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Seroepidemiological Profile of Infections by Hepatitis Viruses and Population Native to the State of Rondonia, Western Amazonia

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Abstract

***Context:** Studies on the prevalence of hepatitis E (HEV) in Brazil show that rates vary between 1% and 38%. However, epidemiological surveys about the virus are still scarce and limited, especially in the Western Amazon, where difficult access to health services and lack of basic sanitation systems favour the transmission of oral-fecal pathologies, including the HEV.*

***Goal:** Determine the seroprevalence of hepatitis virus causes infections and two native populations of the Western Amazon, indigenous and riverside communities.*

***Methods:** Intravenous blood sample was collected from indigenous and residing in Riverside City of Guajará-Mirim-RO, the surroundings of the Madeira River. The samples were tested for the enzyme-linked immunosorbent assay with recomWellanti Anti-HEVIgG (MIKROGEM Diagnostik).*

***Results:** 386 individuals participated in the study volunteers, 268 (69.4%) bordering and 118 (30.6%). The prevalence of HEV was 3.4% (4/118) in indigenous populations. Between riparians, 4.9% (13/268) were reagents for Anti-HEVIgG, of which 2.2% were over 60 years of age.*

***Main Conclusions:** The detection of anti-HEVIgG antibodies in the native population suggests HEV circulation in the region, contributing to the description from Amazon as endemic to the HEV.*

Keywords: *Soroepidemiology, hepatitis and native population.*

Introduction

Hepatitis E (HEV) in the family Hepeviridae and was identified in 1983, through experiment using a fecal suspension done by Russian virologist, Mikhail Balayan [1]. The HEV is classified into three genera, however only genre *Orthohepevirus* infects humans [2,3].

The HEV is a RNA virus, not enveloped, spherical with icosahedral symmetry, approximately 32 nm in diameter. Its genome consists of a single chain of RNA, positive polarity, with approximately 7.2 Kb. Has three read genomic regions (ORF1, ORF2 e ORF3) and two non-coding regions (NCRs) in the terminal 3 ' -5 ' and a syrup poli-A [4].

The transmission in humans occurs primarily by fecal-oral route, by ingesting contaminated food and water. However, the blood transfusion and via vertical also represent contamination routes [5,6].

Hepatitis and is widely distributed in the globe and the spread is determined by your ability to adapt or

rearrangement of this causative agent. Genotypes 1 and 2 are endemic in Asia and Africa due to deficiencies in sanitation network. HEV3 is already present in the Americas, Europe, and Japan; While the HEV4 is found in China, Taiwan and Japan. The genotypes 3 and 4 usually cause sporadic outbreaks of acute autolimitadas [7]

The diagnosis of infection with HEV is accomplished by Antigen detection, RNA-HEV HEV and serum antibodies against HEV (immunoglobulin [Ig], IgM and IgG). Anti-HEV IgM class antibodies can be detected during the acute phase of the disease and can linger in the body for up to 5 months. Anti-HEV IgG antibodies are present after infection, for a period of more than 10 years. Therefore, for epidemiological studies of incidence, diagnosis of acute infection is based on the presence of IgM, HEV anti-HEV Antigen, and RNA-HEV; soon seroprevalence investigations are based on the detection of IgG anti-HEV [8]

Epidemiologically, the World Health Organization (WHO) estimates that 20 million of virus infections occur annually, including 3.3 million HEV of symptomatic cases and 56,600 deaths related to this virus [9]

In Latin America, between the years of 1990 and 2018, studies show rates of positivity, from different methodologies, ranging between 0.1% and 38%[10,11,20–22,12–19]in 3.9% (8/204.

Methodology

Location and Population of Study

The study was conducted in the State of Rondônia, with populations belonging to the municipalities of Guajará-Mirim with 24,856 km2 of territory and old port with 34,096 km2. Both cities are located in the world's biggest drainage basin, part of the Western Amazon (http://cod.ibge.gov.br/622).

Participated in this study, individuals of either sex, of every age range, or not symptomatic, and characterized as native populations, so certain: living in indigenous reservations IgarapéLage, Pacaás, Guaporé River, Sagarana and Rio Negro Ocaia (FUNAI), located in the surroundings of the city of Guajará-Mirim-RO; and, bordering, individuals living on the slopes of the Madeira River, in direct and left margins

The samples of both groups were provided by the clinic specializing in viral hepatitis Research Centre in Tropical Medicine-CEPEM-RO and by the laboratory of epidemiology of Oswaldo Cruz Foundation-FIOCRUZ-RO.

Serological Analyses

The biological material used for the analyses it is blood serum, prepared for the tests with the methodology established in accordance with the instructions of the manufacturer of the serological recomWell IgG anti-HEV immunoassay kit (MIKROGEM ® Diagnostik) that has the same principle of ELISA test, with functional features of 98.9% sensitivity and specificity of 97.8% for detection of antibodies of IgG type anti-HEV. Was defined as positive that result which showed average absorbance above 20% of the value of the average absorbance of the cutoff control. For the result to be considered negative, defined sample result being 20% lower than the average of the cutoff control. The definition of the interpretation of the results is established by the manufacturer, as recommended by the national viral hepatitis Program.

Statistical Analyses

The collected data were stored in a database, using EpiInfo ® software. The information was analyzed through the statistical test Exact Fisher to establish prevalence and relationship between interdependent factors. Both statistical analysis about construction of graphical representations was carried out with the aid of the GraphPadPrism ® 6.0 software.

Results

A total of 386 individuals participated in this study volunteers, divided into two groups native to the Amazon region, composed of 268 (69.4%) bordering and 118 (30.6%). The immunoassay test for the detection of IgG anti-HEV antibodies in both groups, the prevalence of HEV was 3.4% (4/118) and 4.9% (13/268), on indigenous populations and Riverside, respectively.

Table 1. *Frequency of Anti-HEV IgG associated with age in indigenous and Riverside*

Age		Tested		Anti-HEVreagent	
		N	%	n	%
Indigenous	<2	0	0,0	0	0,0
	2-10	0	0,0	0	0,0
	11-20	16	13,6	0	0,0
	21-30	49	41,5	1	0,8
	31-40	27	22,9	2	1,6
	41-50	12	10,1	1	0,8
	51-60	3	2,5	0	0,0
	>60	7	6,0	0	0,0
	Total	118	100	4	3,4
Bordering	< 2	3	1,1	0	0,0
	2-10	41	15,3	0	0,0
	11-20	65	24,3	1	0,4
	21-30	40	14,9	2	0,7
	31-40	36	13,4	2	0,7
	41-50	25	9,3	2	0,7
	51-60	27	10,1	3	1,1
	> 60	31	11,6	3	1,1
	Total	268	100	13	4,9

Legend: n: number

The age range of participants was quite heterogeneous (Table 1). In the indigenous population, were more prevalent among 21 and 30 years (41.5%); followed by adults between 31 and 40 years of age (22.9%). In the Riverside population, although individuals were widely distributed in all age groups, the largest proportion were young participants, between 2 and 10 years and 11 and 20 years, with 15.3 percent and 24.3 percent, respectively. Statistically, there was no relationship between age groups and prevalence of HEV, in both populations (p value > 0.05).

Table 2. *Frequency of Anti-HEV IgG associated with Indian sex and bordering*

Sex		Testedn (%)	Anti-HEVreagent n (%)	P Value	OR (CI 95%)
Indigenous	Female	42 (35,6)	1 (0,8)	>0,05	1,68 (0,24-22,4)
	Male	76 (64,4)	3 (2,5)		
	Total	118 (100)	4 (3,4)	-	-
Bordering	Female	119 (44,4)	3 (1,1)	>0,05	2,78 (0,79-9,58)
	Male	149 (55,6)	10 (3,7)		
	Total	268 (100)	13 (4,9)	-	-

Legend: n: number; OR: odds ratio; CI: confidence interval

The analysis of the variable sex, demonstrates that in the indigenous proportion between men and women was 1:8, in bordering was 1:3. Although, there is no statistical association between positivity and sex, was identified in both groups, a larger number of males with a history of infection with HEV (Table 2).

Discussion

About native populations, this is the first study that brings a comparative among indigenous and bordering on Brazil. Both groups have similar socioeconomic profile, depicting difficulties related to the precariousness of public policy actions, including the lack of access to essential public services such as education and health, making them susceptible to various infections, including the HEV[23,24].

In indigenous people, the first study showing evidence of the presence of the HEV was carried out in 1997, in the Amazon. From reports of an outbreak of acute infection with clinical signs of infection by hepatitis viruses and 82 samples were tested, of which 11% (9/82) were Anti-HEV IgG reagents[25]. In this study the prevalence of HEV was 3.4% (4/118) in indigenous populations.

In the riparian populations, whose rate was 4.9% (13/268), there are no studies with this population, in specific. However, some research has been carried out in the Amazon region and showed positivity similar to this study, varying between 1% and 4%[11,25–28]. One of these surveys, a research carried out in the State of Acre, in 2001, location very close to the locus of this study, the prevalence of Anti-HEV IgG was also 4%.

The presence of Anti-HEV IgG antibodies do not necessarily show the prevalence of the disease, mainly in areas of low endemicity, as in the Amazon region[29]. A general concern about seroprevalence studies of HEV is the performance of diagnostic tests, that demonstrate levels of sensitivity and specificity of 100%, far more than usually occurs to available tests for hepatitis, other and may compromise the determination of virus seroprevalence[30].

In the present study was conducted recomWell HEV IgG serologic test manufacturer MIKROGEN ® Diagnostik reference in development of kits, and used in seroprevalence studies[31,32]with diagnostic sensitivity and specificity of 98.9% and 97.1%. The detection of Anti-HEV IgG samples in this study, obtained in a locale without basic sanitation, suggests the movement of HEV in the native population of the State of Rondônia, in the Western Amazon.

About the profile of natives infected, in General, the positivity of HEV tends to increase with age due to exposure factor [20,24,26,31,33,34]. Following this trend, among adults, the prevalence in this study was greater between 31 to 40 years of age in indigenous and 50 and 60 years in Riverside.

The proportion of positivity among men in relation to persons of the female gender was demonstrated in this study, as well as other research conducted in Brazil, both in the Amazon[10,11,25,26,35], as in other regions[12–20,36]Brazil. A total of 1,115 subjects were tested including 146 patients with acute Non-A Non-B Non-C (NANBNC.

Conclusions

In conclusion, the detection of anti-HEVIgG antibodies in the native population suggests virus circulation in the region, contributing even more to the description from Amazon as endemic to the HEV. On the evidence, it is necessary to expand the study, including inhabitants in the urban region, which also live without basic sanitation and were not included in this study.

It should be noted that studies to identify specific risk factors, developed on the native population and the general population of the region are important to understand the epidemiological chain of HEV within this tropical Amazonian environment.

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