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Original Article

Frequency of HIV type 2 infections among blood donor population from India: A 10-year experience

R Kannangai, SC Nair, G Sridharan, S Prasannakumar, *D Daniel

Abstract

Purpose: In India, HIV-2 epidemic is alongside with HIV-1. Blood banks are introducing nucleic acid testing (NAT) for screening. The limitation of NAT systems is the inability to detect HIV-2. **Materials and Method**: An analysis of HIV screening of a blood bank at a tertiary care center from 1998 to 2007 was carried out. **Results**: A total of 175026 donors were screened by serological assays and 789 were reactive for HIV antibody. Only 478 (61%) were confirmed positive by Western blot/immunoblot. There were 465 (97.2%) donations positive for HIV-1, 6 (1.3%) for HIV-2 (monotypic infection) and 7 (1.5%) for HIV-1 and HIV-2 (dual infection). **Conclusion**: We show the presence of HIV-2 infection among the blood donors and the need for incorporating HIV-2 detection also in the NAT systems.

Key words: *HIV-2, India, Blood donors, nucleic acid testing*

Introduction

Outside the African continent, HIV-2 epidemic in parallel with the HIV-1 is seen in India.[1,2] HIV-2 is seen in European countries neighboring the western African countries. Introduction of HIV-2 in India may be related to trading connections between India and Africa. HIV-2 from India was reported from Mumbai in 1991; infections have been reported from several states of India. HIV-2 was detected in high-risk groups and professional blood donors.[3-5] The seroprevalence of HIV-2 (mono infection) in a survey conducted in five urban and five rural populations of Tamil Nadu was 0.1% while dual infection with HIV-1 and HIV-2 was 0.44%.[6]

In countries like United States, the blood donors are being screened for the blood born viruses by Nucleic Acid Testing (NAT) since the year 2000.[7] NAT has been introduced in India only a few years back and currently blood banks are shifting to this. A limitation of several of the commercial NAT systems is the inability to identify HIV-2. Unlike in West, India is a country with a low epidemic of HIV-2 and hence this has implications in HIV-2 transmission through the contaminated blood supply. Ever since the first report on HIV-2 infection from our laboratory in southern India, we have consistently seen HIV-2 positive infections among patients coming to our institution and hence detection of HIV-2 infections is also a major concern.There are no reports from India on the frequency of HIV-2 infection in blood donors and hence this study aims to fill that lacuna.

Materials and Methods

An analysis was done for HIV data over a 10-year period i.e. from 1998 January to 2007 December of a blood bank in a tertiary care centre in southern India for a total of 175026 blood donations. As a hospital policy, all the donations were received only from patients' relatives or volunteers and not from paid or commercial donors.

Donors were screened by the following WHO/UNAIDS approved third generation assay(s): During the years 1998 through 2001- Abbott HIV-1/HIV-2 third generation plus EIA (Abbott Laboratories, U.S.A), in the year 2002 - Abbott Axsym, (Abbott Laboratories, U.S.A) and for the period from 2003 through 2007- Vitros ECI (Ortho Clinical Diagnostics, Egypt) were used. All the reactive samples were sent to the department of Clinical Virology for confirmation by Western blot/immunoblot testing. All such samples were tested by two ELISAs and Western blot/immunoblot. The different ELISA systems used during the study period were from the WHO/UNAIDS approved list of assays. The Western blot/immunoblot positive samples were considered to be positive for HIV. The Western blot/immunoblot assays used were HIV Blot 2.2 (Genelabs, Singapore), INNOLIA (Innogenetics, Belgium), Qualicode (Transasia, India) and RIBA SIA (Chiron, USA). Strips from all these assays have a recombinant protein for HIV-2 specific envelope protein gp36 and or gp105 for the identification of HIV-2 antibody. Samples which were positive for gp36 reactivity/ gp105 without HIV-1 envelope specific bands were declared as HIV-2 positive samples, while those that showed reactivity to both HIV-1 and HIV-2 specific envelope proteins were declared as positive for dual infection with HIV-1 and HIV-2.

*Corresponding author (email: <danield@cmcvellore.ac.in>)
Department of Clinical Virology (RK,GS,SP), and
Immunohaematology and Transfusion Medicine (SCN, DD)
Christian Medical College, Vellore - 632 004, India
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Results

Among the 175026 donors, 789 were reactive for HIV antibody during screening. Of these 789 samples, 478 (61%) were confirmed positive by Western blot/immunoblot. Among these there were 465 (97.2%) positive for HIV-1, 6 (1.3%) for HIV-2 (monotypic infection) and 7 (1.5%) for HIV-1 and HIV-2 (dual infection). The number of donors found positive for HIV-1, HIV-2; HIV-1 and HIV-2 antibodies year wise (1998- 2007) is given in Table 1. Among the 175026 donors 478 (0.27%) were positive for HIV as confirmed by Western blot/immunoblot. HIV frequency during the last 10 years (1998-2007) is shown in Figure 1.

Discussion

The study reported here shows that 2.8% of the HIV positive individuals are positive for HIV-2 with 1.3% for monotypic HIV-2 infection and 1.5% for dual infection. An earlier study from our hospital has shown that the frequency of HIV-2 during the period of 2000-2001 was 2.47% of the total HIV infection including dual infection as estimated by HIV-2 specific ELISA.[8] A five-year analysis of immunoblot results from our centre during 1993-1997 showed the frequency of HIV-2 infection to be 3.8% of the total HIV infection.[9] Of these, 2.1% was dual and 1.7% was monotypic infection. Several studies including one from our centre has shown that dual infection by Western blot criteria may be an overestimation and only 40-60% of these samples are dual positives by PCR, while the remaining only for HIV-1.[10,11] If a correction factor is used to eliminate the overestimation of dual infection based on our earlier study then the frequency of dual infection in the study reported here will come down to 0.75 from 1.5%. This will give a cumulative frequency (monotypic and dual infection) of 2.25%. It appears that the frequency of HIV-2 is slightly lower during this study period when compared with the 1993-1997 period in the hospital population.

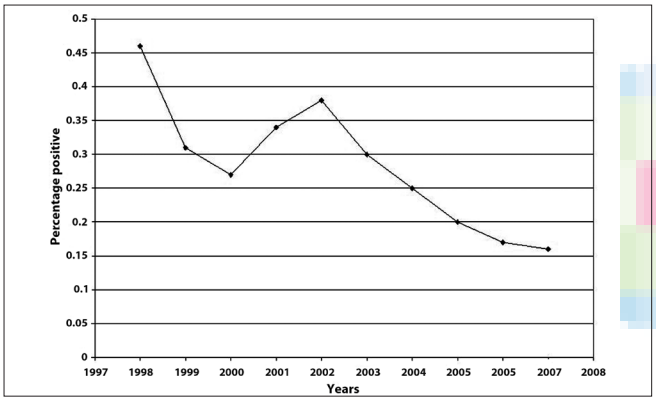

Figure 1: Percentage positive status for HIV in the blood donor population from the year 1998-2007

This information on frequency of HIV-2 infection among blood donors is important as Blood Banks are moving to NAT [http://www.scbcinfo.org/publications]. At present there are several commercial NAT systems for HBV, HCV and HIV. Majority of those systems have the ability to detect only HIV-1 but not HIV-2. The Cobas TaqScreen MPX test from Roche detects the presence of HIV-2; apart from the other three viral nucleic acids.

If the NAT system is done in parallel with a third or fourth generation HIV ELISA, all the established cases of HIV-2 can be detected. However, any one in the seroconversion period may be missed by the serological assay. One multicentre study from India has shown that by using NAT it was possible to detect one additional HIV-1 positive blood compared to serological tests in a total of 12, 224 donations[12]

Earlier, from our institution, it was shown that the frequency of HIV in blood donors for a five year period

Table 1: The number of donors found positive year wise (1998- 2007) for HIV-1, HIV-2 and HIV-1 and HIV-2 antibodies

Year	No. of Blood donors	No. positive at screening	No. of Positives confirmed by Western Blot*		
			HIV-1 (%)	HIV-2 (%)	HIV-1 and HIV-2(%)
1998	14487	97	64 (0.44)	1(0.007)	3 (0.014)
1999	15181	90	47 (0.31)	0	0
2000	15444	70	42 (0.27)	0	0
2001	17023	79	56 (0.33)	1(0.006)	0
2002	16846	88	60 (0.36)	2 (0.012)	1 (0.006)
2003	16846	74	47 (0.28)	1(0.006)	3(0.018)
2004	18073	74	44 (0.24)	1 (0.006)	0
2005	17931	72	36 (0.20)	0	0
2006	20917	71	34 (0.17)	0	0
2007	22272	74	35 (0.16)	0	0
Total	175026	789	465 (0.27)	6 (0.003)	7(0.004)

*49 samples were declared indeterminate after Western Blot/Immunoblot testing. Those were excluded from analysis.

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from April 1988 through March 1993 was 0.17%, compared to the mean frequency rate for the first three years (1988-1991) the mean frequency for the last two years (1991-93) was significantly high.[13] Subsequently, there was data published for the next five years i.e. from 1993-1997. The mean tri-annual frequency reported were 0.13%, 0.27% and 0.36% respectively for the years 1988-91, 1991-94 and 1994-97.[14] We also analyzed mean tri-annual frequency for the years 1998-2000, 2001-2003 and 2004-2006. The frequency was 0.34, 0.32 and 0.20% respectively and this drop of the frequency from 0.34 to 0.20% was significant ($P < 0.05$). After analyzing data year wise, it is apparent that there is a significant drop in the frequency of HIV in blood donors since 2002 ($P < 0.001$). There are reports which show a decline in the frequency of HIV infection in India.[15,16]

A PubMed search shows this is the first report on frequency of HIV-2 among the blood donors over several years. We clearly show HIV-2 infection among the donors, emphasizing the need for HIV-2 detection and envisage its possibility to grossly reduce the risk by using NAT.

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