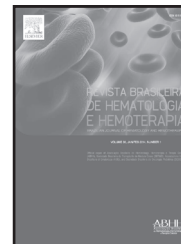




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### Original article

# Seroprevalence of HTLV-1/2 among blood donors in the state of Maranhão, Brazil

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#### ABSTRACT

**Background:** Infection with human T-lymphotropic virus 1 or 2 (HTLV-1/2) is a major health problem. There is a public health policy defining measures for state hematology and hemotherapy centers in Brazil, in order to avoid virus transmission through blood donors. **Objective:** This study aimed to evaluate the seroprevalence of HTLV-1/2 in blood donors in the State of Maranhão, Brazil, during routine blood unit screening.

**Methods:** Screening tests of blood donors using the enzyme-linked immunosorbent assay (ELISA) to detect seropositivity for HTLV-1/2 performed at the Hematology and Hemotherapy Center of the State of Maranhão (HEMOMAR) between July of 2003 and December of 2009 were retrospectively evaluated.

**Results:** Of the 365,564 blood donors, 561 (0.15%) were HTLV-1/2-positive, of whom 72 (12.8%) performed the confirmatory test (Western blot). In donors who had a confirmatory test, 53 (73.6%) were positive. The ages of the infected individuals ranged from 18 to 65 years; 305 (54%) were aged over 40 years. Among the infected individuals, 309 (55%) were male, 399 (71%) were mixed-race, and 259 (46%) were single. Co-infections were frequently found, especially with hepatitis B (in 68.6% of the cases).

**Conclusion:** The results obtained will contribute to the planning and implementation of control measures by the epidemiological surveillance agency of Maranhão, and will also contribute to reducing morbidity. The high seropositivity in a small sample in donors who had confirmatory tests indicates the need for confirmatory tests for all donors who initially test as seropositive.

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## Introduction

Although the human T-cell lymphotropic virus (HTLV) was only recently discovered, it is recognized as an important retroviral agent regarding the damage it inflicts upon humans.<sup>1</sup>

HTLV type 1 (HTLV-1) has recently been shown to be associated with severe diseases, such as T-cell leukemia/lymphoma, tropical spastic paraparesis, and other inflammatory and infectious diseases.<sup>2-4</sup>

It is believed that around 15 to 20 million people worldwide are infected with HTLV-1, although most of them remain asymptomatic.<sup>5</sup> In Brazil, the importance of this virus for public health was only understood in 1993, when serological screening for HTLV-1/2 became mandatory in blood donor candidates.<sup>6</sup> Based on estimates derived from known prevalences, around 2.5 million people in Brazil may be infected with HTLV-1, which makes Brazil the world leader in absolute numbers of cases. HTLV-2 is also present within Brazil; its prevalence is very significant, especially among the indigenous population.<sup>7</sup>

Studies have shown that this virosis is more common in Northern and Northeastern Brazil than in Southern Brazil. The Quilombo settlements in central Brazil present a prevalence of HTLV-1 of 0.5%,<sup>8</sup> whereas São Luís, the capital of the State of Maranhão, Northeastern Brazil, has a high prevalence rate of 10:1,000 habitants.<sup>9</sup>

HTLV transmission between humans is very similar that of human immunodeficiency virus (HIV), and differs only in that HTLV is less infective. Transmission between humans primarily occurs through sexual contact, vertical contact (prolonged breastfeeding and through the placenta, during delivery), and blood contact (through cellular blood components or the sharing of contaminated needles or syringes).<sup>10</sup>

The transmission rate through blood and blood derivatives is approximately 12%, but the risk that individuals infected through blood might develop diseases associated with HTLV is low, perhaps due to the long latent period between infection and the clinical phase of the disease. Many infected carriers die beforehand due to underlying diseases.<sup>3</sup>

Despite the clinical-epidemiological importance of infections acquired at blood banks and the increasing concern of the Brazilian Ministry of Health in regard to this, there are few studies on HTLV-1/2 in Brazil and practically none in Maranhão.

Given the importance of identifying infected blood donors in areas of high prevalence of HTLV-1/2, such as São Luís, Maranhão, the present study aimed to estimate the seroprevalence of HTLV-1/2 during routine blood unit screening at the Centro de Hematologia e Hemoterapia do Maranhão (HEMOMAR), and thus contribute to better strategies to control and prevent this virosis.

## Methods

### Study area

The State of Maranhão, with a population of 6,103,327 inhabitants,<sup>11</sup> is served by HEMOMAR, which is located in the state capital, São Luís; this center is supported by seven

specialized blood banks distributed throughout the hinterlands of the state.

### Sample acquisition

A cross-sectional study was conducted with a retrospective survey of serological tests for HTLV using an enzyme-linked immunosorbent assay (ELISA; Murex HTLV-1 + 2, GE 80/81, Murex Diagnostics® - Dartford, UK). The tests were performed between July of 2003 and December of 2009 to screen blood donors at HEMOMAR in São Luís and in the seven blood banks in the hinterlands of the state. Thus, the positive sample for this study was formed by 561 individuals.

The data obtained were coded and entered into a database using Epi-Info 6 (release 3.04) and Microsoft Office Excel 2010.

### Ethical issues

During the investigative process, the ethical issues regulated by Resolution No. 196/96 of the National Health Board and by the Declaration of Helsinki of 1964, as revised in 2008, were respected. This study was approved by the Research Ethics Committees of the Hospital Universitário Presidente Dutra, Universidade Federal do Maranhão (UFMA) and HEMOMAR.

## Results

Using the ELISA test, 561 individuals (0.15%) positive for HTLV-1/2 were identified out of a total of 365,564 donors over the period from 2003 to 2009 (Table 1).

**Table 1 - Positive results for HTLV-1/2 among blood donors at a blood center in the State of Maranhão between 2003 and 2009.**

Variable	Blood donors	Seropositive
2003	43,917	86
2004	45,398	80
2005	52,325	74
2006	48,725	54
2007	54,051	72
2008	60,590	98
2009	60,558	97
Total	365,564	561

Regarding the spatial distribution of individuals who were seropositive for HTLV, it was observed that most came from the metropolitan area of São Luís, followed by the cities of Imperatriz and Balsas.

Three hundred and nine (55%) individuals positive for HTLV were male. The ages ranged from 18 to 65 years; 305 (54%) were aged 40 years or older (Table 2). It was also observed that 259 (46%) were single and 204 (36%) were married. Regarding self-declared racial background, 399 (71%) were mixed-race, 39 (6.9%) were white, 38 (6.7%) were black, 15 (2.6%) were native Brazilians, one (0.1%) was East Asian, and two (0.3%) were of unidentified racial type.

**Table 2 - Distribution of blood donors who were serologically positive for HTLV-1/2 according to age group and gender in the State of Maranhão, 2003 to 2009.**

Age range	2003		2004		2005		2006		2007		2008		2009	
	Male n (%)	Female n (%)	Male n (%)	Women n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)
18-29	3 (3.5)	0 (0.0)	5 (6.2)	1 (1.2)	8 (10.8)	4 (5.4)	4 (7.4)	2 (3.7)	11 (15.2)	7 (9.7)	14 (14.3)	11 (11.2)	19 (19.6)	7 (7.2)
30-39	20 (23.3)	11 (12.8)	17 (21.3)	9 (11.3)	11 (14.9)	7 (9.4)	9 (16.6)	9 (16.6)	8 (11.1)	6 (8.3)	16 (16.3)	10 (10.2)	16 (16.6)	11 (11.3)
40-49	18 (20.9)	7 (8.1)	18 (22.5)	10 (12.5)	8 (10.8)	6 (8.1)	9 (16.6)	8 (14.8)	7 (9.7)	8 (11.1)	11 (11.2)	14 (14.3)	11 (11.3)	13 (13.4)
50-65	9 (10.5)	13 (15.1)	6 (7.5)	14 (17.5)	16 (21.6)	12 (16.2)	4 (7.4)	9 (16.6)	12 (16.6)	13 (18.0)	8 (8.2)	14 (14.3)	6 (6.2)	13 (13.4)
> 65	3 (3.5)	2 (2.3)	0 (0.0)	0 (0.0)	1 (1.4)	1 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.0)	0 (0.0)
Total	86 (100)		80 (100)		74 (100)		54 (100)		72 (100)		98 (100)		97 (100)	

Of the 561 seropositive individuals according to the ELISA test, only 72 (12.8%) performed the confirmatory test (Western blot), as the state of Maranhão does not provide the examination through the Brazilian Unified Health System (Sistema Único de Saúde - SUS). Of the donors who performed a confirmatory test, 53 (73.6%) were positive.

Between 2003 and 2007, 172 patients from a total of 244,416 blood donors presented associations with hepatitis B (HBV - 118; 68.6%), hepatitis C (HCV - 9; 5.2%), syphilis (8; 4.6%), and HIV (4; 2.3%). It was also observed that 16 patients (9.3%) were positive for HTLV, HBV, and syphilis, and another eight patients (4.6%) were positive for HTLV, HBV, and HCV.

Three patients (0.5%) had had over ten sexual partners, and especially, there was one patient (0.1%) who had had more than 50 (SIC) for occupational reasons. One patient also presented Arnold-Chiari syndrome and syringomyelia, with abnormalities of distal weakening of the upper limbs and proximal weakening of the lower limbs (grade 3 on the motor scale), spasticity in the distal lower limbs, right-side patellar hyporeflexia and left-side hyperreflexia, hyperreflexia of the Achilles tendon on both sides, and Babinsky's sign on both sides, in neurological examinations, along with a neurogenic bladder.

## Discussion

In the present study, the prevalence of positive ELISA tests for HTLV-1/2 was approximately 0.15%. Salles et al.<sup>12</sup> found similar values in 1998, 1999, 2000, and 2001, at the Pró-Sangue Foundation Hemocenter, São Paulo: 0.20%, 0.20%, 0.30%, and 0.10%, respectively. At HEMOACRE, a value of 0.11% was observed using the same kit (Elisa Murex®), and values ranging from 0.08% to 1.80% were found between 1989 and 1996, which were also within the national average.<sup>7</sup> At HEMOMINAS, a value of 0.1% was observed between 1993 and 2007 using ELISA.<sup>13</sup> At Hemonúcleo de Patos, in the state of Paraíba, Braga et al.<sup>14</sup> found a prevalence of 0.025% of HTLV-1 between 2002 and 2011. The higher prevalence in the current study may be justified by population migration in prehistoric times from Asia through North America, reaching what are now the North and Northeast regions of Brazil first. Another possibility is the

African slave trade during Portuguese colonization, mostly to the Southeast and Northeast of Brazil. Furthermore, there is a clear positive ecological correlation (high relative humidity and temperature) with the higher HTLV-1/2 seroprevalence rates among blood donors in these regions of the country.<sup>9</sup>

Regarding gender, most positive cases were males. This was also observed in other studies,<sup>6,13,15</sup> with prevalences among males of 54.95%, 59.4%, and 57.8%. However, this is usually explained by the higher numbers of male donors than female donors. Colin et al.<sup>5</sup> considered that gender was not only a biological variable, but also a cultural, social, and economic variable, with multiple effects, associations, and even confounding bias.

Regarding age, 54% of the individuals were over the age of 40 years; this finding is similar to those of Mota et al.,<sup>12</sup> who reported that 50.55% of the seropositive individuals were 40 years or over, and of Monteiro de Castro et al.,<sup>15</sup> who observed greater seropositivity among individuals over the age of 40 years. Veit et al.<sup>16</sup> observed that 89.47% of the seropositive blood donors were over the age of 34 years.

Regarding the spatial distribution of individuals who were seropositive for HTLV, it was observed that most seropositive individuals were from the metropolitan area of São Luís, followed by the cities of Imperatriz and Balsas. These two cities were developed because of timber and soybeans, respectively, and present intense migratory flows. This leads to the hypothesis that economic and social development may be associated with HTLV transmission.

Regarding the clinical development of the cases of HTLV-1, the present study included the aforementioned case of tropical spastic paraparesis associated with Arnold-Chiari syndrome and syringomyelia. This case has already been the subject of another article published by this group.<sup>17</sup>

## Conclusion

The results from the present study demonstrate that there is a need for greater sanitary education among mixed-race, male, and single individuals, as well as those over 40 years of age, which should be the target group for planning control strategies by municipal and state epidemiological surveillance

agencies, in order to reduce the morbidity caused by this virus. The high seropositivity in such a small sample of donors who had a confirmatory test (Western blot) indicates the need for confirmatory tests in all individuals identified as seropositive during screening.

### Conflicts of interest

The authors declare no conflicts of interest.

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