INCIDENCE OF VIRAL HEPATITIS IN BRAZIL FROM 1997 TO 2010
INCIDÊNCIA DAS HEPATITES VIRAIS NO BRASIL DE 1997 A 2010

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ABSTRACT
Objective: analyzing the trends of the incidence of hepatitis B and C in Brazil in the period from 1997-2010. Method: an ecological study in which there were calculated the incidence rates of hepatitis B and C per 100,000 inhabitants/year, considering the confirmed cases in the period 1997-2010. The Joinpoint program was used to study the trends. Results: there were confirmed 153,921 cases of hepatitis B. Met trend of significant increase in incidence in the country. In most regions, except in the South, there was an upward trend, with low variation. Concerning hepatitis C, 129,045 cases were confirmed, with increasing initial trend followed by significant decline from 2004. By region, there was significant increase in incidence in the Northeast and Southeast, stability in the North and initial increase followed by decrease in the South and Midwest. Conclusion: new cases of hepatitis B increased significantly, while the hepatitis C decreased during the last five years. Descriptors: Hepatitis; Incidence; Health Public Policy.

RESUMO

RESUMEN
Objetivo: analizar las tendencias de la incidencia de la hepatitis B y C en Brasil durante el periodo 1997-2010. Método: estudio ecológico en el que se calcula la tasa de incidencia de la hepatitis B y C por 100,000 habitantes/ano, teniendo en cuenta los casos confirmados durante el periodo 1997-2010. El programa Joinpoint se utilizó para estudiar las tendencias. Resultados: se confirmaron 153,921 casos de hepatitis B. Se encontró una tendencia de aumento significativo de la incidencia en el país. En la mayoría de las regiones, con excepción del Sur, hubo una tendencia al alza, con escasa variación. En cuanto a la hepatitis C, se confirmaron 129,045 casos, con el aumento de la tendencia inicial seguida de un descenso significativo a partir de 2004. Por regiones, hubo aumento significativo de la incidencia en el Nordeste y Sureste, la estabilidad en el Norte e aumento inicial seguido de disminución en el Sur y Medio Oeste. Conclusión: los nuevos casos de hepatitis B aumentaron significativamente, mientras que los casos de hepatitis C se redujeron en los últimos cinco años. Descriptores: Hepatitis; Incidencia; Politicas Publicas de Salud.

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INTRODUCTION

Viral hepatitis (VH) are systemic infectious diseases caused by various etiological agents of human viral hepatitis: the hepatitis B virus (HBV) and hepatitis C virus (HCV); although the variation of each virus, the susceptibility is universal and has in common the becoming of hepatotropism. Thus, distinctions have clinical and laboratory point of view, as well as epidemiologic distributions in populations.

In general, viral hepatitis are silent diseases. Data referring to infections according to the World Health Organization show that worldwide there are about 520 million people infected with HBV and HCV, with a mortality rate of one million deaths annually. In Brazil, the Ministry of Health data indicate the existence of Brazilian five million infected with HBV and HCV at a rate of over 20 thousand deaths per year. Of these deaths, 70% are due to hepatitis C, the most aggressive.

HBV has a wide clinical spectrum, from asymptomatic infections, oligosymptomatic, to fulminant forms. The infectivity of HBV is 50 to 100 times greater than that of the Human Immunodeficiency Virus (HIV). The primary route of transmission is parenteral, by contact with blood and blood products. It is also transmitted through sexual contact and infected mother to her newborn during birth, or perinatal.

The Ministry of Health estimates that at least 15% of the population already in contact with HBV and that 1% of the population has chronic forms. The prevalence of HBV in Brazil increases from South to North, with anti-HBC rates, which is the first antibody present during infection, ranging from 61.5% in Acre, 10.2% in São Paulo and 5.5% in Rio de Janeiro and Santa Catarina.

Regarding HCV, its transmissibility is essentially parenteraly such as blood transfusions, intravenous drug abuse, through contaminated medical equipment, tattoos and rarely sexually or perinatally.

It is not known precisely the national prevalence of HCV; however, studies suggest that the rate varies from 1% to 2% of the general population. People who inject drugs are the main segment infected with hepatitis C and about 40% of the prison population in some countries, whose face is in the proposals for Harm Reduction Programs that work in most countries, whose facilitation by these diseases, as well as the complications of acute and chronic form generate great expense to the public coffers. In this perspective, a study of trends in viral hepatitis is an important tool for assessing the effectiveness of health measures adopted by public health policies, it is also important to monitor the extent of social inequalities that prevail among population subgroups.

Thus, this study will allow recognizing the incidence of viral hepatitis, as well as trends in different regions of Brazil. In this respect, the trend studies are useful for assessing the possible impact of prevention of these diseases programs and can support the development of prevention and health promotion strategies, and will assist in the surveillance process.

OBJECTIVE

- Analyzing the trends in the incidence of hepatitis B and C in Brazil in the period 1997-2010.

METHOD

This was an ecological study using data from the Department of SUS (DATASUS) collected from the National System for Notifiable Diseases (SINAN) the period 1997-2010, in Brazil and its Regions. The survey data were all cases of hepatitis B and hepatitis C, of both sexes and regardless of age.

Incidence rates were calculated from the absolute number of confirmed new cases of hepatitis B (ICD-10 code B16) and hepatitis C (ICD-10 B17.1 code) divided by the corresponding years in the target population and multiplied by 100 million inhabitants. Calculations of specific incidence rates for each year by hepatitis B and C were obtained by the Ministry of Health Core Data Indicators.

To study trend was used to calculate the rates by Joinpoint regression program, which allows describing a trend and identifying whether there have been recent changes, modeling linear segments joined by turning points (Joinpoints). The analysis identifies the actions related to hepatitis. One of the epidemiological assessment of projects proposed viral hepatitis was the National Household Survey, considered most prominent for being the most significant Latin American.

In addition, viral hepatitis have become regarded as notifiable diseases (DNC) only since 2003, when it was published Ordinance No. 2325/GM defined the DNC ratio for the country.

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time at which produce changes in trend and calculates the annual percent change (CAP) in each segment.

The analysis starts with the minimum number of joinpoints and contrasts one or more of these are statistically significant for the aggregate model. Given the log-linear nature of the model, the parameters that are part of the regression are the CAP of the adjusted rates for each segment and the number and location of inflection points, as well as the confidence intervals for this parameter.

RESULTS

In the period 1997-2010 there were confirmed 153,921 cases infected by HBV in the country and found a trend of increased frequency, with PAC of 5.96 (IC 95%: 3.3/8.7) (Figure 1).

Regarding HCV, in turn, there were confirmed 129,045 cases and an increased incidence of cases with PAC of 22.70 (IC 95%: 17.3/28.4) by the year 2004. After this period, there is a change in the trend of new cases with a significant decrease in the incidence, with PAC of -5.82 (IC 95%: -11.1/-0.3) (Figure 2).

The analysis by regions of incidence of HBV, there is a trend of a statistically significant tendency in almost all regions, except the South, which was stable in incidence rates (Table 1).
Regarding the cases of HCV, there were in the Northeast and Southeast a significant increase in disease incidence rate. On the other hand, there was a significant decrease of cases in the South and Midwest and stability of rates in the North (Table 2).

Table 1. Trend Analysis of the population affected by HBV from 1997-2010, using the Average Annual Percentage Change (PAC) with their respective confidence levels of 95% (IC 95%).

<table>
<thead>
<tr>
<th>Region</th>
<th>Absolute Value</th>
<th>PAC 1</th>
<th>IC 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>16296</td>
<td>17,10*</td>
<td>8,9 / 25,9</td>
</tr>
<tr>
<td>Northeast</td>
<td>15789</td>
<td>7,12*</td>
<td>2,5 / 11,9</td>
</tr>
<tr>
<td>Southeast</td>
<td>55682</td>
<td>11,46*</td>
<td>5,3 / 18,0</td>
</tr>
<tr>
<td>South</td>
<td>50313</td>
<td>0,47</td>
<td>-0,7 / 1,7</td>
</tr>
<tr>
<td>Midwest</td>
<td>15813</td>
<td>5,35*</td>
<td>2,9/7,8</td>
</tr>
</tbody>
</table>

PAC: Change Annual Percentage
* Statistically significant
IC 95%: Confidence Index at 95%

Table 2. Trend analysis of the population affected by HCV from 1997 to 2010 using a Change in Annual Average Percentage (PAC) with their respective confidence levels of 95% (IC 95%).

<table>
<thead>
<tr>
<th>Region</th>
<th>Absolute Value</th>
<th>PAC 1</th>
<th>IC 95%</th>
<th>Joinpoint</th>
<th>PAC 2</th>
<th>IC 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>4112</td>
<td>6,79</td>
<td>-3,4/18,1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Northeast</td>
<td>7789</td>
<td>9,21*</td>
<td>2,5/16,3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Southeast</td>
<td>72128</td>
<td>18,25*</td>
<td>9,7/27,5</td>
<td>2004</td>
<td>-9,59*</td>
<td>-18,2/-0,0</td>
</tr>
<tr>
<td>South</td>
<td>37766</td>
<td>12,25*</td>
<td>3,7/21,5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Midwest</td>
<td>7238</td>
<td>6,12</td>
<td>-2,1/15,0</td>
<td>2005</td>
<td>16,76*</td>
<td>-29,4 / -1,8</td>
</tr>
</tbody>
</table>

PAC: Change Annual Percentage
* Statistically significant
IC 95%: Confidence Index at 95%

**DISCUSSION**

From the data analysis of this study, there was in Brazil a growing trend in the incidence of HBV and an initial upward trend, followed by a decrease in incidence rates for HCV. Worldwide, approximately 5% of all acute infections progress to chronic form and every year, about one million people die worldwide victims of HBV infection, 33% caused by hepatocellular carcinoma and other terminals by complications of liver disease.3

In some regions of the world we observe that the prevalence of HBV is low in northern Europe reaching about 0,1% of the population. In specific countries in Europe these values vary as is the case of the Netherlands and Hungary, having lower prevalence of 0,5%. In North America, the United States, 0,5% of the population are chronic carriers, while in Canada the estimated prevalence is 0,7% to 0,9% of the population.10 Most countries in Latin America presents prevalence of less than 2% between them Costa Rica, Nicaragua, Panama, Mexico, Argentina, Southern Brazil, Chile, Paraguay and Uruguay.9

HBV is considered highly prevalent in the Western Amazon basin region, located in Brazil, Colombia, Peru and Venezuela, with a prevalence of up to 8%. In Africa, it is estimated the range between 5% to 20% of the population, and up to 70% to 95% of the adult population has passed the virus exposure markers. Most endemic for HBV in the world is registered in the Western Pacific region, where prevalence is 5% to 35%.10

This progression observed in the incidence of HBV in almost all regions of the country except in the South, can be effect of increased cases reported because of the inclusion of viral hepatitis in the DNC list in December 2003 by the Ministry of Health, he made it through this, the mandatory reporting of all types of viral hepatitis. Thus, the suspected or confirmed cases are reportable to the Municipal and State Health and the Ministry of Health.11

Despite the improvement in the quality of data in recent years as a result of this requirement, the National System for Notifiable Diseases - SINAN is a surveillance system that depends on the notifications for constant updating of its database, which could be one of the possible limitations. Therefore, the system data are liabilities based on these notifications, this mode is not sufficiently reliable to estimate a real rate of infection in the population, taking into account that as previously seen many of these infections are asymptomatic nature and etiology of symptomatic cases not always be confirmed.2

Thus, underreporting could be considered one of the greatest problems of passive surveillance systems, a factor that ends up generating developmental delay or absence of control measures of the disease and effective...
Incidence of viral hepatitis in Brazil…

in recent decades. From the end of 2007, the vaccine against HBV was introduced to a total of 171 countries and about 65% of the world population, compared with 3% in 1992. Coverage is higher in the Americas by 88% in Africa reaches 69% and Asia 30%.10

In Italy, the peak incidence of acute HBV infection occurred in mid 1980, registering 26 000 cases and decreased significantly in the period from 1990 to 2004, with 4,758 cases reported in 2006. The decrease in this rate coincided as increased initiatives immunization coverage in 1991, targeting the prenatal screening of infected pregnant women and universal vaccination of children, adolescents and adults at risk for HBV.14

In southern Brazil, we observed a significant decrease in cases of HBV. In a study in Itajaí, a State City of Santa Catarina in the South, it was found a low prevalence of infection of 1.1% HBV rate similar to that found in adolescents and young adults in developed countries, where vaccination programs against HBV are fully implemented which could be a reason for this decrease.15

Although the Northeast and Midwest having fully implemented the HBV immunization program, increasing it turns out the number of cases as well as in the North and East. The success of immunization programs is related to the quality of biopharmaceuticals and their proper maintenance is essential to maintain the effectiveness of vaccines and information like this would be important to understand the evolution of the incidence rates in these regions.16

One possible explanation for the increase in new cases of HBV is the failure in vaccine storage at the local level, a factor that may jeopardize the effectiveness of immunization. Evaluations performed in the period from 2002 to 2005 in various parts of the world, failures were detected jeopardizing the effectiveness of vaccines in these instances as lack of observation of the equipment in the temperature range recommended for preservation of vaccines; lack of devices to monitor this temperature; equipment worn and need replacement; lack of staff training and incorrect positioning of vaccines inside the refrigerator.16

Chronic hepatitis C is major cause of cirrhosis and hepatocarcinoma, and an important indication for liver transplantation. Hepatocellular carcinoma is the most common primary malignant tumor found in the liver and despite the progress in the knowledge of the emergence and progression of the disease continues to have high mortality rates. The annual incidence in the world of new cases

public health policies. This problem may be related to several factors, namely: the lack of knowledge by health professionals of the reporting process as well as the list of considered reportable diseases; low adherence to the notification and the lack of awareness of the importance of this process for the efficient functioning health surveillance.3

In 2004, the PNHV brought to the National Survey of Viral Hepatitis called Population-Based Study of the Prevalence of infections by viruses A, B and C in the Brazilian capitals using sampling to estimate all the capitals and the Federal District, as well as the IBGE - 2000 Census from 5-69 years. For grouping data from different regions and age groups, a weighting was used in order to correct for different sampling fractions.7

Even though it is in the largest study in Latin America in order to determining the incidence of viral hepatitis, the study did not offer a real estimate of the data, in order that it worked only with the country's capital and biggest problem faced as for its realization the large number of unknown data in the notification form.7

Another important aspect that we point out is vaccination against HBV, which was extended in Brazil more recently, from 2001, to individuals under the age of 20 years old, in all regions.8 Since 1998, the National Immunization Program recommends universal vaccination of children against hepatitis B with the first dose in the first 24 hours of life in order to prevent the infection from mother to child. In Brazil, it is freely offered to risk groups, since the early 1990s.9

The most effective measure for prevention of hepatitis B is recommended the administration of vaccine. Due to the characteristics of HBV transmission, it is necessary to deploy complex immunization strategies so that all age groups of the population are protected. For the control of infection, WHO and all official health organizations, have adopted the introduction of the vaccine for children from birth.12

To promoting immunization, the Ministry of Health promoted campaigns encouraging vaccination, which have been disseminated through the media, contributing to the work of health teams for the family, who are strong promoters of this benefit. However, despite a public policy already implemented in the various regions of the country, many children cannot be vaccinated due to many reasons.13

The implementation of universal vaccination against hepatitis for children in most countries reduced the prevalence of HBV
per year is one million patients. Its etiology is closely linked to chronic infection with HBV and HCV. The risk of developing this type of liver disease after the diagnosis of HBV is 0.5% per year, and the incidence increases in the case of HCV, reaching 5% by year.\textsuperscript{17}

Due to the asymptomatic nature of HCV infection becomes difficult to estimate precisely its prevalence. Studies taking the initiative to determine the prevalence of this disease sometimes are restricted to the main risk groups for developing this infection, being notable as the predominant factor of individual risk using injectable drugs. It is estimated that the prevalence of HCV varies in Latin America. In Brazil and Argentina 1.5% rate is recorded for all ages and 2.5% among adults, in Peru the highest estimate was 1 to 1.9% for all ages and from 2.0 to 2.9 % among adults, while Venezuela reaches 0.95% for all ages and 1.4% in adults.\textsuperscript{18}

In North America, there is recorded low prevalence of cases. In the United States, about 1.6% of the population is infected with HCV, while in Canada this value drops to 0.8%. In Europe, it is estimated with a low prevalence rate of 1%, while in Southeast Asia, the prevalence is 2.15%. Africa has the most significant amounts of infection, estimated at 5.3%.\textsuperscript{10}

With regard to Brazil, there was the occurrence of significant decline in incidence from 2004. This change in trend could be effect of PNHV, created in 2002, which has among its objectives the strengthening of surveillance, increased access and increase the quality and capacity of health services in all levels of complexity. As one of the measures taken to achieve the objectives proposed by PNHV, it was decided to start the work of counseling and HIV testing of viral hepatitis in Testing and Counseling Centers, which are already carried out these activities for HIV.\textsuperscript{19}

The determinants of the HIV and HCV epidemics include viral prevalence, the infectivity of the virus and the frequency of risk behaviors that favor transmission. Injecting drug users are generally the major portion of individuals at risk for HIV infection presenting clinical comorbid hepatitis, particularly with HCV given their greater infectivity rate, having nurtured spread due to blood contact occurred during needle sharing.\textsuperscript{20}

To analyzing the trends, in the incidence of HCV regions of the country, there was a significant decrease in the South and Midwest, and it is possible that this reduction is due to the work of the CTA, for allowing the knowledge of HIV status of individuals providing so the early detection of cases and early treatment, as well as serving as the epidemiological surveillance and health tool, enabling the development of preventive actions. However, they are some possible limitations very common in most health services, most coming from the lack of systematic data, because the collection is by many professionals. Another possible failure happens, the registration of reagents cases because of the dynamic service.\textsuperscript{19}

It is important noting that regional disparities in Brazil are not due to lack of resources, but the persistent inequity. In the Northeast and Southeast there was an increase in the incidence, while the North was recorded stability in the rates. The North and Northeast regions are considered less developed and major deficiencies in the provision, access and organization of health services, as well as unequal incorporation of advanced technologies for diagnosis and treatment of diseases. The Southeast showed a higher economic development, also lives with social inequality and income distribution. A possible cause for the loss of cases in the South can be attributed to the socioeconomic conditions of the population that allows greater access to health services in relation to other regions of the country.\textsuperscript{6}

It can be listed as a possible hypothesis for this upward trend in the rates found in the Northeast and Southeast of the low level of knowledge about hepatitis which indicates the urgency in scaling up harm reduction actions, with the inclusion of information about hepatitis infections and HBV vaccination in their strategies. Thus, there would be the need for continued support to harm reduction programs, as well as the implementation of needle exchange in prisons and incentives for research to guide prevention efforts, and change of injecting drug modes of administration.\textsuperscript{6}

The main limitation of this study is the quality of the data record. The underreporting of cases in SINAN makes it impossible to recognizing the true epidemiological situation of viral hepatitis; and this eventually affects the planning of actions to control these diseases. Every grievance compulsory notification has a notification form and/or research completed at the local level, and its contents are subsequently computerized.\textsuperscript{20}

During the year 2001, there was a gradual transition for the Windows environment version, because the system did not fulfill the needs of epidemiological surveillance. Early versions of SINAN-Windows presented...
problems in data migration, and imported only cases whose variables showed no inconsistency. Data from the Windows version, in turn, migrated again this time to the SINAN-NET deployed in the year 2007, still facing problems in this process, mainly due to the inclusion of new variables.

CONCLUSION

In the period 1997-2010 there was a significant increase in the trend incidence in the country, what is probably related to the inclusion of viral hepatitis the list of compulsory notifiable diseases, the creation of the National Survey of Viral Hepatitis and decreased immunogenicity of the vaccine hepatitis B. Regarding HCV, there was a significant decrease in the incidence from the year 2004 could be a result of the creation of the National Program for Viral Hepatitis, the insertion of serological tests of hepatitis in testing and Counseling centers, as well as the creation of the Harm Reduction Programs. When resuming the reflection on the prevalence of Viral Hepatitis B and C, one can question the effectiveness of current health policies in the control of Viral Hepatitis.

Finally, another important aspect to be questioned is the improvement in the performance of the information system. Therefore, more studies are necessary showing the effectiveness of the collection of epidemiological information system. It is understood that the fragility of a passive monitoring system may in part result in inhomogeneity of notifications. Thus, it becomes necessary to develop continuing education actions with health professionals, with the aim to enable them to identify suspected cases and correct completion of compulsory notification form, as well as the creation of a process of standardization of data collection for the same.

REFERENCES