Blood donors with antibody to the human immunodeficiency virus — the Natal experience

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Summary

The major incursion of human immunodeficiency virus type 1 (HIV-1) infection into the South African heterosexual population has been by southerly migration of the heterosexual HIV-1 epidemic from central Africa. Much important information can be obtained from blood donor seroprevalence data and cohort studies of those individuals infected during the early stages of the epidemic in South Africa. By the end of April 1989, over half a million blood donors in Natal had been screened and the presence of antibody to HIV-1 confirmed in more than 200. The majority of these anti-HIV-1 positive donors are young and single (many of them still at school), although a substantial proportion already have children of their own and a recent history of sexually transmitted disease is common. The Natal Blood Transfusion Service experience indicates that the heterosexual HIV-1 epidemic in Natal is essentially no different from the earlier stages of heterosexual epidemics elsewhere in Africa. There is still time for effective programmes to have a major impact on progression of the epidemic in South Africa, particularly if these programmes are directed at the young population in educational institutions.

Several million people are infected with the human immunodeficiency virus type 1 (HIV-1), which became silently pandemic in the late 1970s and is now increasing in prevalence and in geographical extent. In Africa, the main route of transmission is by heterosexual contact. The distribution and prevalence of HIV-1 infection, however, has been difficult to assess in most developing countries in Africa, partly due to poor development of surveillance activities and some reluctance by governments to recognise publicly the intensity of the epidemic.

Data on HIV-1 infection in South Africa are also incomplete for a variety of reasons and this must place a significant limitation on the value of the epidemiological scenario that can be constructed from them. Schoub et al. have described the HIV epidemic in South Africa as consisting of four separate epidemics — the male homosexual epidemic, the haemophilia/blood transfusion epidemic, the intravenous-drug abuser epidemic and the heterosexual epidemic; the last being the epidemic in which the greatest future growth will undoubtedly occur.

Much important information can be obtained from HIV-1 seroprevalence studies on well-defined populations (such as blood donors) and from longitudinal cohort studies of those infected at an early stage of the epidemic. What should be avoided, however, is the temptation to assume that the blood donor seroprevalence data are representative of the random population. A number of factors peculiar to this group, such as voluntary self-exclusion by high-risk individuals, may lead to misleading conclusions being drawn about the prevalence of HIV-1 infection in the general population.

The Natal Blood Transfusion Service introduced routine testing of all blood donations for the presence of antibody to HIV-1 in August 1985. By the end of April 1989, over half a million donors of all races had been screened and the presence of antibody to HIV-1 confirmed in 218 (Table I) of which 207 (95%) were from the black donor population.

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<th>TABLE I. NATAL BLOOD TRANSFUSION SERVICE DONORS SCREENED FOR ANTIBODY TO HIV-1, AUGUST 1985 - APRIL 1989</th>
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The Natal Blood Transfusion Service experience in the identification, confidential notification, primary counselling and prevalence of HIV-1 antibody-positive black blood donors is presented here.

Material and methods

Since 1985, a sample of every donation of blood has been screened for the presence of antibody to HIV-1 using at least one type 1 enzyme-linked immunosorbent assay (ELISA). All samples found to be repeatedly reactive with the screening ELISA were subject to Western blot analysis and/or an immunofluorescence assay for confirmation of HIV-1 antibody-positivity.

Donors with HIV-1 antibody were notified confidentially and given primary counselling by one or more of a small specially trained team of medical personnel according to guidelines issued by the American Association of Blood Banks, modified for local conditions, before being referred (with donor consent) for long-term follow-up. Where possible, donors were referred to their private medical practitioners for follow-up counselling and regular clinical assessment. The vast majority of the HIV-1 antibody-positive black blood donors, however, did not have access to, or were reluctant to be referred to, a private or family practitioner and were referred, when possible, to the Immunology Clinic at King Edward VIII Hospital in Durban.
Results

Fig. 1 shows the prevalence of HIV-1 antibody-positive black blood donors per 100,000 tested for each 6-month period since screening began. Of the 207 HIV-1 antibody-positive black donors, 126 (61%) were women and 81 (39%) were men (ratio 1.5:1); Fig. 2 shows the female and male proportions of total HIV-1 antibody-positive blood donors in various age groups. One hundred of the black subjects (48%) were first-time donors.

Fig. 1. Prevalence of HIV-1 antibody-positive black blood donors/100,000.

Fig. 2. Female and male proportions of total HIV-1 antibody-positive donors in various age groups.

Fig. 3. Occupations of the 167 HIV-1 antibody-positive black blood donors.

Results positive at the time of donation compared with 7% and 11% in the general black blood donor population.

Although none of the donors admitted to intravenous drug abuse, 106 (63%) had undergone some form of tribal scarification ritual and 91% of female donors had pierced ears.

At the time of counselling, 43 black donors (26%) complained of significant but unexplained weight loss and on examination 85 (51%) had palpable lymphadenopathy in more than one anatomical site.

Discussion

The major route of incursion of HIV-1 infection into the South African heterosexual population has been by downward migration of the heterosexual HIV-1 epidemic from central Africa. Fortunately, however, it would appear that we are still in the relatively early stages of the heterosexual HIV-1 epidemic in South Africa with a seroprevalence in black blood donors of a little over 0.2% at the end of January 1989 compared with rates of up to 18% in other countries in Africa by 1985. In the USA, the HIV-1 seroprevalence rate in blood donors declined from 35/1000 donors in 1985 to 12/1000 in 1987, this decline being attributed to the removal of previously identified seropositive persons from the donor pool. This has not occurred in Natal, however, where the seroprevalence rate has continued to increase in an exponential manner both in first-time and repeat black blood donors, indicating the difficulty in identifying and excluding high-risk donors in areas where heterosexual transmission is the main form of spread of HIV-1 infection.

By early 1989, the seroprevalence rate in black female donors in Natal was almost 3 times that of black male donors (Fig. 1). Although the overall ratio of female to male seroprevalence rates in Africa is usually reported to be about 1:1, this varies with age. The peak rate tends to occur at a younger age in women and the recent Natal Blood Transfusion Service experience is similar in that the highest female to male ratio was in the 17-19-year-old age group (Fig. 2). In fact, all 22 of the HIV-1 antibody-positive donors under 20 years of age were women. In Natal, where 81% of the black donor population is under the age of 30 years, it is apparent that the female to male ratio is increasing as the prevalence of HIV-1 infection increases. Fig. 2 illustrates that in South Africa, just as in the rest of Africa, the greatest effects for women will occur during the childbearing decade, which will have consequences for reproduction and the population structure, while for men the maximum impact coincides with their peak productivity, both at work and in the community. Our data show...
that there are already many one-parent families among HIV-1 antibody-positive donors where only 1 adult death will create orphans. In addition, pregnancy accelerates the development of disease in HIV-1-infected women and 5% of the female donors revealed, during counselling, that they were pregnant.

In Natal, for social and economic reasons, the majority of the blood from black donors is collected by mobile clinics at educational institutions and the workplace in industry. Although this bias is reflected in Fig. 3, which ranks the occupations of the HIV-1 antibody-positive black donors, it is apparent that HIV-1 infection is already well established in many schools. This emphasises the urgent need for effective preventive education programmes in these institutions. In this country, the maximum benefit is likely to result from education programmes directed at young people before they have developed established patterns of sexual behaviour.

This study revealed that the HIV-1 antibody-positive male donors had a significant exposure to prostitutes (30%) as well as a higher promiscuity index, and a higher percentage of male donors also had a recent history of treatment for an STD than the female donors. These data tend to corroborate the suggestion by O'Farrell and Windsor that, just as female prostitutes represent a reservoir for spread of HIV into the male community, so may promiscuous HIV-positive men represent a key group for spread into the female population in the Natal area. In addition, more than 50% of all the donors in this study had a recent history of treatment for STD, which lends support to the evidence that a recent history of STD increases susceptibility to infection. Although the percentage of HIV-1 antibody-positive donors with reactive syphilis serology was not significantly different from that of the general black donor population, a number of other sexually transmitted pathogens were found in a subgroup of these donors (see p. 623). It is important, however, to emphasise that transmission can clearly also occur in the absence of these co-factors.

In developing countries, the use of skin-lacerating instruments for tribal scarification and ear piercing also has potential for HIV transmission. Scarifications for medical purposes have been found to be significantly associated with antibody to HIV in hospitalised patients in Kinshasa. Although a high percentage of donors in this study had a history of scarification and/or ear piercing, interpretation of the causal role of this practice is difficult, mainly because of the absence of a control group and the high background of scarification and ear piercing in the general black population.

In conclusion, the Natal Blood Transfusion Service experience indicates that the heterosexual HIV-1 epidemic in Natal is essentially no different from the early stages of the heterosexual epidemics elsewhere in Africa, which are now in much more advanced stages of development. South Africa is in a fortunate position therefore in that there is sufficient time for effective preventive education programmes to have a major impact on the progression of the heterosexual epidemic, particularly if they are directed at the young population in educational institutions. This opportunity must not be wasted.

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