectable drugs is demonstrably associated with hepatitis B virus infection<sup>(16)</sup>.

In the case of hepatitis C in developed countries, it is observed that the mode of transmission occurs predominantly through the use of injectable drugs, especially through the sharing of needles<sup>(17)</sup>. However, in this study, only 10.2% of the cases reported contact with injectable drugs, a finding that is similar to that found in a study conducted in Southwestern Bahia<sup>(13)</sup>, where only 10.52% of the respondents used some type of drug.

A study conducted in a Pakistani hospital confirms that dental and surgical treatments are risk factors responsible for the increased prevalence of hepatitis B and C<sup>(18)</sup>. In this analysis, exposure to these factors was frequent; however, according to other researchers<sup>(11,19)</sup>, the transmission rate for these conditions is reduced when appropriate biosecurity standards are used, ranging from the safety of the patient to that of the professional.

Represented by a wide genetic variety, HCV has several circulating viruses organized into seven genotypes and about 67 virus subtypes<sup>(20)</sup>. Genotype testing becomes relevant for clinical and laboratory evaluation in defining the appropriate treatment strategy for chronic hepatitis C and it is recommended for cases with treatment indication<sup>(21)</sup>.

The genotypes related to hepatitis C infection found in this study are in line with the existing profile in Brazil and worldwide, where genotype 1 is the most prevalent, followed by genotype 3<sup>(13,22-25)</sup>.

Regarding the clinical form, chronic hepatitis predominated, which corroborates studies carried out in a state in Northeastern Brazil. The analysis of the profile of patients with hepatitis B and C showed that chronic cases corresponded to 76.67% and 99.52%, respectively<sup>(13,26)</sup>.

The risk of virus B chronicity depends on the age at which infection occurs. In children under 1 year of age, the rate reaches 90%. Between ages 1 and 5, the risk is between 20 and 50%, and in adulthood the risk is about 10%. For virus C, the chronicity rate is between 60 and 90%, and it is higher when it involves some factors such as male gender, immunodeficiency and age above 40 years<sup>(22)</sup>.

Most cases associated with chronic hepatitis are due to its silent and oligo/asymptomatic nature. Another important factor for chronicity is the higher occurrence of infection in impoverished and/or vulnerable people, who generally have restricted access to public health services and the diagnosis of infection is only made at an advanced stage of the disease<sup>(17,22,27)</sup>.

With regard to the probable source or mechanism of transmission of reported cases of hepatitis B and C, data released in 2018 show that in more than half of cases this information was recorded as "ignored", thus making it difficult to better assess the likely sources of infection. These findings are similar to the findings in the present study. It is believed that this fact may be related to the difficulty in establishing a single factor as responsible for the development of the infection<sup>(6)</sup>.

Other studies on hepatitis B and C<sup>(27,28)</sup> have highlighted transmission via sex, transfusion and use of injectable drugs, which corroborates the results of this study, which presented, in addition to these transmission mechanisms, the surgical treatment and vertical transmission, the latter being statistically associated with hepatitis B.

An analysis conducted in Argentina<sup>(29)</sup> found that sexual behavior predominated as a risk factor for hepatitis B and factors associated with intravenous drug dependence, transfusion and surgery constituted risk factors for hepatitis C. These findings are similar to those identified in the present analysis, in which the significant statistical association found by virus revealed that positive cases for hepatitis B presented sex as the main possible source of infection while transfusion was the most frequent source of infection for hepatitis C.

Finally, some limitations of this study should be highlighted: the large number of ignored variables recorded on the screening forms; the low number of significant statistical associations, which may be related to the restricted number of hepatitis B and C notifications confirmed in the analyzed period; and the use of secondary data, which may

interfere with the quality of the information. Thus, this study is expected to contribute to health promotion actions and prevention and control of viral hepatitis in the state of Piauí since knowing the clinical and epidemiological profile of infected people can help in the development of effective measures for tackling this important public health problem.

## CONCLUSION

There was a higher prevalence of hospital viral hepatitis in male older patients with low levels of education who already had the chronic form of the disease, the most frequent being the C virus.

It was also noted that most patients were not immunized against hepatitis B, thus reinforcing the importance of intensifying education and awareness campaigns aimed at immunization against virus B. In addition, there were statistically significant associations of HBV and HCV with age, origin, area of residence, probable transmission mechanisms and clinical form, with chronic hepatitis being the most prevalent.

## CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest in the study.

## CONTRIBUTIONS

**Lígia Maria Cabedo Rodrigues**, **Érida Zoé Lustosa Furtado** and **Anne Karoline Nunes de Oliveira** contributed to the study conception and design; the acquisition, analysis and interpretation of data and the writing and/or revision of the manuscript; **Jaqueline da Cunha Morais** and **Maria Tainara dos Santos Resende** contributed to the acquisition, analysis and interpretation of data and the writing and/or revision of the manuscript; **Vanessa Rodrigues da Silva** contributed to the study conception and design.

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