

Prevalence of human T-cell lymphotropic virus types 1 and 2 in blood donors of the Caruaru Blood Center (Hemope)

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Background: There is difficulty in gathering data on the prevalence of human T-cell lymphotropic virus in blood donors as confirmatory testing is not mandatory in Brazil. This suggests there may be an underreporting of the prevalence.

Objective: To estimate the prevalence of human T-cell lymphotropic virus types 1 and 2 in donors of a blood bank in Caruaru, Brazil.

Methods: This was an observational, epidemiological, descriptive, longitudinal and retrospective study with information about the serology of donors of the Caruaru Blood Center, Fundação de Hematologia e Hemoterapia de Pernambuco (Hemope) from May 2006 to December 2010. The data were analyzed using the Excel 2010 computer program (Microsoft Office®).

Results: Of 61,881 donors, 60 (0.096%) individuals were identified as potential carriers of human T-cell lymphotropic virus types 1 and 2. Of these, 28 (0.045%) were positive and 32 (0.051%) had inconclusive results in the serological screening. Forty-five (0.072%) were retested; 17 were positive (0.027%) and 3 inconclusive (0.005%). After confirmatory tests, 8 were positive (0.013%). Six (75%) of the confirmed cases were women.

Conclusion: Epidemiological surveys like this are very important in order to create campaigns to attract donors and reduce the costs of laboratory tests.

Keywords: Blood donors/statistics & numerical data; Blood banks; Human T-lymphotropic virus 1; Human T-lymphotropic virus 2; Epidemiology; Health promotion

Introduction

The human T-cell lymphotropic virus (HTLV) is a member of the *Retroviridae* family. HTLV types 1 and 2 present tropism for CD4⁺ and CD8⁺ T lymphocytes, respectively. In Brazil, these serotypes are the most common in the population^(1,2). The main forms of transmission are unprotected sex, congenital and/or parenteral, with the latter being associated with transfusions and contaminated needles⁽³⁾. The methods used to detect IgG, IgM and IgA anti-HTLV in the screening phase of blood banks are agglutination of latex particles, enzyme linked immunosorbent assay (ELISA) and indirect immunofluorescence (IIF). Western Blot (WB) and polymerase chain reaction (PCR) are used in the confirmatory phase^(1,3). The introduction of screening tests for HTLV-1/2 over the last 25 years was very important as this has excluded seropositive blood donors resulting in a lower rate of infections among blood recipients thereby reducing the number of new infections in the general population⁽⁴⁾. About 51-56 days after transfusions of contaminated blood, there is a risk of seroconversion in 40-60% of cases^(5,6). The determination of the frequency of pathogens in the donor population has been of great importance since the discovery that transmission of infectious diseases through blood transfusions is possible⁽⁷⁾. Currently, there are few studies about the true prevalence of blood-borne diseases in the Brazilian donor population; this fact is attributed to the lack of mandatory confirmatory tests in Brazil⁽⁸⁾. Studies like the current investigation contribute to the mapping of endemic and non-endemic regions, improve our understanding of factors that may be linked to the distribution of the virus and serve as the basis for public health interventions with regard to controlling the spread of HTLV. Therefore, the aim of this study was to estimate the prevalence of HTLV-1/2 in donors of the Caruaru Blood Center, which has the second highest number of donations in the State of Pernambuco, Brazil.

Methods

This was an observational, epidemiological, descriptive, longitudinal and retrospective study. Information about the serology of the donors of the Caruaru Blood Center (Hemope) were collected from May 2006 to December 2010. The seroprevalence of HTLV-1/2 was obtained from a query search of data available in the registry of Hemope donors. This study was performed in the microregion of Ipojuca Valley. According to the Brazilian Institute of Geography and Statistics (IBGE), the town of Caruaru in the state of Pernambuco has

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a predominantly urban population, with 314, 912 inhabitants (census 2010)⁽⁹⁾. However the local blood bank attends donors from a population of over one million inhabitants covering all 32 districts covered by the IV Regional Health Department (IV GERES) as well as individuals from other regions. Data on all blood samples from suitable donors according to the clinical screening during the study period were included in this study. All donors who had no serological data in the blood bank system were excluded.

The seroprevalence of HTLV-1/2 in donors of the Caruaru Blood Center was categorized as: 1) Positive serology when the result exceeded the highest limit established by the cut-off range; 2) negative serology when the result obtained was below the lowest limit of the cut-off range; 3) inconclusive serology when the result was between the highest and lowest limits of the cut-off range ($\pm 20\%$ in the screening phase and $\pm 10\%$ during the retesting phase). When the results obtained during serological screening are inconclusive or positive, the tests are repeated in duplicate. If the result remains unchanged, the donor is notified and a new sample is collected for retesting, in which the screening test is again repeated in duplicate. Finally a confirmatory test is performed.

Throughout the study period, the ELISA methodology was used in the screening and retesting phases employing kits from Murex and REM ORTHO. In the confirmatory phase, the Genelabs MP Diagnostics HTLV BLOT 2.4 kit was utilized in order to distinguish the types (HTLV-1 and HTLV-2).

It is important to remember that the amount of serology tests performed in the period from May 2006 to December 2010 does not match the number of donors, as the serological profile is performed for each donation and so one donor may be tested several times within the same year. The data were entered into an Excel 2010 (Microsoft Office[®]) spreadsheet from which frequency plots were built. The project was approved by the Ethics Committee of the Associação Caruaruense de Ensino Superior (No. 095/11) and Hemope (No. 023/2011).

Results

Of the 61,881 donors of the Caruaru Blood Center between May 2006 and December 2010, 60 (0.096%) individuals were identified as potential carriers of HTLV-1/2. Of these, 28 (0.045%) donors were seropositive and 32 (0.051%) donors were inconclusive in the serological screening. Forty-five (0.072%) were retested with 17 being positive (0.027%) and three inconclusive (0.005%). After confirmatory tests the final result was eight positive samples (0.013%), as shown in Table 1. Seven (87.5%) of the positive results were type 1.

Regarding the gender of the donors, women were the most affected in 75% (n = 6) confirmed positive cases, of which 5 (83.3%) were type 1 (Table 1).

As shown in Figure 1, the prevalence of positive cases (positive in the screening and confirmatory retest) for HTLV-1/2 varied over the years, with high prevalences in 2007 and 2010.

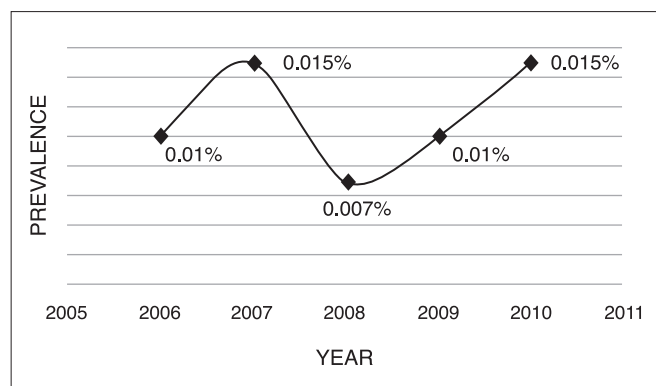


Figure 1 – Profile of seroprevalence for human T-cell lymphotropic virus types 1 and 2 from 2006 to 2010 in blood donors of the Caruaru Blood Center (Hemope)

Table 1 - Distribution of serology for human T-cell lymphotropic virus types 1 and 2 from 2006 to 2010 in donors of the Caruaru Blood Center (Hemope)

	2006		2007		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%
Total samples	7334		12,770		14,195		14,457		13,125	
Total of potential carriers after screening	8	0.1	8	0.06	7	0.05	12	0.08	25	0.19
Reactant	5	0.07	6	0.05	3	0.02	6	0.04	8	0.06
Inconclusive	3	0.04	2	0.015	4	0.03	6	0.04	17	0.13
Retesting	5	0.07	5	0.04	7	0.05	9	0.06	19	0.15
Reactant	2	0.03	3	0.02	3	0.02	4	0.03	5	0.038
Inconclusive	0	0	0	0	0	0	0	0	3	0.022
Negative	3	0.04	2	0.015	4	0.03	5	0.03	11	0.08
Samples submitted to confirmatory tests	2	0.03	3	0.02	3	0.02	4	0.03	8	0.06
Positive	1	0.01	2	0.015	1	0.007	2	0.01	2	0.015
Male	0	0	1	0.008	0	0	1	0.007	0	0
Female	1	0.01	1	0.008	1	0.007	1	0.007	2	0.015
Inconclusive	1	0.01	1	0.008	0	0	0	0	2	0.015
Negative	0	0	0	0	2	0.01	2	0.01	4	0.03
Samples not retested	3	0.04	3	0.02	0	0	3	0.02	6	0.045

Discussion

Seroprevalence rates of HTLV-1/2 vary according to individual risk behaviors, sociodemographic factors and geographical region⁽¹⁰⁾. HTLV-1 is the most prevalent in Japan and least prevalent in India, Mongolia and Malaysia⁽¹¹⁾. In South America, Brazil has a prevalence of HTLV-1/2 of 48/10,000 donors⁽¹²⁾ and Peru has a prevalence of 91.5/10,000 donors⁽¹³⁾. The presence of HTLV-1/2 has been confirmed throughout the Brazilian territory. Probably, type 1 arrived in the country due to the African slave trade, whereas type 2 may be associated with the immigration of Asians⁽¹⁰⁾. According to the latest survey conducted by the Brazilian National Health Surveillance Agency (ANVISA), the prevalence in Brazil in 2010 was 0.17% of the donor population⁽¹⁴⁾.

An epidemiological study conducted with blood donors from several Brazilian states in 2005 investigated the prevalence of HTLV-1/2. In that period, there was a heterogeneous distribution, with higher rates in the north and northeast of the country⁽¹²⁾.

According to another study also published in 2005, the prevalence in the country ranged from 0.08% in Manaus and Florianópolis to 0.33% in Recife and Rio de Janeiro⁽²⁾.

In the blood bank of Campo Mourão, Paraná a prevalence of 0.78% was reported in 2008⁽¹⁵⁾.

In Porto Alegre, a prevalence of 0.1% was observed from 1998 to 2008 with 53.9% of those infected being female⁽¹⁶⁾.

Of 610 blood donors of the Centro de Hematologia e Hemoterapia do Ceará (Hemoce), a blood bank from Ceará, 0.05% were positive and/or inconclusive during screening in the period from 2001 and 2008. These positive and inconclusive samples were retested and 93.4% were positive and 6.6% inconclusive. In a final test, 71.6% of the positive results were confirmed by Western blot. With 50.8% of the total number of samples, HTLV-1 mainly affected women⁽¹⁷⁾.

The state of Pernambuco has one of the highest prevalences in the Northeast region, with a rate that varied from 0.02 to 0.07% between 2005 and 2010; men were the most affected (67.17%)⁽¹⁸⁾.

Among the currently available literature on the subject, there is no detail as to whether the prevalence was calculated taking into account the results of the 'retest' plus the confirmatory test or just the screening phase with the exception of the report from Hemoce⁽¹⁷⁾.

The rates obtained in the present study on donors of the Caruaru Blood Center are lower than those reported in the blood banks of Paraná and Porto Alegre. However, as is common with data from secondary databases, the prevalence reported herein may count a single donor on more than one occasion as a result of successive donations.

The results of this study are consistent with prevalences reported for the cities of Recife and Ceará in the same period as the present study^(17,18).

There were higher prevalences of infected female blood donors in the Caruaru, Ceará, and Porto Alegre blood centers. This may be attributed to more efficient transmission from men to women during sexual intercourse, as the hormones make women more susceptible to infection^(19,20). This finding differs from Recife, where men were the most affected. These different

findings may be caused by variances in the population or samples sizes defined under different criteria.

In 2010 there was an increase in the serological prevalence in the screening phase compared to the other years of the study, particularly due to an increase in the number of inconclusive results; this might be attributed to a change of the manufacturer of the ELISA kit.

Conclusions

The difficulty in gathering data on the prevalence of serological markers in the population of blood donors is evident as confirmatory testing is not mandatory in Brazil yet. This fact contributes to an underreporting of the prevalence of HTLV, not only in Pernambuco but in Brazil as a whole. Therefore, it is necessary to carry out epidemiological surveys in order to target educational campaigns to attract donors, increase transfusion safety and consequently reduce the costs of laboratory testing.

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