Journal of Medical Virology 82:873–877 (2010)

Decreasing Trends in HTLV-1/2 But Stable HIV-1 Infection Among Replacement Donors in Argentina

Carolina A. Berini,[1]* Silvina A. Gendler,[2] Susana Pascuccio,[2] Maria E. Eirin,[1] Willi McFarland,[3] Kimberly Page,[3] Luisa Carnevali,[2] Edward Murphy,[4,5] and Mirna M. Biglione[1]

[1]*National Reference Center for AIDS, Department of Microbiology, Parasitology and Immunology, School of Medicine, University of Buenos Aires, Buenos Aires, Argentina*
[2]*Unit of Hematology and Immunehematology, "Juan A. Fernández" Hospital, Buenos Aires, Argentina*
[3]*Center for AIDS Prevention Studies, University of California San Francisco, San Francisco, California*
[4]*Department of Laboratory Medicine and Epidemiology/Biostatistics, University of California San Francisco, San Francisco, California*
[5]*Blood Systems Research Institute, San Francisco, California*

In Argentina, current procedures to ensure safety of the blood supply for transfusion include reviewing the records of blood donors with particular attention to the serologic detection of specific blood borne infections. Data of 28,483 blood donations received from January 1, 2003 to December 31, 2008 in a public hospital in Buenos Aires were analyzed. Of the 28,483 blood donations, 7,442 (26.1%) were female donors, 14,582 (51.2%) were younger than 35 years old, and 23,746 (83.4%) were Argentine. Among all, only 285 (1.0%) were voluntary donations. The prevalence of HTLV-1/2 was 0.1% (95% CI 0.063–0.15), being 0.07% for HTLV-1 and 0.03% for HTLV-2. The prevalence of HIV-1 was 0.2% (95% CI 0.110–0.206). No HIV-1/HTLV-1/2 co-infections were detected among volunteer donors. During this study period, data confirm that HTLV-1/2 infection was not endemic in Buenos Aires, and that the prevalence of HTLV-1/2 decreased throughout while HIV-1 was stable. Due to the small number of voluntary donations, we could not conduct comparisons to infection rates in replacement donations. Although there have been several ongoing programs aimed at recruiting voluntary blood donations and changing from mostly replacement donations to an altruistic system of blood donations, Argentina is still far from reaching this objective. Additional efforts are needed in order to increase and assure the quality of blood supply in this country. ***J. Med. Virol. 82:873–877, 2010.***

KEY WORDS: HTLV; HIV; blood donors; Argentina

INTRODUCTION

Contrary to the recommended recruitment model of altruistic or community volunteer blood donations proposed by the World Health Organization, the Latin-American blood supply, including Argentina, is based mainly on repository or replacement donations [Pan American Health Organization, 1998]. Such donations, made by patient-recruited donors, are considered less safe, thus representing a significant challenge to the health-care system [Ministerio de Salud y Ambiente, 2009]. In addition to a steady supply of safe donors, current procedures to ensure the safety of blood supply for transfusion include reviewing the records of blood donors with particular emphasis on the serological detection of specific blood-borne infections [Schmunis et al., 2000].

At present, the detection of markers for HTLV-1/2, HIV, HBV, HCV, *Trypanosoma cruzi*, *Treponema pallidum*, and Brucella is mandatory in Argentine blood banks. Although the detection of HTLV-1/2 antibodies

Grant sponsor: National Agency for Scientific Promotion; Grant numbers: PICT-2007-01639, PIP 6120; Grant sponsor: University of Buenos Aires, Buenos Aires, Argentina; Grant number: UBA M404; Grant sponsor: National Reference Center for AIDS; Grant sponsor: Fogarty International Center at the Center for AIDS Prevention Studies at UCSF (AIDS International Training and Research Program, to C.A.B.); Grant number: D43W00003.

*Correspondence to: Carolina A. Berini, Centro Nacional de Referencia para el SIDA, Departamento de Microbiología, Parasitología e Inmunología, Facultad de Medicina, Universidad de Buenos Aires, Paraguay 2155, Piso 11, C1121ABG Buenos Aires, Argentina. E-mail: cberini@fmed.uba.ar

Accepted 17 November 2009
DOI 10.1002/jmv.21728
Published online in Wiley InterScience (www.interscience.wiley.com)

has been proposed by the Argentine Hematology Association since 1997, it only became mandatory in blood banks in December 2004, after endemic areas for these infections were detected in the Northern provinces of the country [Biglione et al., 2005; Salud Pública, 2005]. Since this mandate, no data have been published regarding the prevalence of HTLV-1/2 among blood donors.

The main objective of this study was to estimate the prevalence and the trends in infection prevalence of HTLV-1/2 and HIV-1 antibodies among voluntary and replacement blood donors attending a public blood bank in Buenos Aires, Argentina, over a 5-year period from 2003 to 2008.

MATERIALS AND METHODS

A retrospective analysis of serial cross-sectional data collected at the blood bank of the "Juan A. Fernandez" Public Hospital in Buenos Aires was conducted. Data from consecutive blood donations were collected from blood bank records from January 2003 to December 2008. Blood donors were classified as either replacement blood donors (if they stated that the reason for donating was that they had a friend or relative in the hospital) or as voluntary donors (those who made altruistic, not-remunerated donations). All potential blood donors underwent a medical interview and could refuse to donate by self-exclusion. Samples were tested first as singletons, and reactive samples were repeated in duplicate on the same assay. Samples with at least two positive results were considered repeatedly reactive. HTLV-1/2 screening was performed by ELISA (Vironostika HTLV-I/II, bioMérieux, Boxtel; Murex HTLV I + II, Abbott, Dartford, Kent, UK, or Bioelisa HTLV-I + II(r), Biokit, Barcelona, Spain). Repeatedly reactive samples for HTLV-1/2 infection were confirmed by Western blot (WB) (HTLV blot 2.4, Genelabs Diagnostics, Science Park, Singapore). HIV-1 screening was performed by ELISA (Vironostika HIV-1 Antigen, bioMérieux, Boxtel; Vironostika HIV Uni-Form II plus O, bioMérieux, Boxtel; Vironostika HIV Uni-Form II Ag/Ab, Organon Teknika, Boxtel, the Netherlands; Murex HIV-1.2.O, Murex Biotech Ltd, Kent, UK or anti-HIV TETRA ELISA, Biotest, Dreieich, Germany). Repeatedly reactive samples for HIV-1 infection were confirmed by WB (Novapath HIV-1, Immunoblot, BioRad, Hercules, CA).

Prevalence was estimated as the proportion of confirmed positive tests among the total screened population by year of testing; 95% confidence intervals (CI) were calculated assuming a binomial distribution. Prevalence and changes in prevalence over time were analyzed by chi-square test, stratified by nationality, age, and sex. Statistical analyses were performed using the SPSS software, release 11.5.0, 2002 (Chicago, IL).

RESULTS

Of the 28,483 blood donations, 7,442 (26.1%) were female donors, 14,582 (51.2%) were younger than 35 years old, and 23,746 (83.4%) were Argentine. Of the total donations, 285 (1.0%) were voluntary, mostly of Argentine nationality (n = 243; 85.3%), and principally males (n = 180; 85.3%). Less than one in five voluntary donations (n = 55; 19.3%) were from 18 repeat volunteer donors. The number of donations varied from a low of 3,912 in 2006 to a high of 5,223 in 2004. Tables Ia and Ib show the prevalence of HTLV-1/2 and HIV-1 by year and gender. The prevalence of repeatedly reactive samples for HTLV-1/2 was 0.8% (221/28,483) (95% CI 0.67–0.88) and further WB confirmatory testing yielded a final prevalence of 0.1% (28/28,483) (95% CI 0.063–0.15). There was a decreasing trend in HTLV-1/2 infection, especially among men ($P = 0.004$), and no HTLV-1/2 infection was observed among voluntary donations. When comparing the prevalence of HTLV-1/2 before and after the resolution for mandatory detection in blood banks was passed, no significant difference was observed although the number of positive individuals decreased considerably in 2007 and 2008.

Out of the 28 confirmed HTLV-1/2 seropositive individuals, 21 were HTLV-1 (0.07%) and seven were HTLV-2 (0.03%). Among the HTLV-1-positive individuals, nine were Argentine (five from Buenos Aires city and surroundings, three from Jujuy, and one from Misiones), four Paraguayan, four Peruvian, two Chilean, and one Bolivian. As for the HTLV-2-positive cases, three were Argentine (from Buenos Aires), two Peruvian, and one Uruguayan. Information on two individuals was not available (Table II).

Out of the 21 HTLV-1-positive blood donors, four were positive for hepatitis B virus (HBV) core antibody (anti-HBc). Of these four cases, two were co-infected with *T. cruzi* and one of them also with *T. pallidum*. There were no HIV-1/HTLV-1/2 co-infections. No associations were found between HTLV-1/2 and co-infections with HBV, *T. cruzi* and *T. pallidum* ($P > 0.05$).

TABLE Ia. Prevalence of Confirmed Samples for HTLV-1/2 and HIV-1 in Female Blood Donors From Buenos Aires, Argentina by Year

	Year					
Markers of infection	2003 (N = 1,181), % (95% CI)	2004 (N = 1,322), % (95% CI)	2005 (N = 1,229), % (95% CI)	2006 (N = 1,120), % (95% CI)	2007 (N = 1,331), % (95% CI)	2008 (N = 1,259), % (95% CI)
Anti-HTLV-1/2	0.0	0.0	0.0	0.18 (0.022–0.644)	0.23 (0.047–0.657)	0.24 (0.049–0.695)
Anti-HIV-1	0.0	0.0	0.0	0.09 (0.002–0.496)	0.0	0.16 (0.019–0.573)

TABLE Ib. Prevalence of Confirmed Samples for HTLV-1/2 and HIV-1 in Male Blood Donors From Buenos Aires, Argentina by Year

Markers of infection	Year					
	2003 (N = 3,975), % (95% CI)	2004 (N = 3,901), % (95% CI)	2005 (N = 3,437), % (95% CI)	2006 (N = 2,792), % (95% CI)	2007 (N = 3,319), % (95% CI)	2008 (N = 3,617), % (95% CI)
Anti-HTLV-1/2	0.08[a] (0.016–0.220)	0.05[a] (0.006–0.185)	0.06[a] (0.007–0.210)	0.14[a] (0.039–0.366)	0.09[a] (0.019–0.264)	0.17[a] (0.019–0.312)
Anti-HIV-1	0.15 (0.018–0.284)	0.28 (0.103–0.461)	0.26 (0.076–0.447)	0.22 (0.025–0.405)	0.09 (0.019–0.264)	0.19 (0.036–0.351)

[a]*P*-value for tendency among HTLV-1/2-positive men ($P = 0.004$).

The screening prevalence for HIV-1 was 0.3% (82/28,483) (95% CI 0.22–0.35) and 0.2% (45/28,483) (95% CI 0.110–0.206) after WB confirmation. Out of the 45 HIV-1-positive individuals, 33 were Argentine (23 from Buenos Aires city and surroundings, two from Misiones, two from Corrientes, one from Jujuy, one from La Rioja, and one from Santiago del Estero), seven Paraguayan, three Peruvian, and two Uruguayan. Information on three individuals was not available.

Among the 45 confirmed HIV-1-positive blood donors, 7 were positive for anti-HBc. Of these seven cases, one was positive for antibodies to hepatitis C virus (HCV), two were co-infected with *T. cruzi*, and one of them also with *T. pallidum*. A total of two HIV/HCV co-infections and two HIV-1/*T. pallidum* were detected. HIV-1 prevalence was stable, over the study period but HIV-1 infection was significantly higher among male compared to female donors ($P < 0.05$). No HIV-1 infection was detected among voluntary donors.

DISCUSSION

This study reports the prevalence of HIV-1 and HTLV-1/2 before and after its detection became mandatory in blood banks from Argentina as well as the trends in these transfusion-related infections at a public blood bank setting in Buenos Aires.

Studies conducted in the 1990s in Argentina, before the screening for HTLV-1/2 antibodies became compulsory, showed prevalence of 0.03%, 0.07%, and 0.21%, respectively, which are in agreement with our results [Perez Bianco and Santarelli, 1993; Del Pino et al., 1994; Schmunis et al., 2000]. However, a higher prevalence was found in this sample compared to data from the Ministry of Health (MoH) [Informe del Control de Sangre a Transfundir, 2007]. This may be due to the use of commercial kits which are not the best in terms of sensitivity for HTLV-1/2 detection [Berini et al., 2008]. Nevertheless, the final prevalence (0.1%) after WB confirmation is low, despite the high prevalence of these retroviruses among high-risk populations and the high immigration rates from HTLV-1/2 endemic areas to the capital city [Lombardi et al., 1991; Pampuro et al., 1993; Biglione et al., 2005]. Regarding this point, it is interesting to note that almost half of the persons with HTLV-1/2 antibodies were from neighboring countries such as Peru, where HTLV-1 is known to be endemic. When examining the decreasing trend of HTLV-1/2 infection over the years studied, it is noted that the detection of HTLV-1/2 antibodies in blood banks became mandatory in December 2004 and could have contributed to the reduction in the number of infected individuals coming for further donations.

Comparison of HTLV-1/2 infections with other markers for co-infections did not show any significant association, suggesting that the transmission of HTLV-1/2 infections is not associated with risk exposures for infection with other infections assessed in this study.

With respect to HIV-1, the epidemic in Argentina was principally focused in men who have sex with men

TABLE II. Nationality of HTLV-1, HTLV-2, and HIV-1-Infected Individuals

	Countries					
	Argentina, n (%)	Paraguay, n (%)	Peru, n (%)	Chile, n (%)	Bolivia, n (%)	Uruguay, n (%)
HTLV-1 (n = 21)[a]	9 (42.9)	4 (19.0)	4 (19.0)	2 (9.5)	1 (4.8)	0
HTLV-2 (N = 7)[a]	3 (42.9)	0	2 (28.6)	0	0	1 (14.3)
HIV-1 (N = 45)	33 (73.0)	7 (15.6)	3 (6.7)	0	0	2 (4.5)

[a]Information on one individual is missing.

(MSM) and injecting drug user communities in mid-1980s. The infection has disseminated to the heterosexual population and it is especially affecting sexually active women [Ministerio de Salud y Ambiente de la Nación, 2008].

Previous studies conducted among blood donors in 1993 and 2000 reported a final prevalence of 0.21% and 2.42–3.36 per 1,000 donations, respectively, similar to the findings presented in this study [Perez Bianco and Santarelli, 1993; Schmunis et al., 2000]. Although constant efforts are being made to promote HIV testing, there were no significant changes in HIV-1 seropositivity during the last few years.

In summary, HTLV-1/2 infection prevalence decreased in blood donors between 2003 and 2008, indicating that Buenos Aires city is a non-endemic area. Although there was only a small number of voluntary donors in this study, neither HTLV-1/2 nor HIV infections were observed in this population, indicating that the use of these donations for blood and blood components is safe [Saguier et al., 2003]. This situation is similar in other Latin American countries, including Chile, El Salvador, Guatemala, Mexico, Nicaragua, Paraguay, Peru, and Venezuela, where the majority of blood supplies come from repository donors [Schmunis et al., 2000]. The national programs launched in the last decade in Brazil for recruiting voluntary blood donors have increased significantly this type of donation [Schmunis et al., 2000].

Several strategies are being implemented nationwide aimed at increasing voluntary blood donations; however, the number of voluntary donors is still far from covering the needs of the national blood supply system. Therefore, big efforts are being made to implement national programs aimed to boost voluntary, altruistic, and habitual blood donations in Argentina as well as to assure the quality of screening for infection markers and to conduct appropriate surveillance and prevention measures at local levels.

ACKNOWLEDGMENTS

Helpful comments were provided by George Rutherford, Jennifer Evans, and Maria de Los Angeles Pando. A special thank to Sergio Mazzini and Marie for reviewing the English version of this manuscript. The authors certify that they have no affiliation with/or financial involvement in any organization or entity with a direct financial interest in the subject matter or materials discussed in this manuscript.

APPENDIX

For HBV antigen Hepanostika HBsAg Uni-Form II, bioMérieux, Boxtel; and for HBc, Hepanostika anti-HBc Uni-Form, bioMérieux, Boxtel; Bioelisa anti-HBc, Biokit; and Enzygnost Anti-HBc monoclonal, Dade-Behring, Marburg, Germany were used.

For HCV antibodies, antibody to HCV core antigen ELISA Test System, Ortho Clinical Diagnostics (Raritan, NJ); anti-HCV ELISA, Wiener Laboratories S.A.I.C. (Rosario, Argentina); Bioelisa HCV, Biokit; or Murex HCV 4.0, Abbott Laboratories (Abbott, IL) were used.

For Chagas HAI Chagas, Polychaco S.A.I.C. (Buenos Aires, Argentina); Chagatest HAI, Wiener Laboratories S.A.I.C.; SERODIA Chagas, Fujirebio, Inc. (Tokyo, Japan); Chagatek ELISA, bioMérieux (Buenos Aires, Argentina); or Chagatest ELISA recombinant v.3.0, Wiener Laboratories S.A.I.C. were used.

For *T. pallidum* VDRL test, Wiener Laboratories S.A.I.C. or VDRL-SEPSSI, Britania (Buenos Aires, Argentina) were used.

REFERENCES

Berini C, Pascuccio S, Bautista C, Gendler S, Eirin ME, Rodriguez C, Pando MA, Salomon H, Biglione MM. 2008. Comparison of four commercial screening assays for the diagnosis of human T-cell lymphotropic virus types 1 and 2. J Virol Methods 147:322–327.

Biglione MM, Astarloa L, Salomon HE. 2005. High prevalence of HTLV-I and HTLV-II among blood donors in Argentina: A South American Health Concern. AIDS Res Hum Retroviruses 21:1–4.

Del Pino N, Martínez Peralta L, Pampuro S, Pimentel E, Libonatti O. 1994. HTLV-I/II seroprevalence and coinfection with other pathogens in Blood Donors in Buenos Aires. J Acquir Immune Defic Syndr 7:206–207.

Informe del Control de Sangre a Transfundir. 2007. Available at www.anlis.gov.ar [accessed December 30, 2008].

Lombardi V, Carrillo MG, Alimandi M, Boxaca M, Rossi P, Libonatti O. 1991. Overt and latent HIV 1 and HTLV-I infection in cohorts of at high risk individuals in Argentina. Mol Cell Probes 5:409–417.

Ministerio de Salud y Ambiente. 2009. Seguridad Transfusional. Available at www.msal.gov.ar/htm/plan-nacional-donacion-sangre/documentos/seguridad-transfusional.doc [accessed January 7, 2009].

Ministerio de Salud y Ambiente de la Nación. 2008. Boletín sobre VIH/SIDA en la Argentina. Año XI, Número 25, Agosto 2008, p 7.

Pampuro SE, Rabinovich RD, Martinez Peralta L, Gallo D, Hanson C, Libonatti O. 1993. Presence of human T-cell lymphotropic virus types I and II and coinfection with human immunodeficiency virus in different groups at risk in Argentina. J Acquir Immune Defic Syndr 6:851–852.

Pan American Health Organization. 1998. Blood bank situation in Latin America, 1996: Serological markers for communicable diseases in blood donors. Epidemiol Bull 19:12–14.

Perez Bianco R, Santarelli MT. 1993. Analysis of a national survey for diseases transmitted by blood transfusion. Medicina (B Aires) 53:491–496.

Saguier MC, Góngora GN, Houriet S, Reybaud JF, Blejer JL, Galli AC, Salamone HJ. 2003. Seroprevalencia en donantes voluntarios de sangre. Rev Arg Transfus 29:38.

Salud Pública Resolución 58/2005. 2005. B.O. 31/01/05-MSA-Normas Técnicas y Administrativas de la Especialidad Hemoterapia. Available at www.femeba.org.ar [accessed March 22, 2009].

Schmunis GA, Zicker F, Segura EL, del Pozo AE. 2000. Transfusion-transmitted infectious diseases in Argentina, 1995 through 1997. Transfusion 40:1048–1053.