

Seroepidemiological Differences Between Hepatitis B Virus Infection in Urban Areas and the Amerindian Population in Venezuela

IRMA V. MACHADO, JOSEFINA CARVAJAL, ALEJANDRO MONDOLFI, NORKA MARCANO, LUIS YARZABAL, AND NICOLAS E. BIANCO

Clinical Immunology National Center, Venezuelan Health Ministry, Central University of Venezuela, and WHO/PAHO Collaborative Center (CECOIC) (I.V.M., J.C., N.M., N.E.B.), Tropical Medicine Institute, Central University of Venezuela (A.M.), Caracas, and Amazonian Center for the Investigation and Control of Tropical Diseases (CAICET) and Venezuelan Health Ministry, Territorio Federal Amazonas (L.Y.), Venezuela

INTRODUCTION

Viral hepatitis caused by the B virus (HBV) is considered to be a serious health problem in many Latin American countries (PAHO report, 1985). Differences in the prevalence of HBV worldwide according to geographic area have been reported, and this is probably related to sociocultural habits, income, and sanitation (McCullum and Zuckerman, 1981; PAHO report, 1985). The presence of delta virus has also been documented among Latin American Indian communities with a high endemicity of HBV infection (PAHO report, 1985). In Venezuela, there is a low prevalence of HBsAg among blood-donor volunteers (Mazzur et al., 1980). However, a moderate rate of exposure to hepatitis B virus is shown by the presence of HBV serological markers (HBsAg, anti-HBs, and anti-core antibodies) in low-risk healthy people (Machado et al., 1985).

Following a seroepidemiological protocol, we have surveyed prospectively various Venezuelan communities considered to be at different risk levels of contracting HBV infection. The survey, which included both urban and Indian communities, was designed further to characterize the epidemiological patterns of HBV transmission in Venezuelan people of different sociocultural and economic classes.

MATERIALS AND METHODS

Seven hundred fifty serum samples were examined for HBV serum markers as follows:

Urban Low-Risk Population

Two hundred and two samples were from a poor urban area; the mean age of the people tested, was 29 yr, with 49% in the second and third decades of life. The male: female ratio was 68:134. HBV markers included HBsAg, anti-HBs, and anti-core (IgG and IgM) antibodies. Alanine aminotransferase (ALT) levels were also determined for all samples.

Two hundred and forty-two pregnant women from a middle economic class, with a mean age of 30 yr, were examined in the third trimester of pregnancy. All were

tested for the presence of HBsAg, anti-HBs, and total anti-core antibodies. Those samples positive for HBsAg were further examined for HBeAg.

Urban High-Risk Population

One hundred three male homosexuals were randomly selected for evaluation for the presence of HBsAg, anti-HBs, and anti-core antibodies. The detection of IgM-anti-core antibodies and HBeAg was only attempted in selected cases.

Thirty-eight serum samples were obtained at random from a group of prostitutes and similarly examined for HBsAg, anti-HBs, and anti-core antibodies.

Amerindian Population

One hundred and forty-five serum samples from the Territorio Federal Amazonas in the south of Venezuela were studied as follows:

Sixty-three subjects were from the Yanomami ethnic group, 34 male and 29 female, with a mean age of 19 yr. Sera were examined for the presence of HBsAg, anti-HBs, anti-core, and anti-delta antibodies. Pathologically, 27% of the group examined presented with jaundice, 85% with liver and spleen enlargement, and all possessed antimalaria antibodies.

Eighty-two individuals were from the Piaroa and Curripaco ethnic group. The mean age of this group was 19 yr, and sera were studied for the presence of HBsAg only. Forty-five out of the 82 subjects presented with *Onchocerca volvulus* infection.

Methods

Enzyme immunoassay (EIA) was used for the detection of HBsAg (using monoclonal antibodies), anti-HBs, total or IgM-anti-core antibodies, and HBeAg (Abbott Laboratories, Diagnostic Division, Caracas). The anti-delta antibodies of both IgG and IgM subclasses were detected by radioimmunoassay (RIA, Abbott anti-delta). All samples were kept frozen at -20°C until used.

RESULTS

The results are expressed as a percentage of positive samples.

TABLE I. Prevalence of HBV Serologic Markers in Venezuelan Urban Population

	HBsAg	Anti-HBs	Total anti-core
Lower-class suburb (202) ^a	6	25	4
Low risk (444)			
Pregnant women (242)	2 ^b	8	9
Male homosexuals (103)	12	45	55
High risk (141)			
Prostitutes (38)	11	11	29

^aNo. in parentheses = total No. of tested samples.

^bThe positive HBsAg samples (6) were negative for HBeAg.

TABLE II. Prevalence of HBV and HDV Serologic Markers in Venezuelan Amerindians (Yanomami Ethnic Group)

HBV markers	% positive samples
HBsAg	33
Anti-HBs	38
IgG + IgM anti-core	89
IgG + IgM anti-HDV	30

Urban Population

All the population groups studied demonstrated the presence of HBV markers (Table I). The low-risk group from the poorer urban areas was dominated by the presence of anti-HBs antibody, but this was not correlated with anti-core antibodies. Anti-HBs antibody was present in various family members tested simultaneously. ALT levels greater than the normal value (>37 IU) were found in 23% of sera, but there was no correlation with HBV markers. However, ALT levels with a mean of 59 IU \pm 13 SD were found in 11 anti-HBs positive samples obtained from healthy people with a mean age of 20.

The group of pregnant women contained ten positive HBsAg samples (4%) at the beginning of the study. However, a second determination of HBsAg only confirmed the positive results in six women (2.4%) with HBeAg being absent (Table I).

Finally, the highest rate of HBV markers was found in male homosexuals and prostitutes. Three out of 15 homosexuals were HBeAg positive, and 3 out of 21 were IgM-anti-core positive, indicating recent HBV contact rather than reactivation of liver disease. This was further demonstrated by the absence of pathology on follow-up.

Amerindian Population

Ninety percent of the 63 Yanomami serum samples showed the presence or at least one HBV serological marker (Table II). HBV markers as well as anti-delta antibodies were present at similar percentages over different age ranges (Table III). Total anti-delta antibodies were also tested in 20 HBsAg-positive sera collected during a hepatitis outbreak which occurred in the same community in 1975; 8 out of 20 sera were positive for the anti-delta antibodies.

The Amerindian group B were only tested for HBsAg. Fourteen of 82 sera were found to be positive (17%).

TABLE III. Yanomami Ethnic Group: Correlation of Positive Samples to Age Ranges

	Age	Age
Serological markers	4-14yr (29) ^a	>14 yr (31)
HBV markers	76%	100%
IgG + IgM anti-HDV	34%	29%

^aNo. in parentheses = No. of samples tested. Total number = 60.

DISCUSSION

A previous epidemiological survey in healthy Venezuelan people has suggested an increased rate of positive HBV contacts in marginal urban areas (Machado et al., 1983). In the present investigation, we found a larger number of people to have anti-HBs antibodies in a low-income urban population. Although this finding was not correlated with the presence of anti-core antibody, the possibility that these represent false-positive results appears unlikely. In fact, the anti-HBs positivity encountered was highly reactive and was present alone in 43 sera, 31 of which were derived from people in the second and third decades of life. High levels of anti-HBs antibody (>300 RIA units) have been reported among Venezuelan young adults (Machado et al., 1983). Therefore, this type of response may indicate anti-HBs antibody persistence some years after natural infection (Hoofnagle et al., 1978). The finding of a mild increase in ALT level in anti-HBs-positive samples rather than a direct correlation might be due to the increased frequency of the positive serological marker in the tested samples. No significant correlation was found between ALT levels and HBV markers in these samples. The study of the pregnant women belonging to a middle economic class showed a prevalence rate for HBsAg similar to that reported for volunteer blood donors in Venezuela (Mazzur et al., 1980). The absence of HBeAg in the HBsAg-positive samples indicates a decreased risk of transmission to the infants of these women (Beasley et al., 1977). A larger study of 840 Venezuelan women has shown similar results. This study also demonstrates the correlation between the presence of HBsAg and the different socioeconomic classes, showing the highest prevalence of HBsAg among the lower socioeconomic classes (Gallego et al., 1985). The early acquisition of anti-HBs antibody, plus the low prevalence both of HBsAg and HBeAg in mothers, raises the possibility that in Venezuelan low-risk populations maternal-infant transmission of HBV contributes less to the maintenance of the infection than casual exposure, sexual contact, or blood transfusion. Finally, the high-risk urban group was represented by male homosexuals and prostitutes.

In contrast to the findings in urban communities, we found that HBV infection is hyperendemic in the Venezuelan Amazonas region. Indigenous communities located to the west of the country have already been described as endemic for HBV infection, and outbreaks of fulminant hepatitis occur due to delta virus superinfection (Hadler et al., 1984). The presence of HBV serological markers have been reported in

some selected sera from Amazonian communities (Machado et al., 1985). We have now found that the Amerindian groups studied showed variable rates of HBV serum markers, ranging from 17% to 30% for HBsAg, representing up to a twofold prevalence compared to that encountered in the Venezuelan Yucpa Indians (PAHO report, 1985). The coexistence of perinatal plus horizontal transmission is suggested by the presence of positive markers in all age groups. Recent sera samples together with sera taken during 1975 showed the presence of anti-delta antibodies. As a number of infectious agents including HBV are highly endemic in these Amerindian populations, confirmatory tests for the presence of delta virus should be performed to avoid possible nonspecific results.

In conclusion, although horizontal HBV transmission appears to be predominant in Venezuelan urban populations, endemic perinatal and horizontal HBV as well as delta virus infections coexist among Venezuelan Amerindians.

SUMMARY

We surveyed prospectively for markers of hepatitis B different Venezuelan populations. Our results indicate that the inhabitants from low socioeconomic groups appear to have acquired anti-HBs antibody during the first and second decades of life with a 25% prevalence; no correlation was found between ALT levels and HBV markers. Pregnant women had a low prevalence of HBsAg (2%) with absence of HBeAg. The highest-risk urban population was represented by male homosexuals and prostitutes with 12% of samples HBsAg positive and 55% positive for anti-HBc antibodies. HBV is hyperendemic in Venezuelan Amerindian population. Approximately 90% of sera contained at least one HBV marker, and 30% were positive for anti-delta antibodies. Horizontal transmission appears to be important in Venezuelan urban areas, whereas evidence was obtained for the coexistence of perinatal plus horizontal transmission patterns among Venezuelan Amerindians.

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