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Research Article

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Timeline Analysis of Hepatitis B Cases in Northeastern Brazil

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ABSTRACT

The objective of this study was to analyze the spatial and temporal distribution of cases of Hepatitis B in the states of northeastern Brazil. This is an ecological study of the spatial and temporal distribution, by gender, age group and race of all cases of hepatitis B of the Brazilian Northeast, reported in the period from 2007 to 2013. The data were organized and processed in SPSS® version 20 and analyzed using descriptive statistics and linear regression. Regarding the spatial distribution, a vector map was constructed using the program QGis2.4.0® version Chugiak. In the analyzed period, there were 7,922 cases of Hepatitis B. There was an increase of 121 cases per year (p<0.0001); for men, it was 59 cases (p<0.001) and for women, this growth was 58 cases per year (p=0.006). The study highlights the need to intensify prevention and control strategies, as already started with the expansion of vaccination coverage. In addition, it is necessary a more effective specific approach that achieves the risk groups considered at risk.

Keywords: Hepatitis B; Spatial analysis; Temporal distribution

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INTRODUCTION

The infection by the hepatitis B virus (HBV) is among the main public health diseases worldwide. The various forms of transmission, the virus stability as well as the presence of chronic carriers allow survival and, thus, the persistence of the virus in the population. It also affects the economically active age groups with decreased productive capacity, which creates a serious social problem [1,2].

There is an estimative that approximately 350 million people are chronic carriers of HBV, distributed in several regions of the world. Worldwide prevalence rates of patients with hepatitis B range from 0.1% to rates above 30%, as in Asia. In India, the virus is responsible for 60% of cases of chronic liver disease. In Portugal, viral hepatitis are the second most common cause of liver disease [3-5].

In Brazil, about 120,343 cases of the disease were confirmed from 1999 to 2011, with great predominance in the South and Southeast of the country. The Northeast has about 9.2% of the total cases. In this region, the detection rates per 100,000 inhabitants, in 2010, were 2.5 below the national average of 6.9%. However, in some states, there were the highest detection rates per 100,000 inhabitants, such as Paraíba (João Pessoa-PB) (10.9%) and Maranhão (Sao Luis, MA) 7.7% [6].

In this perspective, the transmission of HBV easily occurs through sexual contact, vertical, parenteral, piercings, dental materials and surgeries with failed sterilization processes. In the external environment, the virus survives for up to seven days and the risk of transmission in unvaccinated persons is about 5 to 40%. Moreover, infection represents the most frequent cause of chronic hepatitis, cirrhosis and hepatocellular carcinoma [5,7,8].

Past infection or vaccination is responsible for the acquired immunity to the virus. In order to achieve effective prevention, immunization is the most important means. The vaccine is safe and effective: about 95% of vaccinees respond with adequate levels of protective antibodies, and, yet, it is virtually free of complications,

may only cause reactions at the injection site. Furthermore, it not only prevents hepatitis, as well as cancer. More than 80 countries worldwide adopt vaccination for the entire population as a strategy to combat disease [2,7,9].
The implementation of the hepatitis B vaccine occurred gradually in Brazil. In 1989, the vaccination began in the Western Amazon. In 1998, it was included in the National Immunization Program - PNI for children. In 2001, its provision was extended to people under 20 years and, in 2010, to susceptible individuals up to 29 years old, as well as for vulnerable groups such as pregnant women, firefighters, health professionals, police (military, civilian and road), correctional officers, garbage collectors, sexual partners of HBV carriers, blood donors, homosexuals, manicures, settlements and camp populations, among others. In 2013, the supply of the vaccine was extended to individuals up to 49 years old [6,10].
The progression of the disease represents a major increase in public spending on treatment and, ultimately, liver transplantation. Therefore, it is important to know the current situation of hepatitis B in the population in order to clearly understand the actual health status of the population. Thereby, maps are used for they allow to observe the spatial distribution of risk situations and health problems. Furthermore, the spatial approach allows the combination of various databases, such as demographic and environmental. Such information contributes to the health surveillance systems as well as to provide support to guide specific actions and decision-making [11, 12].
Geographic Information Systems (GIS) arise in this context as a powerful tool in helping professionals and students of health areas. Furthermore, GIS ensure the spatial distribution by the graphic data base, since those systems allow the construction and the use of databases which can determine the associations between disease occurrence and environment [13,14].
Digital cartographic databases, product of geoprocessing projects in other sectors, are only the starting point for the spatial analysis of health. In order to be used as a means of analysis, health databases must be georeferenced, integrated to environmental and socioeconomic data, and subjected to evaluation procedures of their spatial distribution [15].
In view of this, the objective of this study was to analyze the spatial and temporal distribution of cases of Hepatitis B in the states of the Brazilian Northeast, based on data available from the National System of Disease Notification Information (SINAN).

METHOD

This is an ecological study, of spatial and temporal distribution, by gender, age group and race of all cases of hepatitis B of the Brazilian Northeast, reported from 2007 to 2013.
The investigated region has geographical area of 1,554,291.607 km², equivalent to 18% of the national territory. The region has the largest number of states, namely: Alagoas, Bahia, Ceará, Maranhão, Paraíba, Piauí, Pernambuco, Rio Grande do Norte and Sergipe, with a population of 56,186,190 inhabitants [2].
Data collection occurred through the information available from the Diseases Information System (SINAN), of the Department of the Unified Health System (DATASUS), under the Ministry of Health. The study included cases of Hepatitis B reported from January 1, 2007, to December 31, 2013.
For constructing the table, the Statistical Package for the Social Sciences® (SPSS) version 20 was used, license number 10101131007. There was an estimated curve for the number of cases, according to the period. The linear regression was analyzed according to the total number of cases and by gender. Microsoft Excel was used to build tables and graphs through absolute and relative frequencies.
Regarding the spatial analysis, it was constructed a vector map of the Northeast using the program QGis2.4.0® version Chugiak. The shape file of Brazil was used and manipulated to remove the region of interest. With the data, a map for the formation of hepatitis B clusters in northeastern Brazil was built, which contained a time series of the infection from 2007 to 2013, and a mitigation of the results was performed, after creating the vector map.

RESULTS

From 2007 to 2013, there were 7,922 cases of hepatitis B, with the highest observed incidence, respectively, in the states of Bahia, with about 0.05, Ceará, Maranhão and Pernambuco, with 0.03. Piaui appears as the only one with the lowest incidence. Bahia is the most populous state, follows in proportion to the number of cases of the disease (Figure 1).
For Table 1, the best curve the fit the data was linear. There has been an increase in the number of cases over the period. There was an increase of 121 cases per year ($p<0.0001$); for men, it was 59 cases ($p<0.001$) and for women, this growth was 58 cases per year ($p=0.006$).
Figure 1 shows the incidence by age group. It is the age group 40-59 years for two reasons: the decline between 2008 and 2009, and the growing and continued rise from 2009. Secondly, there is the age group 20-39 years, representing an upward trend in most years studied.

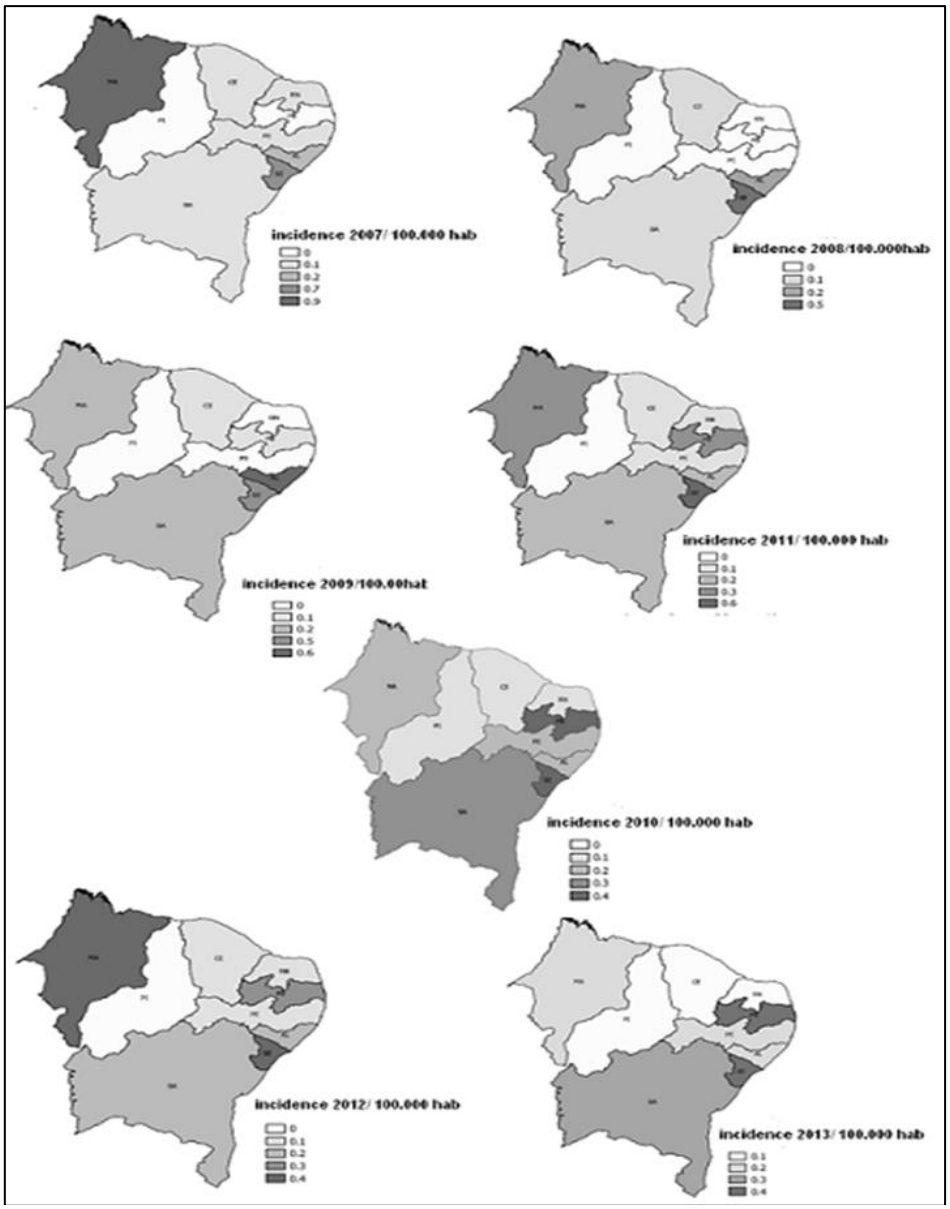

Figure 1: Incidence of Hepatitis B cases in Northeast from 2007 to 2013, Fortaleza, Ceará, Brazil, 2015

Table 1: Percentage of cases of Hepatitis B in the Northeast by gender, from 2007 to 2013, Fortaleza, Ceará, Brazil, 2015

	Male		**Female**		**Total**	
Year	Nº	%	Nº	%	Nº	%
2007	417	54.2	351	45.8	768	100
2008	439	52.4	399	47.6	83838	100
2009	624	55.3	515	45.2	113	100
2010	596	51.6	483	44.7	1079	100
2011	677		635	48.4	1312	100
2012	703	52.3	646	47.7	1349	100
2013	776	51.7	725	48.3	1501	100
	r^2= 0.914		r^2=0.809		r^2=0.942	
	p= 0.001		p=0.006		p< 0.001	

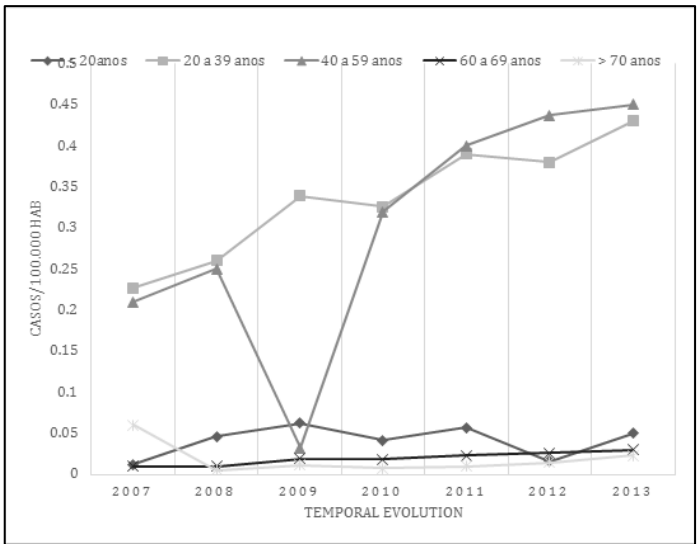

Chart 1: Cases of Hepatitis B by age group per 100,000 inhabitants in the Northeast region from 2007 to 2013.Fortaleza, Ceará, Brazil, 2015

There was prevalence of infection in blacks (11.4/100,000 inhabitants.), followed by mulattos (9.2/100.00 inhabitants), with representative fluctuations in relation to indigenous and yellow races. Thus, the graph results show gradual increase of the infection over the years, except in the indigenous race.

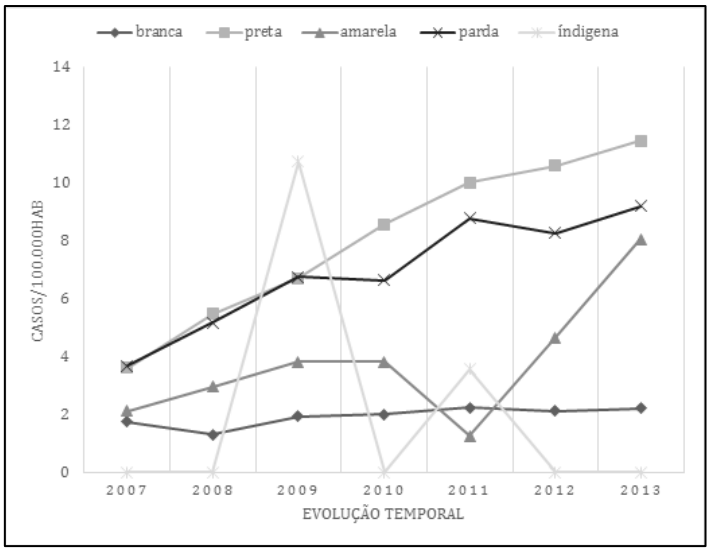

Chart 2: Hepatitis cases reported by race between 2007 and 2013 in the Northeast Fortaleza, Ceará, Brazil, 2015

DISCUSSION

This study allowed the characterization of the incidence of hepatitis B in the Northeast region, regardless of the stage of infection. The combined use of GIS and SINAN is an important tool of epidemiology and public health at optimizing information [16].

Despite all the measures taken for the prevention of hepatitis B through vaccination and government campaigns, the incidence of reported cases had increased among the studied years. The state of Bahia showed an increased incidence in relation to other states in the region, where it was observed that mostly young and mature men contract the disease, probably due to the number of partners and extramarital relationships [17]. In this aspect, women seek health services, both for prevention as for the diagnosis and treatment earlier and more regular than men do.

Given the severity of HBV infection, the Ministry of Health adopted other control measures that contributed to reducing the incidence of the virus, such as the requirement of serological screening for Hepatitis in hemotherapy services and the recommendation of screening for pregnant women [1,6,18].

In general, epidemiological studies show a higher frequency in male cases. Thus, women's vulnerability can occur because of the difficulty of gender relations in colluding with the partner the issue of condom use, multiple partners, as well as occupational exposure and sexual exploitation [3,7,11]. The constant predominance of men in the literature was not as significant as in other studies [1,19,20], only in accordance with a study of the North[3] region, of local nature, as it has an equivalent distribution of the number of cases among men and women.

Regarding age, there was a high incidence in the age groups in productive age, corroborating some studies[21, 22] and the last newsletter, where the incidence is higher from 20 years for all regions studied and regardless of gender. Several factors may contribute to the concentration of the disease in these age groups, especially those related to risk lifestyle and behavior [23].

Those factors probably contribute to increased infection and transmission of other sexually transmitted diseases (STDs), as well as behaviors that offer higher risk, such as the use of injecting drug and sex without condoms and with multiple partners. Thus, those findings also corroborate a study from Rio Grande do Sul, in which there was a high risk of HBV infection in the population group aged 30-59 years old [24].

Before the breakthrough of HBV, There was improvement of prevention measures over the years. The Brazilian Government has progressively guaranteed the population gratuity of hepatitis B vaccine, which is available in the public health system. The health centers and the Reference Centers in Special Immunologic (CRIE) shall provide the vaccine and register vaccination coverage up to 29 years old until 2010. This measure was reformulated in 2012, when vaccination range expanded to 49 years of age in the population at risk [25].

With the recent expansion of the immunization schedule, it is not possible yet to assess the impact of this measure to reduce the incidence in the population. Considering that many infected individuals are asymptomatic and that symptomatic infections are insufficiently notified, the frequency of hepatitis B is certainly still underestimated [7].

Besides vaccination, early diagnosis of hepatitis B through serological tests contributes to reducing grievances related to the disease such as cirrhosis, liver cancer and death.

The inclusion of testing in Brazil occurred from 2004 in the Centers of Counseling and Testing (VCT). Its expansion occurred from 2008, reaching a larger portion of the population at risk. About 41% of people begin the treatment in advanced stage of the disease and the main factor associated with late arrival to health services is the lack of knowledge of their serological status. This is a strong indication of the need for prioritization and permanent mobilization to encourage early diagnosis of not only Hepatitis B, but also HIV and syphilis [26].

In this sense, the development of studies about the influence of increased incidence and detection rate from testing for hepatitis B are still incipient. However, the expansion of testing can be considered a strong factor in the speed of diagnosis, prevention of grievances and complications, avoiding unfavorable outcomes.

CONCLUSION

The Hepatitis B scenario analyzed during the period proposed by the study showed the growth of cases in the Northeast. Control strategies used in major age groups are still incipient, because the magnitude of infection and silent progression of the disease to the chronic forms and their main grievances, especially in the most productive age groups of the population.

The study also highlights the need to intensify prevention strategies, as already started with the expansion of vaccination coverage. In addition, it is necessary a more effective specific approach that achieves the groups considered at risk.

The limitations of the study were the use of secondary data from Hepatitis B, and the possible existence of underreporting or loss information while filling the reporting forms, and favored because it is a silent disease with late diagnosis.

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