

# HBV epidemiology in Latin America

Raymundo Paraná<sup>a,\*</sup>, Delvone Almeida<sup>b</sup>

<sup>a</sup>*Gastro-Hepatology Unit, University Hospital of Bahia, Federal University of Bahia, Brazil*

<sup>b</sup>*Medical Post-Graduate program – University of Bahia, Brazil*

## Abstract

In Latin America, despite the paucity of population studies, hepatitis B is considered endemic. The western Amazonia is a highly endemic area where hepatitis D is also prevalent. In this area, outbreaks of fulminant hepatitis due to HBV and HDV are frequently reported. Non-safe sexual activity seems to be the most important transmission route, but intrafamilial transmission, during early childhood, is extremely significant in Amazonia. The HBV genotype distribution is heterogeneous with a high prevalence of genotype F in the Amazonian region and genotype A in all other areas. In the region where Asian and Italian immigration occurred, genotypes B, C and D are also described.

© 2005 Elsevier B.V. All rights reserved.

**Keywords:** Hepatitis B virus; HBV epidemiology; Brazil; Latin America

## 1. Introduction

Approximately 350 million people worldwide are currently infected with the hepatitis B virus (HBV). More than 40% of these individuals will develop severe hepatic complications. Despite vaccination, selection in blood banks and awareness programmes for the control of sexually transmitted diseases, the existence of a large number of infected individuals worldwide calls for attention for the seriousness of the situation (Lee, 1997). Currently, Latin America – with low indexes of socio-economic development – has a high number of cases of hepatitis B infection (de Paula et al., 2001).

Hepatitis B is a disease of universal distribution. There is variability in infection rates (from 0.1% to 20%) according to different regions of the world (Shapiro, 1993). Thus, the world is divided into regions of high, intermediate and low endemicity (Fig. 1).

In regions of low HBV prevalence, the prevalence of chronic patients is lower than 2%. The risk of infection during a person's lifetime is 20%. Within these areas, particular ethnic groups are found with HBV infection rates higher than in the general population.

In areas with intermediate endemicity, the prevalence of chronic HBV carriers ranges from 2% to 7%. From 20% to 50% of the population presents serological evidence of previous exposure to HBV. The highest infection rates are in older children, adolescents and young adults.

In areas of high endemicity, the risk of infection by HBV is higher than 60% and most infections occur at birth or early in childhood. The children in these populations are at high risk of acquiring chronic infection before 5 years of age. In these areas, the prevalence of chronic patients ranges from 8% to 25% and the prevalence of anti-HBs is 60–85%.

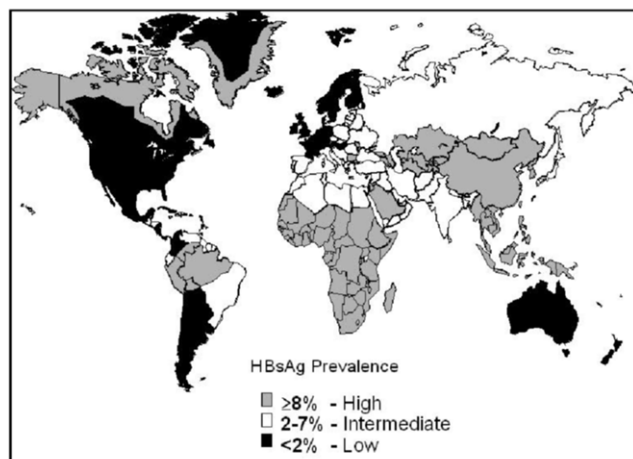


Fig. 1. Geographic distribution of chronic HBV infection (adapted from CDC).

## 2. Epidemiological studies

In Latin America (Table 1), there is a large variability in the serum prevalence of HBV (Mazzur et al., 1981). Regions of high endemicity are found in the Amazon basin

\* Corresponding author. Av. Juracy Magalhães Junior, 2096, Sala 510, 41920-000, Salvador, Bahia, Brazil.

E-mail address: unif@svn.com.br (R. Paraná).

Table 1  
Frequency of HBV markers in Latin America

Country	HBsAg (%)	Anti-HBs (%)
Argentina	0.8	14.7
Barbados	1.4	9.0
Brazil	2.1	26.7
Chile	0.4	3.8
Colombia	1.0	25.1
Costa Rica	0.6	17.3
Ecuador	2.0	29.4
Mexico	1.6	11.6
Puerto Rico	0.2	9.2
Dominican Republic	4.1	55.3
Suriname	2.3	28.1
Peru	2.2	20.2
Venezuela	2.8	11.6

and the northern region of Latin America, contrasting with areas of low prevalence found in south-eastern regions and regions with a temperate climate. A tendency of progressive increase in the seroprevalence of this virus is observed from the southern to the northern regions of South America (Fay, 1990).

Epidemiological studies performed in different parts of the world demonstrate that several population factors determine differences in the HBV distribution worldwide (Tavares-Neto et al., 2004; Kane, 1995). In Latin America, several socio-economic and cultural factors influence the variability of this distribution. On the one hand, the intense migratory flow of rural populations to large urban centres in search for better opportunities is certain to influence the dissemination of the disease. On the other hand, due to the lack of resources, we still find the continuation of risky sexual and medical practices despite educational campaigns from around the world since the discovery of the HIV virus. In addition to this, the colonization of this region by people with different serological inheritance leads to this variable distribution, and in some regions this is quite high (Leon et al., 1999).

Since the start of the HBV vaccination programmes in North American and European countries in 1985, a significant reduction in the disease's endemicity has been observed. Not all South American countries were able to implement national vaccination programmes. The vaccine is indicated for those who relocate to endemic regions, health professionals, serum-negative drug users, convicts, homosexuals, sex professionals, hospitalized psychiatric patients, and patients who require the frequent use of blood and its by-products. The World Health Organization (WHO) recommends that in populations with a chronic HBV prevalence above 2%, vaccination must be performed in early childhood (Chavez et al., 2003). For populations with a lower prevalence, the WHO recommendations

include the selection of pregnant women and the vaccination of newborns of infected mothers.

In Brazil, HBV vaccination is now guaranteed by the government. Indeed, since 1988, HBV vaccination programmes were implemented in highly endemic areas in western Amazonia. Fonseca (2002) reported the beneficial results of this vaccination programme in the Labrea region, where HBsAg prevalence decreased from 20% to 3.5% in 12 years. Viral hepatitis remains a subject to be explored in the tropical/equatorial South American areas because there are few studies of prevalence based on population. Several aspects in this area related to geographic region, socio-economic status, and racial and cultural differences, among others, lead to significant differences in the prevalence of these viruses.

Most epidemiological studies performed in Latin American countries have been based on the analysis of blood bank populations, which led to significant analytical distortions (Tanaka, 2000).

Between 1996 and 1997, a sero-epidemiological study was conducted in six Latin American countries: Argentina, Brazil, Chile, the Dominican Republic, Mexico and Venezuela (Silveira et al., 1999). This study included 1200 participants who presented a given antibody for the core of the HBV (anti-HBc). However, this study only included men and women between 1 and 40 years of age. The results of this study showed that the Dominican Republic had the highest antibody prevalence (21.4%), followed by Brazil (7.9%), Venezuela (3.2%), Argentina (2.1%), Mexico (1.4%) and Chile (0.6%). In this study, the highly endemic Amazon regions were not included.

The investigation of chronic HBV patients identified from HBsAg determination was performed in the Dominican Republic (1.9%), Argentina (0.2%) and Mexico (0.1%).

No differences in the seroprevalence between genders were verified, except for Brazil, where the prevalence in male individuals was higher, and for the Dominican Republic, where the prevalence in female individuals was higher.

Brazil was the only country with an association between high prevalence and low socio-economic levels.

All countries showed an increase in seroprevalence after the age of 16 years, suggesting sexual activity as a probable source of transmission. In the Dominican Republic and Brazil, the seroprevalence was high in childhood, suggesting vertical transmission as a potential means of transmission. Other potential transmission sources found were dental and surgical procedures, and tattooing.

When these data are compared with another study conducted in 13 Latin American countries almost two decades before (Mazzur et al., 1981), it is clear that, despite the difficult social and economic situation that prevails in most cities in this region, a large reduction in HBV prevalence was still observed (Table 2).

In a recent study conducted in the Amazon region of western Brazil, where HBV prevalence is high, significantly

Table 2  
Anti-HBc frequency in Latin America after two decades

Country	1980	1999
Argentina	9.4	2.1
Barbados	11.9	
Brazil	27.6	7.9
Chile	5.3	0.6
Colombia	18.1	
Costa Rica	16.7	
Ecuador	21.9	
Mexico	9.0	1.4
Porto Rico	10.1	
Dominican Republic	81.1	21.4
Suriname	37.9	
Peru	20.4	
Venezuela	15.5	3.2

more cases were found among relatives of infected mothers than among relatives of non-infected mothers. Among the transmission forms involved, the study verified the sharing of personal hygiene objects such as toothbrushes (Lobato et al., 2005). The study showed that HBV is easily transmitted by the interfamilial route. The children present HBV seroconversion after 1 year of age, suggesting that true vertical transmission is not the main contamination route.

In the Amazon region, epidemic outbreaks of fulminant hepatitis have occurred for more than half a century, particularly among indigenous populations. In 1984, US and Venezuelan researchers identified the hepatitis D virus as an HBV super-infection agent responsible for these outbreaks among chronic hepatitis patients (Echevarria and Leon, 2003). These cases in Brazil are known as Labrea fever, which was also described in the African Equatorial Forest (Andrade et al., 1992).

Indigenous populations not settled in this region presented a low prevalence of infection by hepatitis B and C viruses as demonstrated by Aguiar et al. (2002), who found anti-HBc in 2.2% of 312 individuals from an indigenous population in Campo Grande, in Mato Grosso do Sul, a central-west region of Brazil.

### 3. HBV genotype distribution in Latin America

The HBV genotypes are denominated with the letters A to H. Genotype H was described several years ago in Central America (Arauz et al., 2002). The study of three antigenic determinants, among which the determinant “a” of the viral surface proteins, allowed the definition of 9 subtypes that correspond to the geographic areas of virus repartition ayw1, ayw2, ayw3, ayw4, ayr, adw2, adw4, adr<sup>q</sup> and adr<sup>q</sup> (Table 3). The geographic distribution of the 8 genotypes and known viral subtypes varies worldwide (Courouce-Pauty et al., 1983).

Table 3  
Genotypes, subtypes and geographic distribution

Genotype/subtype	Geographic area of highest prevalence
A/adw2/ayw1	North and central Europe East and southern Africa
B/adw2/ayw1	Asia
C/adr/ayr/adw2	Asia French Polynesia
D/ayw2/ayw3	Mediterranean countries India
E/ayw3	West Africa
F/adw2/adw4/ayw4	South America French Polynesia

In Latin America, mainly in Amazonia, we predominantly found genotype F (Blitz et al., 1998), and subtypes adw4 and adw2. The genotypes A, B and D have already been described in Argentina (Telenta et al., 1997) and in southeastern/northeastern Brazil. The results of more recent studies using more sensitive techniques for the detection of HBV genotypes and subtypes have demonstrated great genetic variability in the geographic distribution of the virus (Silva et al., 2002; Araujo et al., 2004; Viana et al., 2005), and the presence of genotypes A and D in populations never suspected before.

In indigenous populations, the prevalence of genotype F is observed (Gaspar and Yoshida, 1987; Blitz et al., 1998; Viana et al., 2005). The presence of genotypes A and D suggests the influence of the African descent that occurred due to the slavery period, as well as the influence of European colonization, and the strong Italian immigration that occurred during the 20th century.

Currently, the great challenge for healthcare services in Latin America is to create surveillance and information systems, as well as to implement practices for endemics control already recommended by the respected international health agencies. By doing this, we will be able to reduce the indexes of infectious–contagious diseases and, therefore, hepatitis B, as well as providing a wider base of knowledge about the occurrence of these endemics in the population.

### Acknowledgements

Bahia State Foundation for research development (FAPESB). CAPES/COFECUB 404/02; Brazilian Agency for Research (CNPq) for financial support on viral hepatitis research.

### References

- Aguiar JI, Souza JA, Aguiar E, Oliveira J, Lemos E, Yoshida C. Low prevalence of hepatitis B and C markers in a non-amazonian indigenous population. *Braz J Infect Dis* 2002;6:269–70.
- Andrade ZA, Lesboredes JL, Ravisse P, Paraná R, Prata A, et al. Fulminant hepatitis with microvesicular steatosis (a histologic comparison of cases occurring in Brazil – Labrea Hepatitis – and in central Africa – Bangui hepatitis). *Rev Soc Bras Med Trop* 1992;25:155–60.

- Araujo NM, Mello FC, Yoshida CF, Niel C, Gomes SA. High proportion of subgroup A (genotype A) among Brazilian isolates of hepatitis B virus. *Arch Virol* 2004;149:1383–95.
- Arauz P, Norder H, Robertson BH, et al. Genotype H: a new Amerindian genotype of hepatitis B virus revealed in Central America. *J Gen Virol* 2002;83:2059–73.
- Blitz L, Pujol F, Swenson P, Porto L, Atencio R, Araújo M, et al. Antigenic diversity of hepatitis B virus strain of genotype F in Amerindians and other population groups from Venezuela. *J Clin Microbiol* 1998;36:648–51.
- Chavez JH, Campana SG, Haas P. An overview of hepatitis B in Brazil and in the state of Santa Catarina. *Rev Panam Salud Publica* 2003;14:91–6.
- Courouce-Pauty AM, Plancon A, Soulier JP. Distribution of HBsAg subtypes in the world. *Vox Sang* 1983;44:197–211.
- de Paula VS, Arruda ME, Vitral CL, Gaspar AM. Seroprevalence of viral hepatitis in riverine communities from the western region of the Brazilian Amazon Basin. *Mem Inst Oswaldo Cruz* 2001;96:1123–8.
- Echevarria JM, Leon P. Epidemiology of viruses causing chronic hepatitis among populations from the Amazon Basin and related ecosystems. *Cad Saude Publica* 2003;19:1583–91.
- Fay OH. Hepatitis B in Latin America: epidemiological patterns and eradication strategy. The Latin American regional Study Group. *Vaccine* 1990;8(Suppl):S100–6.
- Fonseca JC. HDV in Latin America. *Rev Soc Bras Med Trop* 2002;25:52–4.
- Gaspar AM, Yoshida CF. Geographic distribution of HBsAg subtypes in Brazil. *Mem Inst Oswaldo Cruz* 1987;82:253–8.
- Kane M. Global program for control of hepatitis B infection. *Vaccine* 1995;13:S47–9.
- Lee WM. Hepatitis B virus infection. *N Engl J Med* 1997;337:1733–45.
- Leon P, Venegas E, Bengoechea L, Rojas E, Lopez JA, Elola C, et al. Prevalence of infections by hepatitis B, C, D and E viruses in Bolivia. *Rev Panam Salud Publica* 1999;5:144–51.
- Lobato C, Tavares-Neto J, Rios-Leite M, et al. Intrafamilial prevalence of HBV in western Brazilian Amazon region: an epidemiologic and biomolecular study. *J Gastroenterol Hepatol* 2005, in press.
- Mazzur S, Bastiaans MJ, Nath N. Hepatitis B virus (HBV) infection among children and adults in the Solomon Islands. *Am J Epidemiol* 1981;113:510–19.
- Shapiro CN. Epidemiology of hepatitis B. *Pediatr Infect Dis J* 1993;12:433–7.
- Silva C de O, Azevedo M da S, Soares CM, Martins RM, Ramos CH, Daher RR, et al. Seroprevalence of hepatitis B virus infection in individuals with clinical evidence of hepatitis in Goiânia, Goiás. Detection of viral DNA and determination of subtypes. *Rev Inst Med Trop Sao Paulo* 2002;44:331–4.
- Silveira TR, da Fonseca JC, Rivera L, Fay OH, Tapia R, Santos JI, et al. Hepatitis B seroprevalence in Latin America. *Rev Panam Salud Publica* 1999;6:378–83.
- Tanaka J. Hepatitis B epidemiology in Latin America. *Vaccine* 2000;18(Suppl 1):S17–9.
- Tavares-Neto J, Almeida D, Soares MC, et al. Seroprevalence of hepatitis B and C in the Western Brazilian Amazon region (Rio Branco, Acre): a pilot study carried out during hepatitis B vaccination program. *Braz J Infect Dis* 2004;2:133–9.
- Telenta PF, Poggio GP, Lopez JL, Gonzalez J, Lemberg A, Campos RH. Increased prevalence of genotype F hepatitis B virus isolates in Buenos Aires, Argentina. *J Clin Microbiol* 1997;35:1873–5.
- Viana S, Paraná R, Moreira RC, Macedo V. High prevalence of hepatitis B virus in the Western Brazilian Amazon. *Am J Trop Med Hyg* 2005;73:808–14.