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THE OCCURRENCE OF VIRAL HEPATITIS AND ONCOGENIC RISK IN BRAZIL

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Abstract: Viral hepatitis A, B, and C are the most commonly diagnosed types in Brazil, and more than one million deaths occur worldwide each year due to acute infections, liver cancer, or cirrhosis resulting from these infections. Some professions may be more exposed to the risk of accidents with biological material and consequent infection by hepatitis or other oncogenic viruses. In this study, we describe the epidemiological profile of viral hepatitis confirmed in 2020 in Brazil, in order to alert to the risk of exposure to hepatitis viruses in the workplace. Of the more than 16,000 confirmed cases of hepatitis, the highest positivity rate was observed in males (58.6%). The most affected age group was the 20 to 59 age group, and the South (36.5%), Southeast (35%), and Northeast (10.6%) regions were the most affected by viral hepatitis. There was a higher incidence of chronic hepatitis (76.67%) than acute hepatitis, and in terms of virus type, the highest percentage of infections were caused by virus's type C (54.29%), B (38.46%) and A (1.84%). Prevention of hepatitis B and C and their chronic forms represent essential public health measures to prevent these infections in the general population and in health workers, which can also prevent cancer associated with oncogenic viruses.
Keywords: Viral hepatitis, Cancer, Oncogenic viruses and Public health.

INTRODUCTION

Transmissible infectious diseases remain on the list of the biggest global public health problems, including infections caused by epidemic viruses. In Brazil, viral hepatitis is one of the main infections that affect the population, causing mild liver changes, and can also be moderate or severe. Most people with hepatitis do not show symptoms, but the disease can evolve from a silent form to nonspecific symptoms: fever, fatigue, malaise, dizziness, nausea and vomiting. Some patients may present abdominal pain, yellow skin and eyes, as well as dark urine and light-colored stools, which can be considered suspicious clinical symptoms and help in early diagnosis (Ferreira & da Silveira, 2004). Viral hepatitis types A, B and C are the most commonly diagnosed in our country, and the fewer common types are type D found in the North region and type E, which is rare in Brazil and common in countries in Africa, Asia and the Middle East. It is worth noting that type D can only infect patients with chronic hepatitis B. Hepatitis E can become chronic in immunocompromised individuals and can be fulminant in pregnant women, resulting in high mortality rates with a worse prognosis from the third trimester of pregnancy onwards. Hepatitis caused by types B or C, which are predominant in the South and Southeast regions, tend to become chronic and are more likely to present asymptomatically, making diagnosis and treatment difficult. Hepatitis C causes approximately 60 to 80% of chronic infections when compared to hepatitis B. Asymptomatic cases that evolve to chronicity in types B and C compromise the liver, leading to advanced fibrosis or cirrhosis, situations that may indicate the need for transplantation or even cause liver cancer (Raza et al., 2007, World Health Organization, 2017).

Studies have shown that more than one million deaths occur each year worldwide due to acute infections, liver cancer or cirrhosis related to hepatitis. The mortality rate caused by hepatitis C, for example, can be compared to the rates attributable to the human immunodeficiency virus (HIV) or even tuberculosis (WHO, 2016). Regarding viral hepatitis, some professionals may be frequently exposed to the hepatitis B and C viruses, which may favor infection resulting from a work accident. With the possibility of asymptomatic cases, there is an increased risk of developing liver cancer that may be

related to the work environment (Wong et al., 2003). In this context, the present study aimed to describe the epidemiological profile of confirmed cases of viral hepatitis in Brazil in 2020 and discuss the possible association with exposure in the work environment.

METHODOLOGY

A descriptive study was carried out on the epidemiological profile of confirmed cases of viral hepatitis in Brazil, covering the period from January to December 2020. Data regarding clinical, epidemiological and sociodemographic characteristics were extracted from the Notifiable Diseases Information System (SINAN) and tabulated using the Excel program.

RESULTS

In 2020, 16,818 cases of viral hepatitis were confirmed in Brazil. Analysis of the sociodemographic profile of confirmed cases showed that cases were more frequently reported among men (58.6%) than among women (41.3%). When analyzing the age group of those affected by viral hepatitis, we observed that people aged 40 to 59 years represented 46.1% of confirmed cases, followed by people aged 20 to 39 years (27.8%). On the other hand, it was observed that children under 1 year old, children and adolescents, and the elderly, who represent vulnerable groups, had lower percentages. Regarding self-reported race/color, white and brown people represented 45.3% and 32.3% of confirmed cases, respectively. Regarding education, a greater number of people had completed secondary education (17.6%) and incomplete elementary education from 5th to 8th grade (11.7%) were observed. It is also worth noting that 36% of this field was left blank or ignored. Analyzing the geographic regions, those with the highest number of notifications of confirmed cases of viral hepatitis were the South (36.5%), Southeast (35%) and Northeast (10.6%) regions; (Table 1).

In Table 2, we analyzed the confirmed cases of viral hepatitis in pregnant women and the data indicated that the first trimester of pregnancy represented the largest number of reported cases among pregnant women (366 confirmed cases). It is noteworthy that 0.19% of cases in pregnant women were classified as having unknown gestational age, which may reveal that these pregnant women were not receiving prenatal care or that this information was not evaluated when filling out the case investigation form.

Pregnant women with a positive diagnosis for viral hepatitis		
Gestational period	**N**	**%**
1º trimester	366	**2,17**
2º trimester	282	**1,67**
3º trimester	313	**1,86**
Gestational age ignored	32	**0,19**
Total (pregnant women)	**993**	**5,90**
Non-pregnant women	4.339	**25,79**
Not applicable	10.933	**65**
In blank/ignored	553	**3,28**
Total (casos confirmados)	**16.818**	**100**

Table 2: Confirmed cases of viral hepatitis in pregnant women in 2020, Brazil.

Source: SINAN, Ministry of Health.

In 2020, confirmed cases of viral hepatitis that did not present data regarding the type of source or mechanism of infection represented 62.61% of cases. However, in cases where this data was obtained, the sexual route (14.75%), injectable drugs (5.41%) and transfusion route (3.09%) were the most reported among confirmed cases. There was also a higher occurrence of chronic hepatitis (76.67%) when compared to acute hepatitis (9.33%) and regarding the type of virus, the data pointed to a higher occurrence of type C virus (54.29%), followed by type B (38.46%) and type A (1.84%) (Table 3).

Sociodemographic profile		
Gender	**N**	**%**
Men	9.866	**58,6**
Women	6.946	**41,3**
In blank/ignored	6	**0,03**
Age (years)	**N**	**%**
> 1	103	**0,61**
1-4	14	**0,08**
5-9	26	**0,15**
10-14	28	**0,16**
15-19	204	**1,21**
20-39	4.690	**27,8**
40-59	7.757	**46,1**
60-64	1.605	**9,54**
65-69	1.105	**6,6**
70-79	1.024	**6,1**
80 years and above	261	**1,55**
In blank/ignored	1	**0,006**
Race/Color	**N**	**%**
White	7.623	**45,3**
Black	1.633	**9,7**
Yellow	158	**0,9**
Brown	5.441	**32,3**
Indian	81	**0,5**
In blank/ignored	1.882	**11,2**
Education	**N**	**%**
Illiterate	275	**1,63**
Elementary School (E.F.)		
1ª to 4ª grade not concluded	1.142	**6,8**
4ª grade concluded	745	**4,4**
5ª to 8ª grade not concluded	1.963	**11,7**
Elementary school concluded	1.250	**7,4**
High school (E.M.)		
High school not concluded	926	**5,5**
High school concluded	2.952	**17,6**
University level (E.S.)		
University level not concluded	389	**2,3**
University level concluded	979	**5,8**
In blank/ignored	6.063	**36**
Not applicable	134	**0,8**
Region of notifications	**N**	**%**
North	1.563	**9,3**
Northeast	1.790	**10,6**
Southeast	5.898	**35**
South	6.135	**36,5**
Midwest	1.432	**8,5**
Total	**16.818**	**100**

Table 1: Sociodemographic profile of confirmed cases of viral hepatitis in 2020, Brazil.

Source: SINAN, Ministry of Health.

Confirmed cases of viral hepatitis, SINAN (2020)		
Source/mechanism of infection		
Type of source	**N**	**%**
Sexual	2.481	**14,75**
Transfusional	520	**3,09**
Injectable drug use	911	**5,41**
Vertical	158	**0,93**
Work accident	47	**0,3**
Hemodialysis	82	**0,5**
Home	285	**1,69**
Surgical treatment	279	**1,65**
Dental treatment	459	**2,72**
Person	369	**2,19**
Food/water	127	**0,75**
Others	569	**3,38**
In blank/ignored	10.531	**62,61**
Etiological classification		
Type of virus	**N**	**%**
Virus: A	310	**1,84**
Virus: B	6.469	**38,46**
Virus: C	9.131	**54,29**
Virus: B+D	42	**0,24**
Virus: E	5	**0,03**
Virus: B+C	189	**1,12**
Virus: A+B	21	**0,12**
Virus: A+C	16	**0,09**
Not applicable	104	**0,61**
In blank/ignored	531	**3,15**
Clinical form		
Clinical type	**N**	**%**
Acute hepatitis	1.570	**9,33**
Chronic hepatitis	12.895	**76,67**
Fulminant hepatitis	24	**0,14**
Inconclusive	1.729	**10,28**
In blank/ignored	600	**3,56**
Total	**16.818**	**100**

Table 3: Confirmed cases of viral hepatitis, according to etiological classification, source/ mechanism of infection and clinical form, Brazil, 2020.

Source: SINAN, Ministry of Health.

DISCUSSION

Despite all the efforts implemented by the Ministry of Health to expand and simplify the diagnosis and treatment of viral hepatitis, the annual cut-off for the year 2020 showed more than 16 thousand confirmed cases of the disease in the country. These data may be higher depending on the date of extraction of the data from SINAN, which are updated by the States and sent to the Health Surveillance Secretariat (SVS). It is worth noting that the data for the period evaluated may have been influenced by the COVID-19 pandemic (Ministry of Health, 2023).

In this assessment, we observed a higher prevalence of viral hepatitis cases in men when compared to women. A study correlating hepatitis B and C with hepatocellular cancer revealed a higher incidence of this type of cancer in men than in women. The distribution of the disease by gender may be associated with more frequent behaviors of men in relation to women, such as injectable drug use or work-related exposures (Buettner & Thimme, 2019).

Regarding the age range of confirmed cases, a discrete percentage of children under 1 year old and adolescents aged between 15 and 19 years old and elderly people over 60 to 64 years old were observed, although there is a need for prevention aimed at these priority groups (Ferreira & da Silveira, 2004).

It is interesting to note that during the period of this investigation, the highest prevalence of viral hepatitis was observed affecting the age groups of people who were employed or of working age, that is, the age group from 20 to 59 years old. On the other hand, the data regarding color/race indicated that white and brown people were more affected than black people. The item on education, as in other communicable diseases, indicated that the lower the education, the greater the risk of exposure, either due to a

lower perception of risk or misinformation about prevention methods. These data corroborate those described by Marques et al. (2019), in a similar study that described the sociodemographic profile of patients diagnosed with viral hepatitis in the state of Ceará.

According to the demographic analysis, the South and Southeast regions had better notification percentages, while the North and Northeast regions had fewer notifications of confirmed cases. These differences in reporting between Brazilian regions may reflect, to a greater or lesser extent, the scope of Primary Care in these regions and a better or worse system for feeding reference data on hepatitis. In general, official records show that there was a significant reduction in viral hepatitis in the country, especially hepatitis B, between 2019 and 2020 (Ministry of Health, 2023).

The sources and/or mechanisms of viral hepatitis infection demonstrated that sexual transmission accounted for the highest percentage of confirmed cases, which, from a work perspective, includes sex workers as a vulnerable group for hepatitis infection and suggests the need for investments in public prevention policies, such as the provision of free condoms to the entire population. This information is in line with data made available in 2024 by the Ceará State Health Department, which recorded approximately 54.5% of cases of hepatitis C transmitted sexually (SVS, 2024).

The use of injectable drugs was also a significant route for hepatitis infection, highlighting the need to inform drug users about the risks of sharing syringes that expose them to hepatitis C infection and other diseases such as HIV, as revealed by Silva et. al (2021) in a multicenter study developed in the Amazon region of Brazil.

A study carried out by Pacheco et. al (2013) in Pará revealed that 60% of the cases of hepatitis C registered in the state are due to the use of non-injectable illicit drugs. In this sense, the classification of the viral type of confirmed cases indicated the highest percentage of type C virus followed by type B, both with potential for chronicity and development of liver neoplasia, further corroborating the data on the clinical type, since chronic hepatitis affected 76.67% of confirmed cases.

Another important aspect to be highlighted is the percentage of positive cases in pregnant women, with the highest percentage detected in the first trimester of pregnancy, reinforcing the importance of prenatal testing and the need for treatment of these women with a positive diagnosis for hepatitis, as described by Terrault et. al (2021).

Estimates from the National Cancer Institute (INCA) indicate the occurrence of more than 700,000 new cases of cancer in Brazil between 2023 and 2025. Regarding liver cancer, estimates predict the occurrence of 10,700 cases with an estimated risk of 4.95 cases, with 6,390 cases expected in men and 4,310 in women.

These numbers express the increase in liver cancer in the Brazilian population, ranking as the 10th primary location in men. However, there is no official data available on the number of patients with a positive correlation between viral hepatitis and/or oncogenic viruses and the development of liver cancer (Ministry of Health, 2022).

Although scientific evidence shows that various exposures in the workplace can cause cancer, the number of notifications of work-related cancer can be considered underreported. Estimates indicate that 10.8% of cancer cases in men and 2.2% of cases in women are related to their work places and processes, and that occupational cancer represents 2 to 4% of all types of cancer (Fritschi & Driscoll, 2006).

The International Agency for Research on Cancer (IARC, 2020) recognizes that half of all human carcinogens are of occupational origin, that is, they are present in work environments and processes. Identifying these agents is important, however, it is necessary to break down barriers and discover how these agents can spread and affect a greater number of people outside the restricted work environment. In general, doctors and health professionals do not associate oncogenic viruses with work, with the most common association being that related to accidents at work, especially with sharp objects. Even so, accidents at work represented only 0.3% of the cases of viral hepatitis reported in 2020 in Brazil, which may indicate the invisibility or underreporting of cases, corroborated by the fact that 62.61% of confirmed cases did not present information about the source of infection. It is important to alert health professionals that recovering this information can help in planning preventive actions against hepatitis infections.

Although the liver is the main organ involved in the metabolism of exogenous chemicals, including potential occupational carcinogens, few studies have revealed this association, as is the case of workers exposed to vinyl chloride used in the production of plastics, who are at increased risk for liver angiosarcoma. A case-control study conducted by Wong et al. (2003) demonstrated evidence that workers exposed to vinyl chloride who are infected with hepatitis B or consume alcohol may have an increased risk of developing liver cancer.

Studies indicate a high rate of hepatitis B and C infections, as well as human papillomavirus (HPV) and Epstein-Barr virus (EBV) in researchers, doctors, nurses, dentists and laboratory technicians. In addition to acute infection, these exposed professionals may be at risk of developing Occupational and Environmental Liver Disease (OELD); (Joveleviths et. al, 2024).

CONCLUSION

Hepatocellular carcinoma is mainly caused by chronic hepatitis B and C infections. Most studies correlate chemical agents as risk factors for liver cancer, however it is important to note that hepatitis viruses have oncogenic capacity. Considering the high risk of infection by these viruses after work accidents involving sharp objects or contact with bodily fluids, these infections may represent a risk factor for certain occupations such as healthcare professionals. Other workers must be considered in this risk spectrum, such as sex workers, due to unprotected sexual contact with multiple partners, professionals who work in the cleaning area in hospital environments who are exposed to contaminated bodily fluids and who do not receive instructions on prevention in their work environments or neglect to use personal protective equipment in their work processes.

Activities related to tattooing and piercing can also expose professionals and clients to greater exposure to hepatitis B and C viruses, when the use of disposable materials and sterilization of materials are not used properly. Professionals who work in rescue and emergency services, such as first responders and firefighters, may be exposed to hepatitis viruses during rescue and life-saving operations.

Vaccinating the population and workers against hepatitis is the first step in preventing liver cancer associated with these infections. Screening for hepatitis in the population helps in the early diagnosis and treatment of positive cases, especially asymptomatic cases. It is necessary to warn people about the importance of following recommendations regarding safe sexual practices and the use

of condoms. In work environments where professionals may be exposed to these viruses with oncogenic potential, it is essential to apply biosafety recommendations, as well as the regulations and guidelines of the World Health Organization.

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