

SEROEPIDEMIOLOGY OF HEPATITIS A AND B IN TWO URBAN COMMUNITIES OF RIO DE JANEIRO, BRAZIL

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SUMMARY

Hepatitis B markers were determined in 397 individuals from Niterói and 680 from Nova Iguaçu and prevalences of 9.1% (1.0% of HBsAg and 8.1% of anti-HBs) and 11.1% (1.8% of HBsAg and 9.3% of anti-HBs) were found, respectively.

The comparative prevalence of both markers in relation to age showed a higher prevalence of HBsAg in the group 21-50 years old. Considering the anti-HBs antibody, it was demonstrated a gradual increase with age, reaching 14.9% in Niterói and 29.1% in Nova Iguaçu in individuals over 51 years old.

For hepatitis A, in 259 samples from Niterói, equally distributed by age groups, an overall prevalence of 74.5% of anti-HAV antibodies was found. This prevalence increases gradually reaching 90.0% at age over thirty. In 254 samples from Nova Iguaçu analysed, a prevalence of 90.5% of antibodies was encountered when the same criteria of distribution of samples were used. This level of prevalence reached 90.0% already in the age over ten years old.

The tests were performed by enzyme immunoassay with reagents prepared in our laboratory.

KEY WORDS: Seroepidemiology HBsAg anti-HBs anti-HAV.

I N T R O D U C T I O N

Epidemiological studies on hepatitis A and B carried out in several parts of the world have shown a wide variation in their occurrence^{8,9,10}.

In developed countries, hepatitis A is shifting from infecting in early childhood, very common in developing countries, to infecting older age groups, in consequence of the improvement in socioeconomic and hygienic conditions³.

Hepatitis B presents epidemiological features which differ from hepatitis A, on account of several important factors such as the diversity of ethnic and social groups, occupa-

tion and living conditions that influence the dissemination of HBV^{8,11}.

Evidence of the circulation of both hepatitis viruses in a population could be achieved by the detection of antibody against hepatitis A virus (HAV) which is a specific marker of past HAV infection and antibody to hepatitis B surface antigen (anti-HBs) indicating past HBV infection as well as HBsAg indicating a carrier of HBV.

With the development of sensitive and specific serological assays for the detection of viral hepatitis markers in our laboratories, it became possible to assess the occurrence and

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distribution of these viruses in local population.

In this report we present the results of a seroepidemiological survey of hepatitis A and B in serum samples, representative of the populations of two communities of Rio de Janeiro, Brazil.

MATERIAL AND METHODS

Subjects: During May and June 1986, blood specimens were obtained from individuals in two widely separated suburbs of Rio de Janeiro, Niterói and Nova Iguaçu. The samples were collected in two sections of each suburb, home by home applying a randomized method from maps of the area.

For hepatitis B, a total of 397 samples were obtained from Niterói. Of these samples 140 were collected from people less than 20 years old, 170 from people between 21 and 50 years of age and 87 from people 51 years and over. From Nova Iguaçu, of 680 samples, 229 were from people less than 20 years old, 331 from people 21 — 50 years old and 120 from people 51 years and over.

For Hepatitis A, 259 serum samples from Niterói and 254 from Nova Iguaçu were equally distributed in the different age groups: 33 samples were from children 0-5 years old, and 60 samples from each age group 6-10, 11-15, 16-20, 21-30, 31-40, 41-50, 51-60 and from a group of individuals over 61 years of age.

Determination of HBsAg — Microplates coated with IgG anti-HBs and specific affinity chromatographed anti-HBs conjugated with horseradish peroxidase (HRP), were used in the direct immunoenzymatic method, according to CAMARGO et al.².

Determination of anti-HBs — Competitive and direct enzyme immunoassays were tested for anti-HBs antibody. For competitive assay, 50 ul of serum were neutralized with 50 ul of a mixture of purified antigen subtype adw₂ and ayw₃ (final O.D. at 280 nm = 1.3 diluted to 1/1500), for 18 hours at room temperature. The test was completed as for HBsAg, and the total absence of colour, read by visual inspection, was considered a positive result. In the direct method, 100 ul of each serum sam-

ple were added to a microplate well previously coated with purified HBsAg. After an incubation period, HBsAg conjugated to HRP was added to the system. In the presence of anti-HBs in the serum sample the complex HBsAg (capture) — anti-HBs (sample) — HBsAg/HRP will form and an orange colour will develop by the addition of the substrate Ortho Phenilenediamine (OPD). A sample was considered positive when the optical density at 492 nm was greater than the cut-off (negative control mean x 2.1).

Determination of anti-HAV — Competitive enzyme immunoassay was used to detect the presence of anti-HAV IgG. Briefly, the microplate was coated with anti-HAV antibody obtained from high titered convalescent human serum by precipitation and ion exchange chromatography. 50 ul serum samples diluted 1:30 and 50 ul of HAV antigen obtained from the supernatant of an infected FRhk-4 (fetal Rhesus kidney) cell culture, were incubated together in the plate for 2 hs/37°C. In the next step, anti-HAV antibody conjugated to HRP was added to the microplate and the substrate (OPD) was added to the system. In the competitive assay, the inhibition of anti-HAV in the serum test due to the presence of HAV, prevent the formation of the complex anti-HAV-HAV-anti-HAV and the absence of colour means a positive result. The absence of anti-HAV in the serum test will permit the formation of the complex which in the presence of substrate, develop a pale orange colour. The results were read by spectrophotometry at 492 nm and the cut-off was calculated by the ratio (Negative control mean + Positive control mean)/2. Values less than the cut-off were considered as a positive result and values greater than the cut-off as a negative result.

Statistical method — The chi-square test was used to compare the prevalence of hepatitis markers in both groups studied ($\alpha = 0.05$).

RESULTS

In Niterói, 8.1% of the sera had antibodies to HBsAg and 1% carried HBsAg. These figures are essentially the same as those in Nova Iguaçu where 9.3% of the sera had antibodies and 1.7% carried HBsAg. These results are shown in Table I.

T A B L E I
Hepatitis B markers in two communities of Rio de Janeiro

	Total	HBsAg (%)	anti-HBs (%)	Both markers (%)
Niterói	397	4/397(1.0)	32/397(8.1)	36/397(9.1)
Nova Iguaçu	680	12/680(1.7)	63/680(9.3)	75/680(11.0)
	1077	16/1077(1.5)	95/1077(8.8)	111/1077(10.3)

The comparative prevalence of HBsAg and anti-HBs in these two urban communities showed that from 16 samples positive for HBsAg, 4 were from Niterói and 12 from Nova Iguaçu. The distribution of this antigen by age groups (Table II) showed a higher prevalence in the

group 21-50 years old. The prevalence of people with antibody to HBsAg gradually increased with age, reaching 14.9% in Niterói and 29.1% in Nova Iguaçu in individuals over 51 years old.

T A B L E II
Comparative prevalence of HBsAg and anti-HBs in two urban communities of Rio de Janeiro, in relation to age

	Niterói			Nova Iguaçu		
	N	HBsAg(%)	anti-HBs(%)	N	HBsAg(%)	anti-HBs(%)
0 — 20	140	1(0.7)	2(1.4)	229	1(0.4)	10(4.3)
21 — 50	170	2(1.2)	17(10.0)	331	10(3.0)	18(5.4)
> 51	87	1(1.1)	13(14.9)	120	1(0.8)	35(29.1)

In Niterói, the cumulative frequency of HBsAg (Figure 1) in relation to age varied from 0.25% in the early infancy to 1% in the old age. Antibody to HBsAg was not detected in sera of children under the age of 10 years

and only two had antibody in those between 10 and 20 years, a frequency of 0.5%. This rate increased to reach 8.1% in the older age groups.

NITERÓI

NOVA IGUAÇU

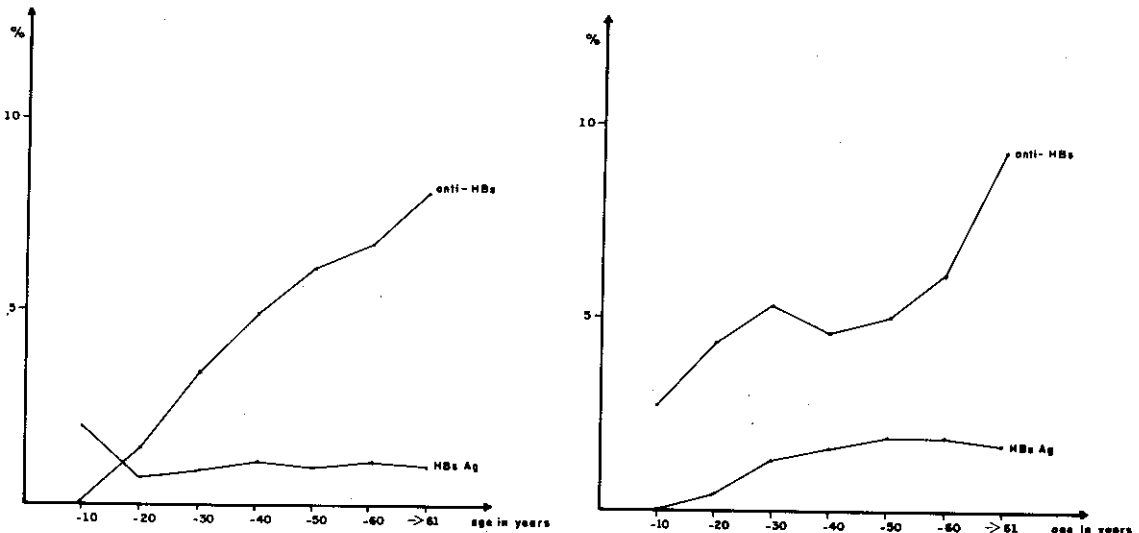


Fig. 1 — Cumulative frequency of HBsAg and anti-HBs in Niterói and Nova Iguaçu.

In Nova Iguaçu the cumulative frequency of HBsAg starts with 0.1% at 20 years, reaching the maximum 1.7% by 50 years of age. The cumulative frequency of anti-HBs was 0.3% in children up to 10 years gradually increasing to 9.2% in older adults.

A prevalence of 74.5% of antibody to HAV was found in Niterói and 90.5% in Nova Iguaçu. In children under 5 years old (Figure 2) the prevalence was more than twice as high (71.4%) in Nova Iguaçu as compared with the same age group of Niterói (31.5%). Anti-HAV antibodies had already been acquired by 90.0% of young person by the age of eleven in Nova Iguaçu, while in Niterói this percentage was not reached until the age of 31 years or older.

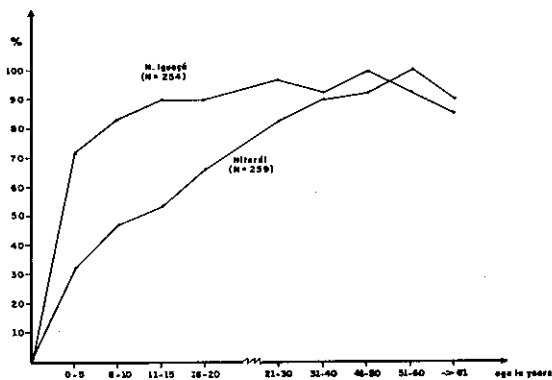


Fig. 2 — Prevalence of anti-HAV antibodies in Niterói and Nova Iguaçu.

DISCUSSION

The preparation and standardization of reagents for the determination of serological markers of hepatitis A and B in our own laboratory has facilitated epidemiological studies in several regions of Brazil as such studies have been hampered in the past by the high cost of imported reagents used for diagnostic purpose^{7,11,12,13}.

In relation to hepatitis B, the prevalence of HBsAg carriers found among blood donors in Rio de Janeiro has been around 1.5%, the same prevalence encountered in earlier studies^{12,13}.

The distribution of HBsAg and anti-HBs related to age has shown a similar profile to that described for non-endemic regions⁸: the

highest HBsAg prevalence is found in young adults (20-40 years old) and the antibody prevalence increases with advancing age reaching its peak among older people. However, in groups at increased risk for example institutionalized mentally retarded children, or those living in precarious sanitary conditions there is a greater dissemination of the virus while in children under 12 not belonging to these groups the appearance of HBsAg is uncommon⁴. In endemic areas for HBV, as in Northern Brazil, the spread of HB virus occurs early in infancy and a prevalence of 12.1% of HBsAg in children under 14 years old was demonstrated in Lábrea, Amazon¹.

Our results showed generally a low prevalence of both HBsAg and anti-HBs in children, with a gradual increase with age to a peak of HBsAg in the age range 21-50 years and a high prevalence of anti-HBs in those over 51 years old (Table II).

Hepatitis A has a fecal-oral transmission and the dissemination occurs easily in poor hygienic conditions spreading preferentially among children. In a survey carried out on children living in slums in Rio de Janeiro, we found that over 90% of children had antibody to HAV by the age of 4 years. In our results, the prevalence found in Nova Iguaçu was twice as great as in Niterói in children under 5 years old (71.4% and 31.5% respectively), levels which correlated with the sanitary conditions of the area.

In São Paulo, different prevalences were also found to be related to different socioeconomic groups with 40.0% of children between 2-11 year of age with antibodies in middle social class compared with 75.0% in lower social class⁵. In adult populations available data of blood donors demonstrated a prevalence greater than 90.0% while in groups with a higher standard of living as university graduates, a lower prevalence of 65.0% was observed^{12,7}.

Our results indicate that hepatitis A remains endemic in our population and any difference found in adjacent areas of the same region probably reflect the different sanitary conditions in which different classes of the population live.

SUMARIO

Seroepidemiologia de Hepatite A e B em duas comunidades urbanas do Rio de Janeiro, Brasil

Foi determinada a prevalência de marcadores de hepatite B em amostras representativas de duas comunidades, Niterói (397) e Nova Iguaçu (680), encontrando-se 9,1% (1,0% de HBsAg e 8,1% de anti-HBs) em Niterói e 11% (1,7% de HBsAg e 9,3% de anti-HBs) em Nova Iguaçu.

Por estudo comparativo em relação à idade, foi verificada maior prevalência de HBsAg no grupo etário de 21 a 50 anos. Em relação a anti-HBs, foi demonstrado um aumento gradual com a idade, alcançando 14,9% em Niterói e 29,1% em Nova Iguaçu nos grupos de indivíduos acima de 51 anos de idade.

Em relação a Hepatite A, em 259 amostras de Niterói, foi encontrada a prevalência de 74,5% de anticorpos anti-HAV. Esta prevalência aumentou gradualmente, alcançando 90% a partir de 30 anos. Em 254 amostras de Nova Iguaçu, a prevalência foi de 90,5%. Estes valores já são alcançados em crianças a partir de 10 anos.

Todós os testes foram feitos em sistema imunoenzimático padronizado em nosso laboratório.

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