

HIV SEROINCIDENCE IN A HOSPITAL WORKER POPULATION: KINSHASA, ZAIRE

by

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Summary — The rate of acquisition of antibody to Human Immunodeficiency Virus (HIV) was determined among adults working at a hospital in Kinshasa, Zaire. Of 749 persons found to be HIV seronegative in September 1984, 579 (77.3%) were retested eight months later. Three persons had become HIV seropositive (annualized seroincidence, 0.74/100 person-years; 95% confidence interval, 0.08-1.59/100 person-years). This rate is approximately 10-30 times lower than estimates of HIV antibody acquisition for high risk group members in the United States and Europe, yet 20-100 times higher than among persons not belonging to high risk groups in the United States. While seroincidence in Kinshasa appears low in comparison with American and European high risk groups, substantial numbers of Kinshasa adults may be becoming infected with HIV.

KEYWORDS: Human Immunodeficiency Virus (HIV). AIDS; Seroincidence; Hospital Infection; Zaire.

Introduction

In October 1983, cases of the Acquired Immune Deficiency Syndrome (AIDS) were documented in Kinshasa, Zaire (17). Shortly thereafter, the Zairian Department of Public Health created a national AIDS research program, the Projet SIDA, and invited collaboration by the United States Public Health Service and the Institute of Tropical Medicine (Antwerp, Belgium).

In the United States and Europe, prevalence and limited incidence studies of antibody to human immunodeficiency virus (HIV) have been conducted among members of risk groups including homosexuals, intravenous drug abusers, and hemophiliacs (3, 4, 9, 12, 13, 16). These studies have demonstrated that over the past several years, the proportion of group members seropositive to HIV infection in Zaire differs from the United States and Europe; the major route of HIV transmission throughout Central Africa

is thought to be heterosexual contact (6, 17, 20). Thusfar, HIV seroincidence has not been measured in any African populations.

In September 1984, the Projet SIDA conducted an HIV seroprevalence study among staff of a Kinshasa hospital, as part of a study of risk factors for HIV infection. Eight months later, in May 1985, hospital staff were retested to determine the rate of HIV antibody acquisition.

Materials and methods

La Clinique de Ngaliema (CN) is a 300-bed hospital in Kinshasa, operated under government contract.

Serosurvey # 1: All CN employees were invited to participate in a study in mid-September, 1984. Participants were interviewed regarding possible risk factors for HIV outside the hospital (eg, blood transfusions, medical injections received) and about current and past medical work with emphasis on exposures to patients and blood.

Serosurvey # 2: From May 20-23 1985, all CN employees were invited to provide a second blood specimen for serologic testing.

Laboratory studies: Eight to 10 ml of blood were obtained from all participants in both studies. Sera were tested for antibody to HIV by a commercially available enzyme-linked immunosorbent assay (ELISA), (Litton Bionetics, Charleston, SC)* and by Western blot analysis. A specimen was considered positive for antibody to HIV if it was repeatedly reactive on two separate ELISA assays. Confirmation on western blots were prepared by electrophoresis of lysates of virus infected 3.01 cells (leu 3 positive cells)(10) onto 12% SDS gels (Integration Sciences, Newton, MA)*, transfer of proteins to nitrocellulose filters and incubation of the filters with sera diluted 1:1 000. Antibody to viral proteins were detected using I¹²⁵-labeled protein A and autoradiographic film. Banding patterns of antibody to p24, p41, and p110 were compared with those of serum known to be positive, diluted 1:4 000.

For all persons who were seronegative in serosurvey # 1 but seropositive in serosurvey # 2, both sera were retested by ELISA and Western blot techniques. A new seropositive was defined as a person whose first serum (September 1984) was negative and whose second serum (May 1985) was positive by both techniques.

Statistical analysis: Chi-square, Fisher's Exact Test and Student's «t» test were used to test individual associations, seroincidence was calculated using standard life-table techniques, and confidence intervals for seroincidence were derived from the binomial distribution(8).

Results

Serosurvey # 1: Of 840 CN employees in mid-September 1984, 790 (94%) participated in the seroprevalence study. Participants were equally

* Use of trade names and commercial sources is for identification only and does not constitute endorsement by the Department of Health and Human Services or any of its agencies.

divided by sex (398 men and 392 women). Men were older than women (mean age 40.2 years vs 33.7 years; t-test, $p < 0.0001$). Participants had lived in Kinshasa for an average of 22.8 years (median, 21 years). Three-fourths (596/790, 75.4%) were medical/technical personnel (including physicians, nurses, nurses' aides, laboratory technicians) and the remainder were administrative or service employees.

Forty-one of 790 participants (5.2%) were HIV antibody positive and Western blot confirmed. No significant differences in seropositivity were noted according to sex, age or marital status. There was no association between seropositivity and work category (medical/technical staff: 33/596, 5.5%; administrative and service staff: 8/194, 4.1%), specific job classification for medical personnel, extent or type of patient or blood contact, accidental needlesticks during the past year, routine washing of needles or syringes, or having hospital contact with a known or suspected AIDS patient.

Serosurvey # 2: Of the 749 HIV seronegatives identified in September 1984, 579 (77.3%) agreed to provide a second serum specimen in May 1985. No differences in age, sex, marital status or work category were noted between these 579 seronegatives and the 170 seronegatives who did not participate in the seroincidence study.

Three of these 579 seronegatives (0.5%) were seropositive in May 1985. The annualized seroincidence rate was 0.74/100 person-years (95% confidence interval, 0.08 — 1.59/100 person-years). All three new seropositives were women, aged 31, 39 and 48 years old. All were medical workers (two nurses, one «fille de salle» — a position with limited patient care and extensive housekeeping responsibilities) from different hospital services. One was married, one was divorced and one was never married.

Detailed interviews regarding possible HIV exposures during the period September 1984 - May 1985 were obtained from two of these three women.

Seropositive # 1: This 48 year old divorcee is a fille de salle working in the labor and delivery suite. She denied any contact with blood at work. From June 1984 to May 1985 she received 19 medical injections but denied scarifications, transfusions, acupuncture, or dental work. She is post-menopausal, lives alone and denied having sexual relations during the past several years. She is in good health except for a chronic gastritis treated symptomatically.

Seropositive # 2: This 31 year old healthy woman is a pediatric nurse and has regular patient contacts. She delivered a child by Cesarian section on May 3, 1985. She received 24 medical injections during the previous year but denied scarifications, acupuncture, or dental work. Her husband is her only reported sex partner, with whom she had vaginal intercourse and occasional fellatio but denied anal intercourse.

Seropositive # 3: This 39 year old never married nurse worked in the outpatient clinic at CN. She was reportedly healthy but has left CN and could not be located.

Discussion

Seroincidence among nearly 600 HIV seronegative healthy hospital workers in Kinshasa, Zaire was 0.74/100 person-years, or one new seropositive annually among 135 persons. Given the small number of new seropositives, no conclusions are possible regarding modes of HIV acquisition or relative risks by sex or occupational group.

The actual rate of new HIV infections in this population may be somewhat higher. The imperfect sensitivity of ELISA testing (2), the possibility that new seropositives at CN may have been more likely to become ill or die (7) and become lost to follow-up, and the occasional finding of HIV in antibody-negative persons (14) could all contribute to a higher incidence than actually measured in this study.

Seroincidence at CN may be compared with data from high risk groups studied in the United States and Europe. For example, annual sero-incidence was estimated at 7-18% among male homosexuals (3, 4, 12, 13), 3-23% among IV drug abusers (4, 16), and 13% among type A hemophiliacs (9). These estimates for high risk groups range from 10 to over 30 times higher than CN sero-incidence.

While sero-incidence estimates for the general population in the United States are not available, approximations can be based on AIDS incidence data and infection-to-case ratios (7, 11, 12, 19). Using an infection-to-case ratio of 75:1 (7) and an AIDS case incidence of 0.1/100,000 (1), the calculated HIV sero-incidence in the no-identifiable risk population in the United States would be 7.5/100,000, or approximately one new seropositive per 13,000 persons. This sero-incidence estimate is nearly 100 times lower than CN data.

An alternative calculation can be made from over one million American blood donors tested in 1985, of whom 38/100,000 were ELISA and Western blot positive for HIV antibodies (18). Even if all seropositives were infected during the previous year, sero-incidence among these blood donors would remain nearly 20 times lower than at CN.

In conclusion, sero-incidence at CN appears substantially lower than in high risk groups in the United States or Europe, yet markedly higher than in the no-identifiable risk population in the United States. Sero-incidence reflects the interaction of multiple factors, including virulence of the etiologic agent, host immunity or resistance, prevalence of infection in the population, the frequency and distribution of sexual and other practices associated with transmission, and the efficiency of HIV transmission by different routes. Current knowledge regarding these and related variables is inadequate to explain completely differences in sero-incidence between such diverse groups as intravenous drug abusers and residents of Kinshasa, Zaire.

Sero-incidence data based upon eight months' observation of 579 persons must be interpreted cautiously. Nevertheless, extrapolating CN sero-incidence to the adult population of Kinshasa (1.2 million, 1985 official estimate) suggests that substantial numbers of new infections with HIV may be occurring in this city. Further studies are planned in order to chart the progression of HIV in Kinshasa.

Séroïncidence du virus HIV chez le personnel d'un hôpital à Kinshasa, Zaïre.

Résumé. — L'apparition d'anticorps contre le virus de l'immunodéficience humaine (HIV) a été déterminée chez des adultes travaillant dans un hôpital à Kinshasa, Zaïre. Des 749 séronégatifs pour le HIV, en septembre 1984, 579 (77,3%) furent retestés huit mois après. Trois personnes devinrent séropositives pour le HIV (c'est-à-dire une séroïncidence annuelle de 0,74/100 personnes-années). Cette valeur est de 10 à 30 fois inférieure à celle d'un groupe à haut risque des Etats Unis ou d'Europe, mais est de 20 à 100 fois supérieure à celle de personnes aux Etats Unis n'appartenant pas un groupe à haut risque. Bien que cette séroïncidence puisse paraître faible en comparaison avec celle de groupes américains et européens à haut risque, de nombreux adultes peuvent s'infecter avec le HIV à Kinshasa.

HIV seroïncidentie bij het personeel van een hospitaal in Kinshasa, Zaïre.

Samenvatting. — Het optreden van antilichamen tegen het humane immunodeficiëntievirus (HIV) werd nagegaan bij volwassenen die werkzaam zijn in een hospitaal in Kinshasa, Zaïre. Van 749 in september 1984 voor het HIV seronegatieve personen, werden er 579 (77,3%) opnieuw getest acht maand later. Drie personen werden dan HIV seropositief bevonden (een seroïncidentie op jaarbasis van 0,74/100 personen-jaren; 95% betrouwbaarheidsinterval 0,08-1,59/100 personen-jaren). Deze waarde ligt ongeveer 10 tot 30 maal lager dan de schattingen voor de seroconversie van een risicogroep in de Verenigde Staten en in Europa, maar ligt 20 tot 100 maal hoger dan voor personen in de Verenigde Staten die niet tot een risicogroep behoren. Alhoewel de seroïncidentie gering lijkt in vergelijking met Amerikaanse en Europese risicogroepen, kunnen er in Kinshasa toch aantallen volwassenen met het HIV besmet worden.

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