

Seroprevalence of hepatitis B and C virus markers among blood donors in Rio de Janeiro, Brazil, 1998-2005

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The prevalence of infection by hepatitis B (HBV) and C (HCV) viruses varies among geographical regions. In order to determine the prevalence of HBV and HCV infection in voluntary blood donors we evaluated the prevalence of HBsAg, anti-HBc, and anti-HCV markers of 128,497 blood donor samples collected from 1998 to 2005 in the state of Rio de Janeiro. These markers were analyzed by immunoenzymatic tests, as determined by the Ministry of Health. Data were obtained from the Sorology Laboratory of the Hemotherapy Service of the Instituto Nacional de Câncer, Rio de Janeiro. Overall prevalence estimates were: 0.27% for HBsAg, 3.68% for anti-HBc, and 0.90% for anti-HCV. There was a significant decrease in the overall prevalence of HBsAg (from 0.36 to 0.14%) and anti-HBc (from 6.12 to 2.05%) in the period encompassed between 1998-2005. Similarly, there was a decline in anti-HCV prevalence rates in Brazilian blood donors, from 1.04% in 1998 to 0.79% in 2004, with an increase of HCV prevalence to 1.09% in 2005. These prevalence estimates were higher than those found in other countries, indicating high rates of infection by HBV and HCV and a persistent risk of HBV and HCV transmission by transfusion.

Key words: hepatitis B virus - hepatitis C virus - blood donors - seroprevalence -Brazil

Infection by hepatitis B virus (HBV) and hepatitis C virus (HCV) is a worldwide public health problem, representing a significant cause of morbidity and mortality, especially in developing countries. It is estimated that 350 million people worldwide are chronic HBV carriers, representing approximately 7% of the total population (Kao et al. 2002) while HCV infection is found in approximately 3% of the world population, accounting for 160 million people (Frider 2000, Zou et al. 2000). Their transmission occurs, mainly, through direct contact with blood, intravenous injections, transfusion of blood and/or hemo-components, and sexual relations, this last, mainly in HBV carriers (Wright et al. 1994). In HCV carriers the sexual transmission is controversial (Tahan et al. 2005). Chronic HBV infection is prevalent in Southeast Asia, China, and Africa, where over 10% of the population may be infected (Purow & Jacobson 2003). In these countries, vertical transmission is important (Custer et al. 2004). In Western Europe and North America, the hepatitis B affects less than 1% of the population, although more than 1 million people in the United States are chronically infected (Purow & Jacobson 2003). In Brazil, prevalence of HBV is variable, increasing from South to North. Previous studies detected low infection rate in Southern Brazil, middle rate in Northeast and Southeast, and high prevalence in the Amazon

region, state of Espírito Santo, and in west of the state of Santa Catarina (Ministério da Saúde - MS 2004).

Over many years, hepatitis was the main cause of transfusion-associated chronic disease, liver cirrhosis, hepatocellular carcinoma, and death (Chattopadhyay et al. 2005). Since 1993, the screening of blood donors for HBV and HCV infection became obligatory in Brazil as part of the HIV control program, leading to a tighter control of blood samples used in transfusion (Gonçales Junior 1998). In Brazil, the official immunization schedule includes the HBV vaccine, only for newborns, children and young adults less than 19 years, although the vaccine is available in the government health program (Sistema Único de Saúde - SUS, MS) for populations at risk of HBV infection. In Brazil, however, few studies have been carried out on the prevalence of HBV and HCV markers in blood donors. These showed a wide variation of HBV and HCV markers prevalence in Brazilian territory; in the Amazon region, a recent prevalence estimate accounted for 3.3% of HBsAg, 49.9% of anti-HBc (Braga et al. 2005), and 5.9% of anti-HCV (Da Fonseca & Brasil 2004). Arraes et al. (2003) found an anti-HBc prevalence of 12% in Recife, while Almeida Neto et al. (2001) found 16% in São Paulo. Rosini et al. (2003) collected data from the state of Santa Catarina and found a prevalence of 0.64% to HBsAg, 5.35% of anti-HBc and 0.34% of anti-HCV.

Our objective was to determine the prevalence of HBV and HCV infection in voluntary blood donors using hepatitis B surface antigen (HBsAg), hepatitis B core antigen (anti-HBc), and hepatitis C antibody (anti-HCV) serological assays. This report presents the results of a retrospective study of screening blood donors in the state of Rio de Janeiro, Brazil from 1998 to 2005.

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MATERIALS AND METHODS

We analyzed data collected from the Serviço de Hemoterapia do Laboratório de Sorologia (Sorology Laboratory in Hemotherapy Service) of Instituto Nacional de Câncer in Rio de Janeiro from 1998 to 2005. HBV markers were analyzed with Microparticle Enzyme Immunoassay (MEIA-Abbott AxSym System Laboratories, Deerfield, IL, US). The 3.0 version of the same system was used for analyzing anti-HCV (HCr43, c200, c100-3, and NS5). Identification of HBV and HCV infection markers was carried out according to Ministry of Health directives 1376 of 1993. χ^2 analyses were carried out for verifying significant alterations in the mean prevalence of these markers.

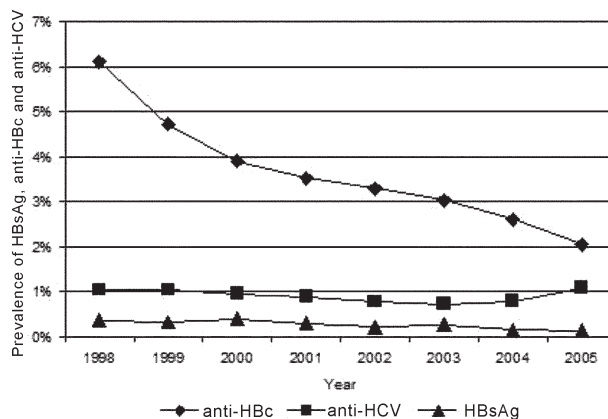
RESULTS

We analyzed data from 128,497 blood samples collected from 1998 to 2005. In this period, approximately 57,823 were repetition donors, which correspond to 45% of the number of blood donors. Prevalence of HBsAg, anti-HBc, and anti-HCV in blood donors are shown in the Table. The overall HBsAg prevalence was 0.27% (347/128,497), anti-HBc prevalence was 3.68% (4723/128,497), and anti-HCV prevalence was 0.90% (1153/128,497). There was a steady decrease in the overall prevalence of HBsAg and anti-HBc-positive individuals from 1998 to 2005. HBsAg prevalence estimates dropped significantly from 0.36% in 1998 to 0.14% in 2005 ($p < 0.001$), and at the same time, anti-HBc estimates also dropped significantly from 6.12% in 1998 to 2.05% in 2005 ($p < 0.001$). Similarly, there was a decline in anti-HCV prevalence among Brazilian blood donors from 1.04% in 1998 to 0.79% in 2004 ($p < 0.001$), although the HCV prevalence increased not significantly to 1.09% in 2005 (Figure).

TABLE

Decreasing rates of hepatitis B virus markers and maintenance of anti-HCV among blood donors in Rio de Janeiro, period 1998-2005

Year		Markers		
		HBsAg	anti-HBc	anti-HCV
1998	N	48/13,363	818/13,363	139/13,363
	%	0.36	6.12	1.04
1999	N	54/17,103	807/17,103	178/17,103
	%	0.32	4.72	1.04
2000	N	72/18,214	712/18,214	172/18,214
	%	0.4	3.91	0.94
2001	N	56/19,256	678/19,256	169/19,256
	%	0.29	3.52	0.88
2002	N	38/17,374	572/17,374	135/17,374
	%	0.22	3.29	0.78
2003	N	41/15,821	480/15,821	114/15,821
	%	0.26	3.03	0.72
2004	N	24/17,059	445/17,059	134/17,059
	%	0.14	2.61	0.79
2005	N	14/10,307	211/10,307	112/10,307
	%	0.14	2.05	1.09



Graphic showing the prevalence of HBsAg, anti-HBc, and anti-HCV positive blood donors in Rio de Janeiro in the period encompassed between 1998-2005.

DISCUSSION

We verified that the prevalence of HBsAg and anti-HBc markers in Rio de Janeiro declined, although the mean prevalence of anti-HCV did not change significantly from 1998 to 2005. In this study, the overall, 0.27% HBsAg prevalence in volunteer blood donors from Rio de Janeiro, in the period encompassed between 1998-2005, was lower than in Lábrea, state of Amazonas (3.3% in 2000) (Braga et al. 2005) and state of Santa Catarina (0.7% in 1994-1995) (Treitinger et al. 2000), and in 1999-2001 (0.98, 0.84, and 0.64% respectively) (Rosini et al. 2003). However, a comparison with developed countries, like Germany (0.16% in 1997-2002) (Offergeld et al. 2005), United States (0.07% in 2002) (Zou et al. 2004), Italy (0.003% in 1994-1997) (Tosti et al. 2002), and Canada (0.012% in 2000) (Chiavetta et al. 2003) showed that HBsAg prevalence estimates in Rio de Janeiro blood donors were higher.

The overall prevalence for anti-core antibody (HBc) in the Rio de Janeiro sample (3.68%) was lower than in the state of Santa Catarina in 1999-2000-2001 (8.83, 7.09, and 5.35% respectively) (Rosini et al. 2003). The anti-HBc prevalence in 1998 was 6.12% in our sample, contrary to 12% in Recife in 1997 (Arraes et al. 2003), showing that despite the high anti-HBc prevalence in Brazil, HBV infection is not highly endemic in Rio de Janeiro. Anti-HBc prevalence in Rio de Janeiro in 1998 (6.12%) was similar to HBV prevalence in Colombia (6.8%), Panama (6.7%), but higher than in other Latin American countries for the year 1997: Chile (1.5%), Costa Rica (3.8%), Ecuador (3.9%), El Salvador (3.8%), Honduras (3.5%), Nicaragua (3.1%), Paraguay (5.6%), and Uruguay (4.1%) (Schmunis et al. 2001). The anti-HBc prevalence of Rio de Janeiro was also higher than in Italy (0.03% in 1994-1997) (Tosti et al. 2002).

The overall prevalence for anti-HCV marker in blood donors in Rio de Janeiro, in 1988 to 2005, was 0.9%. In Brazil, prevalence of anti-HCV marker has been found to be variable in different regions, ranging from 5.9% in the Amazon (Da Fonseca & Brasil 2004) to 0.31% in Santa Catarina (Rosini et al. 2003). The anti-HCV prevalence found in 1998 (1.04%) was similar to the ones found in El

Salvador (1.3%) and Honduras (1.9%) in the years 1994/1997, but much lower than in Chile (6.8%), Venezuela (6.6%), Costa Rica (4.6%), Nicaragua (4.1%), Panama (5%), Paraguay (4.3%), Peru (3.1%), Uruguay (4.9%), and Colombia (8.5%) (Schmunis et al. 2001). Although the HCV prevalence is not high as in others American countries it is increasing since 2004. This data should be an alert to government focus actions in HCV prevention in view of the fact that vaccine is not available.

As the HBsAg and anti-HBc prevalence, the anti-HCV prevalence found in Brazil was higher than in developed countries like United States (0.25% in 2002) (Dodd et al. 2002), Germany (0.1% in 1997/2002) (Offergeld et al. 2005), Canada (0.017% in 2000) (Chiavetta et al. 2003), and Italy (0.002% in 1994/1997) (Tosti et al. 2002).

Three factors may contribute to a large reduction of the main frequency of blood transfusion-associated hepatitis: systematic interviews with screening questionnaires and exclusion of donors reporting defined risk factors, introduction of third generation tests like ELISA for testing HBsAg and HCV antigens (increasing detection sensitivity for these viruses and reducing the window of detection), and/or an overall decrease in infection levels of these pathogens in the general population. Vaccination program of children and fertile age women against hepatitis B plays also an important role in decreasing the occurrence of hepatitis. The introduction of novel technologies for detecting viral nucleic acid, like PCR (polymerase chain reaction) and NAT (nucleic acid test), might have contributed to the decrease in prevalence of HBV and HCV because they are more sensitive and specific, and makes the infection window period shorter (Dodd et al. 2002).

Although HBsAg and anti-HBc mean frequencies in Rio de Janeiro have decreased, when compared to other countries, HBV and HCV prevalence in Brazil is high. This study also demonstrated that HCV infection is a serious problem in the Brazilian southeast region, which requires further studies and greater attention on the part of federal government health authorities.

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