

The seroprevalence of hepatitis B and C in an Amerindian population in the southwestern Brazilian Amazon

Soroprevalência da hepatite B e C em uma população indígena da Amazônia Sul-Occidental Brasileira

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Abstract We have investigated the seroprevalence of hepatitis B and C among Karitiana Indians ($n = 119$) living in the State of Rondônia, southwestern Brazilian Amazon. The prevalences of anti-HBs and anti-HBc were 16.1% and 35.3%, respectively, with HBsAg being found in only four (3.4%) subjects. Anti-HCV antibodies were detected in two subjects (1.7%). Age-stratified prevalence data suggest that both vertical and horizontal (the last among adults) routes of HBV transmission are important in this community.

Key-words: Hepatitis B and C. Epidemiology. Amazonian Indians.

Resumo A soroprevalência de hepatite B e C foi investigada na comunidade indígena Karitiana ($n = 119$), que habita o Estado de Rondônia, Amazônia Occidental Brasileira. A prevalência de anticorpos anti-HBs e anti-HBc foi respectivamente de 16,1% e 35,3%, sendo detectado HBsAg em somente quatro (3,4%) indivíduos. Anticorpos anti-HCV foram encontrados em dois (1,7%) indivíduos. Os dados estratificados por idade sugerem que tanto as vias de transmissão vertical como horizontal (esta entre adultos) são importantes nesta comunidade.

Palavras-chaves: Hepatite B e C. Epidemiologia. Índios amazônicos.

Several recent surveys have disclosed high seroprevalences of hepatitis B virus (HBV) and hepatitis delta virus (HDV) infection in both urban and rural communities within the Brazilian Amazon^{5,9}, especially in the western part of this vast region^{4,12,15}. Few of these studies have simultaneously assessed the prevalence of hepatitis C virus (HCV), but the available data indicate that HCV infection remains relatively uncommon in this area¹⁷.

Native Amerindians of diverse ethnic groups are among the populations with the highest prevalence of HBV infection in the Amazon^{3,6,7,13,14,15,16,17,18}. Among them,

positivity rates of hepatitis B surface antigen (HBsAg) may exceed 10%^{3,6,7,13,14,15,16,17}. These findings have been explained by either the relatively low level of genetic variability in Amerindian populations, leading to universally increased predisposition to certain infections¹⁵, or the occurrence of alternative routes of horizontal HBV transmission, involving blood-sucking mechanical vectors³ and cultural practices such as skin scarification and tattooing⁷. There is, however, substantial regional and sometimes small-area variation in the prevalence of viral hepatitis across the Brazilian Amazon¹⁵. For instance, Amerindians who belong to the same

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linguistic group, share the same cultural practices and live in nearby villages may present quite different prevalence rates of HBV markers¹⁷. The differential prevalences of HBV infection in communities exposed to varying environmental conditions and cultural practices may provide insights into the relative importance of these factors in horizontal HBV transmission in highly endemic areas such as the Amazon Basin. Thus, the present communication describes the prevalence of HBV and HCV infection among Karitiana Indians living in the southwestern Brazilian Amazon.

The Karitiana Indian Reservation occupies an area of 89,862 hectares covered with rain forest (64°15'W, 9°30'S) situated 90km southwest of Porto Velho, the capital of the State of Rondônia, in the southwestern Brazilian Amazon. The Karitiana Indians are members of the Tupi-Arikén linguistic family who have been living in the same area since the early 1960s. At the time of the field survey, 152 people were present in the reservation, all of them inhabiting the same village situated on the banks of the Sapoti stream. As part of an extensive morbidity investigation, a cross-sectional seroepidemiologic survey was performed in this village in September 1994^{10 11}. A health questionnaire was completed for all 152 inhabitants (72 males and 80 females). The ages of all children and most adults were calculated from the date of birth as recorded in official documents (birth certificates or identification

cards), but for some older people only self-reported ages were available.

After informed consent of donors, their parents or guardians, venous blood samples were collected from 138 people for plasma separation. Children below one year of age (n = 4) and people who refused or were unable to participate (n = 10) were excluded from blood collection, and 19 people were excluded from HBV and HCV marker testing because of the low available sample volumes. The study population (n = 119) consisted of 55 males and 64 females aged 1-76 years (mean, 18.0 ± 7.8 [SD] years), who corresponded to 78% of the total population. Plasma samples were stored at -20°C until tested. They were screened for HBV markers (HBsAg and antibodies to HBV surface antigen [anti-HBs] and core antigen [anti-HBc]) by radioimmunoassay, for anti-HCV antibodies by second-generation enzyme immunoassay (ELISA-II) and for anti-human immunodeficiency virus (HIV) by enzyme immunoassay using commercially available kits (Abbott/Dainabot Laboratories, Tokyo, Japan). Prevalence rates are presented with 95% confidence intervals and compared with 2 tests. Significance was defined at the 5% level.

Table 1 presents the age-stratified prevalence rates of HBV markers in the population under study. The overall prevalence rates of anti-HBs and anti-HBc antibodies were 16.1% (95% confidence interval: 10.2-24.3%) and 35.3%

Table 1 - Prevalence of hepatitis B virus (HBV) infection markers in Karitiana Amerindians according to age.

Age (years)	Total population ^a	N ^o examined ^b	HbsAg		anti-HBs		anti-HBc		At least one HBV marker	
			n	%	n	%	n	%	n	%
< 1	4	0	-	-	-	-	-	-	-	-
1-6	41	32	0	0	9	28.1	2	6.2	10	31.2
7-15	42	37	2	5.4	6	16.2	10	27.0	14	37.8
16-29	38	33	1	3.0	3	9.1	12	36.4	13	39.4
30	27	18	1	5.5	1	5.9 ^c	18	100.0	18	100.0
Total	152	119	4	3.4	19	16.1	42	35.3	55	46.2

^a 72 males and 80 females; ^b 55 males and 64 females and ^c one subject not tested for anti-HBs in this age group.

(26.9-44.6%), respectively. HBsAg was detected in only four subjects [3.4% (1.1-8.9%)], and at least one HBV marker was found in 46.2% (37.1-55.6%) of the subjects. A previous study detected lower prevalence rates of anti-HBs antibodies (5%, 5/98) and HBsAg (0/98) in this community, but age-stratified rates were not

given¹⁵. The prevalence of HBV markers was higher in females [53.1% (40.3-65.5%)] than in males [38.2% (25.7-52.3%)], but this difference was not statistically significant (age-stratified Mantel-Haenzel $\chi^2 = 2.32$, 1 d. f., $p = 0.128$). Anti-HCV antibodies, that had not been previously investigated in this community¹⁵, were found in

only two individuals [1.7% (0.3-6.5%)]. These cases were not further investigated by confirmatory polymerase chain reaction since adequate sample volumes for viral RNA extraction were not available. Plasma samples were not tested for anti-HDV antibodies. All samples were negative for anti-HIV antibodies.

The prevalence of HBV markers was already high (> 30%) in the youngest age group (1-6 years), remained relatively unchanged (< 40%) until the age of 29 years, and then sharply increased to 100% (Table 1). This indicates that a considerable proportion of HBV infections among the Karitiana is acquired in early childhood, probably as a result of vertical transmission. Most of the remaining infections seem to be contracted after subjects start sexual activity. These findings contrast with both the slow but constant age-related increase in HBV prevalence found in an urban population of low endemicity in the northwestern Brazilian Amazon², and with the sharp increase in HBV prevalence throughout childhood found among the Txucarramãe living in the highly endemic Xingu Park, Central Brazil³. Within this context, the Karitiana provide an interesting example of an Amerindian population with limited genetic variability¹ but without high-risk practices potentially leading to HBV infection, such as skin scarification, body piercing and tattooing.

Three HBsAg carriers belong to the same nuclear family. The 39-year-old father and two

children (a male aged 14 years and a female aged 11 years) were also anti-HBc positive. Their mother was negative for all HBV markers, challenging the hypothesis of vertical transmission in this case. The other HBsAg carrier was a 29-year-old female, anti-HBc negative. She has five children (age range: 3-14 years), all of them negative for HBV markers. Similar patterns of familial aggregation of HBV infection have been found in other endemic areas⁸.

Table 2 presents the HBV marker status of mothers of children aged 1-10 years who were positive for at least one HBV marker. Note that these 11 children are clustered into six nuclear families and that all mothers had anti-HBc antibodies but no other HBV infection marker. These findings are compatible with past HBV infection, but also with either low titers of anti-HBs or HBsAg or a false-positive test for anti-HBc antibodies. The mothers of seven other positive children in this age group could not be identified or were not tested for HBV markers.

In conclusion, the overall seroprevalence of HBV among the Karitiana is lower than those commonly reported for Amerindian communities, but still higher than those found in most urban communities in the Amazon. Both vertical and sexual routes of HBV transmission seem to be important in this community, and age-stratified prevalence data do not suggest the frequent occurrence of alternative routes of horizontal transmission among children.

Table 2 - HBV status of mothers of children aged 1-10 years who were positive for at least one HBV marker.

Mother				Child				
Age (years)	HbsAg	anti-HBs	anti-HBc	Age (years)	Sex	HbsAg	anti-HBs	anti-HBc
40	-	-	+	2	M	-	+	-
As above				6	M	-	+	-
As above				10	F	-	+	-
29	-	-	+	4	M	-	+	-
As above				5	F	-	+	-
27	-	-	+	5	F	-	+	-
As above				7	F	-	+	+
30	-	-	+	5	F	-	+	-
As above				8	F	-	+	-
37	-	-	+	9	M	-	+	-
19	-	-	+	5	F	-	+	-

M = male and F = female.

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