Behavioural risk factors for acquisition of HIV infection and knowledge about AIDS among male professional blood donors in Delhi

D. Chattopadhyaya,¹ L.W. Riley,² & S. Kumari³

In 1989–90 a study was carried out in Delhi of the risk behaviours and epidemiological characteristics exhibited by 15 paid blood donors who were positive for human immunodeficiency (HIV) virus and on 100 paid seronegative donors. All the donors were male. Compared with the seronegative donors, a significantly greater proportion of seropositive donors were unmarried, had lived in at least two cities in the previous 5 years, donated blood at least once per month, were heterosexually promiscuous, and had visited a clinic for sexually transmitted diseases. Awareness about acquired immunodeficiency syndrome (AIDS) was poor, and even those donors who had heard of AIDS were ignorant about certain important aspects. The results indicate that, based on the risk factors identified in this study, there is a need to adopt more careful selection criteria for blood donors in India.

Introduction

The mandatory screening of blood donors for antibody to human immunodeficiency virus (HIV) to prevent transfusion-associated HIV infection has been an important component of acquired immunodeficiency syndrome (AIDS) control programmes (I–3). In the USA, individuals who engaged in certain high-risk behaviours (e.g., intravenous drug use, sexual promiscuity, or homosexual acts) were excluded from donating blood by the U.S. Food and Drug Administration, even before the causative agent of AIDS was discovered.⁴⁻⁻ It has been reported that paid blood donors have an HIV infection rate that is higher than that of the general population (4, 5). India has a large reservoir of paid or “professional” (as they are referred to locally) donors and baseline data on screening of donors’ blood have revealed that there has been an alarming rise in the HIV seropositivity rate from zero in November 1986 to 2.8 per 1000 in October 1988 (6). However, it is not clear what factor(s) predispose professional donors to acquire HIV infection. Better understanding of these factors may help to institute specific control or preventive measures. We therefore carried out a study in Delhi to identify specific risk behaviours and epidemiological characteristics associated with professional blood donors that might account for their higher rate of HIV infection.

Materials and methods

The study population comprised a group of male blood donors associated with two of the leading commercial blood banks in Delhi. One of these blood banks refers donor samples to the National Institute of Communicable Diseases (NICD) as part of the National AIDS Surveillance Programme, while the other refers seropositive samples to NICD for confirmation.

At NICD, serum samples were tested for HIV antibody using a commercial enzyme-linked immunosorbent assay (ELISA) kit.⁶ Samples that repeatedly gave positive results by ELISA were further tested using a commercial Western blot kit.⁶

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* Recommendations to decrease the risk of transmitting acquired immunodeficiency syndrome (AIDS) from blood donors. Memorandum to Establishments. Washington, DC, Office of Biologies Research and Review, National Center for Drugs and Biologies, Food and Drug Administration, 24 March 1983.

* Revised definition of high risk groups with respect to acquired immunodeficiency syndrome (AIDS) transmission from blood and plasma donors. Memorandum to Establishments. Washington, DC, Office of Biologies Research and Review, National Center for Drugs and Biologies, Food and Drug Administration, 3 September 1985.

* Additional recommendations for reducing further the number of units of blood and plasma donated for transfusion or for further manufacture by persons and increased risk of HTLV-III/LAV infection. Memorandum to Establishments. Washington, DC, Office of Biologies Research and Review, National Center for Drugs and Biologies, Food and Drug Administration, 30 October 1986.
Donors who were HIV positive by ELISA as well as by Western blot (seropositive donors) were requested to attend a personal and confidential interview with a medical officer, who recorded demographic and epidemiological data as well as information concerning their knowledge about AIDS using a specially designed standard questionnaire (Table 1). Attempts were made to contact all seropositive donors identified between March 1989 and February 1990. A repeat sample of blood was collected from each of these donors at the NICD laboratory to confirm their earlier seropositivity. Seronegative donors were selected randomly for similar interviews, using the same questionnaire that was administered to the seropositive donors; repeat samples of blood were also collected from these donors to confirm their previous seronegativity. All the interviews, for seropositive as well as seronegative donors, were carried out by the same medical officer.

The proportions of seropositive and seronegative donors with various characteristics were compared statistically using $\chi^2$ and Fisher’s exact tests (7).

**Results**

Of 18,512 samples of blood donated by the professional donors between March 1989 and February 1990, 24 were positive for HIV antibody by repeated ELISA tests. Of these, 20 were confirmed by Western blot assay, which yielded an overall HIV infection rate of 1.1 per 1000 donations.

**Behavioural risk factors**

Data on the behavioural risk factors of the professional donors are shown in Table 1. Only 15 of the 20 seropositive donors could be contacted for interview, while 100 seronegative donors were interviewed. There was no significant difference in the mean or median ages of the seropositive and seronegative groups. However, all the seropositives were unmarried, compared with 51% of the seronegatives ($P < 0.001$). There was a tendency for the seropositive donors to have lived in two or more cities over the previous 5 years, whereas the seronegative donors had tended to remain in Delhi for longer ($P < 0.001$). Also, seropositive donors gave blood more frequently ($P < 0.001$) and were more likely to have done so at more than one centre ($P < 0.001$) compared with the seronegative donors. Nevertheless, an equally large proportion of seropositive and seronegative donors had donated blood for more than two years. Promiscuity, as indicated by sexual involvement with two or more female partners in one year, was more prevalent among the seropositive donors ($P < 0.001$), and a significant proportion (40%) of them had attended a sexually transmitted disease (STD) clinic, compared with only 1% of seronegative donors. Two of the seropositive donors admitted to having donated blood at a private plasma product marketing company.

A large proportion of both seropositive and seronegative donors were unemployed. Neither group of donors reported a history of jaundice or hospitalization. Also no donor had received any transfusion of blood or blood products, and none had donated blood in a hospital. There was no evidence of parenetal drug abuse among the donors and none had been abroad during the previous 5 years. Admission of homosexuality could not be elicited from any of the donors.

**Knowledge about AIDS**

Seven (47%) of the 15 seropositive donors and 52 of the 100 seronegative stated that they had heard of AIDS. Of 59 donors who habitually donated blood at more than one centre, 39 (66%) had heard of AIDS, compared with 20 (34%) who donated only at one centre ($P < 0.05$). Among married donors, 31 (63%) of 49 had heard of AIDS, compared with 28 (42%) of 66 unmarried donors ($P < 0.05$). Duration of residence in Delhi and the number of

<table>
<thead>
<tr>
<th>Table 1: Behavioural characteristics of the professional blood donors in relation to their serostatus for HIV infection</th>
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<td>Behavioural characteristic</td>
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<td>----------------------------</td>
</tr>
<tr>
<td>Unmarried</td>
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<tr>
<td>Resided in ≥ 2 cities in past 5 years</td>
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<tr>
<td>Donation frequency ≥ once per month</td>
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<tr>
<td>Donated at &gt; one blood bank</td>
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<tr>
<td>Donated blood for ≥ 2 years</td>
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<td>Sex with multiple partnersc</td>
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<tr>
<td>History of attending an STD clinic</td>
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<tr>
<td>Donated blood at private biological product marketing company</td>
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<tr>
<td>Unemployed</td>
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*a* Figures in parentheses are percentages.

*b* NS = not significant.

*c* Two or more partners in 1 year.
cities they had visited were not associated with donors' knowledge of AIDS.

Of the 59 donors who had heard of AIDS, 39 (66%) knew that it is present in India, 47% responded that AIDS can be transmitted by blood transfusion, 68% by sexual intercourse, and 2% by intravenous needle use, while 61% stated that it can lead to death. A total of 13 (22%) of these donors had engaged in sexual intercourse with multiple partners, but only 5/13 (38%) knew that AIDS can be transmitted by sexual intercourse.

### Discussion

Although paid blood donors have been identified to be a high-risk group for HIV infection, it is not clear what factors predispose them to it. We found that the following risk factors were significantly associated with seropositivity for HIV infection among professional donors in Delhi:

- unmarried status;
- residence in different cities over the previous 5 years;
- higher frequency of donating blood;
- donation of blood at more than one centre; and
- sexual promiscuity.

The rate of seropositivity per 1000 blood donations was lower than that observed in other developing countries, where a prevalence as high as 18% has been reported (8–10). In India, the prevalence was reported to be 2.8 per 1000 donors in October 1988, before mandatory screening of all blood donors was introduced (11).

The exclusively male donor population in the present study contrasts with observations in other countries where paid donors include also females (12).

All the 15 seropositive donors donated blood at least once every 2 months, 13 (87%) of them at least once a month, whereas only 31% of the seronegative donors gave blood as frequently as this. The higher frequency of donation among seropositives may predispose them to greater exposure to improperly sterilized transfusion equipment, as has been reported for hepatitis virus (13, 14). A similar association between HIV infection and a history of four or more monthly blood donations has been found among paid donors in Mexico City (4). Paid donors who donate blood as frequently as this may use the proceeds to finance a promiscuous life-style.

A significantly higher proportion of seropositive donors sold blood at more than one centre. By periodically changing centres, donors are able to increase the period between visits to any given blood bank, thus bypassing government guidelines about the minimum allowed interval between two consecutive donations by the same donor (15).

The economic status of donors did not seem to be related to the frequency with which they sold blood since there was no evidence of a significant difference in the employment status of seropositive and seronegative donors. Unemployment was high in both groups. Some reports from South America, however, have demonstrated a significantly higher prevalence of HIV antibodies among beggar blood donors and a higher prevalence of seropositivity among people of low socioeconomic status (5, 16).

The higher number of sexual partners among the seropositive donors is consistent with findings that sexual intercourse with multiple partners is a high-risk behaviour for HIV infection, and is one of the important criteria recommended by the U.S. Federal Drug Administration for exclusion of donors; however this is not yet practised in India. This finding may be associated with the higher proportion of seropositive donors who visit STD clinics. Other studies have also reported that blood donors with a history of STD had a significantly greater risk of being seropositive than donors with no such history. The concomitant presence of STD has been stated to be a predisposing factor for HIV infection (17, 18).

In India a serosurvey among sexually promiscuous females has revealed a large number of HIV seropositives (6). Although in 1987 the prevalence of HIV infection among prostitutes in Delhi was practically zero (19), the tendency of seropositive donors to migrate may provide them with opportunities to acquire infection in other cities where the prevalence of HIV infection among prostitutes is higher (11).

There was no difference between the seropositive and seronegative donors in terms of their knowledge about AIDS. Duration of residence in Delhi did not affect whether they had heard about AIDS; however, both donors who sold blood at more than one centre and married donors were more likely to have heard about AIDS.

Knowledge about AIDS, even among the 59 donors who had heard about it, especially its modes of transmission, was limited. More than half of them (53%) did not know that AIDS can be transmitted by blood transfusion, while 22% (13/59) had engaged in sexual intercourse with multiple partners. Since professional donors represent a distinct population group in Delhi, their knowledge about AIDS may not be representative of that of the general population. However, the study highlights a severe deficiency in the AIDS education of a group that has

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1. See footnote c, p. 319.
been clearly identified to be at risk of infection. A more detailed examination of the specific risk factors identified in this study, as well as increasing awareness about them among professional blood donors (e.g., at blood centres), must be carried out as part of the national strategy to control AIDS in India.

An estimated 1.5 million units of blood are collected each year in India, against a requirement of about 4 million units, the shortfall in many places being met by professional donors (6). The fact that a donor is negative for HIV infection in serological tests does not ensure the total safety of blood donations from that individual since there have been reports of transmission of HIV through transfusions from seronegative donors. Such donors often have identified risk factors (20). Moreover, at the time of donation an individual may be in the “window phase” at the very early stages of HIV infection (3). Our findings therefore emphasize that the need for transfusion must be balanced against a knowledge of the risk factors and that a risk–benefit assessment should be made before each transfusion, regardless of the results of serological tests (3).

It is desirable that the blood transfusion service in India should not be dependent on professional blood donors. The main obstacles to voluntary blood donations are general illiteracy, ignorance, and little appreciation of voluntary blood donors in terms of incentives (21). Involvement of young people in schools and colleges, if necessary with the help of teachers, is likely to be helpful in promoting voluntary blood donations. Also, audiovisual aids, public meetings, radio, television and newspapers should be used to the best possible extent to disseminate correct information about blood transfusions and to remove fears about HIV infection among the general public. Various social organizations could also be involved in this regard.

d’une infection par le virus de l’immunodéficience humaine (VIH). Un taux global d’infection par le VIH de 1,1 pour 1000 dons a été observé.

Un total de 15 donneurs séropositifs et 10 séronégatifs ont reçu un questionnaire type pour savoir s’ils présentaient certaines caractéristiques épidémiologiques et comportementales.

Les donneurs étaient exclusivement des hommes et il n’y avait pas de différence d’âge significative entre séropositifs et séronégatifs. Comparés aux donneurs séronégatifs, les séropositifs se déplaçaient plutôt plus souvent, donnaient du sang plus fréquemment et changeaient plus souvent de centre de dons. Les séropositifs pratiquaient plutôt davantage le vagabondage sexuel et une proportion importante avait consulté un dispensaire pour maladies sexuellement transmissibles. Près de la moitié des séropositifs et des séronégatifs n’avaient pas entendu parler du syndrome d’immunodéficience acquise (SIDA), mais la proportion de ceux qui en avaient entendu parler était plus élevée chez les donneurs non mariés et chez ceux qui donnaient du sang dans plus d’un centre. Chez ceux qui avaient entendu parler du SIDA, 66 savaient qu’il existait en Inde, 47% savaient qu’il pouvait être transmis par transfusion sanguine, 68% par rapports sexuels, 2% par emploi d’aiguilles intraveineuses et 61% savaient qu’il pouvait être mortel.

L’étude montre la prévalence de certains facteurs de risque associés au SIDA chez des donneurs de sang professionnels séropositifs en Inde, et qu’il existe de sérieuses insuffisances dans l’information sur le SIDA pour ce groupe particulier. Si les donneurs de sang considéraient ces facteurs de risque comme inquiétants, et s’ils étaient plus sensibilisés au problème du SIDA, cela contribuerait à renforcer les programmes de lutte contre le SIDA dans des pays en développement comme l’Inde.

Résumé

Facteurs de risque comportementaux pour l’acquisition d’une infection par le VIH chez des hommes donneurs de sang professionnels à Delhi et leurs connaissances sur le SIDA

Des échantillons de sérum de tous les donneurs de sang professionnels (rémunérés) travaillant pour deux banques de sang commerciales à Delhi, ont été testés par épreuve immuno-enzymatique (ELISA) et par Western blot de confirmation pour recherche

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