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Incidence of dual presence of antibodies to HIV_1 and HIV_2 in seropositive cases seen in Ibadan, Nigeria

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Summary

Between July 1987 and December 1988, sera from 6,385 individuals were screened for HIV_1 but only 1,861 of these samples were screened for HIV_2. Majority of those screened for HIV infection (89.7%) were blood donors, 4.9% were international travellers/volunteers, 3.8% were patients (i.e. those with haematological malignancies, multiply transfused patients and those suspected of having HIV infection), and the rest (1.6%) were female sex workers. Screening for HIV_1 antibody was done using Welcozyme anti-HTLV III (Wellcome Diagnostics, Dartford, England) or Elavia I (Diagnostics Pasteur, Marnes La Coquette, France). ELAVIA Ac-Ab-Ak II was used to detect HIV_2. The confirmatory test employed was western blot, using LAV Blot I and LAV Blot II (Diagnostic Pasteur, Marnes La Coquette, France). The seroprevalence rate for HIV_1 in the blood donors was 0.51% while that of HIV_2 was 0.33%. The seroprevalence rates for HIV_1 and HIV_2 amongst the adult travellers were 1.64% and 0.55% respectively and the comparative rates in the multiply transfused patients (including those with haematological malignancies) were 1.23% each. All the HIV_2 positive cases in this group had refractory anaemia. In those suspected of having HIV infection, the seroprevalence rate of HIV_1 was 2.94% and no patient in this group had HIV_2. Evidence of dual infection by HIV_1 and HIV_2 was obtained from 18.5% of the seropositive individuals. The dual infection rate in seropositive Nigerians is similar to that reported for some West African countries. We would strongly suggest that all blood samples for HIV tests in Nigerians should be screened for both HIV_1 and HIV_2. The two blood donors with evidence of dual infection could not be contacted due to fictitious addresses. The only patient with a dual infection has refractory anaemia and he is still being followed up but has not yet developed full-blown AIDS.

Résumé

Entre Juillet 1987 et Décembre 1988, du sérum samguin pris de 6,385 individus étaient testés pour HIV_1 mais 1,861 de ces prélèvements ont été testés pour le HIV_2. La majorité de ceux testés pour l'infection HIV (soit 89.7%) étaient donneurs du sang; 4.9% étaient voyageurs internationaux/ volontaires; 3.8% étaient patients (i.e. ceux souffrant des maladies malignes hématologiques; des patients transfusés du sang à plusieurs reprises et ceux soupçonnés de l infection HIV) et les autres étaient des ouvrières. Le test pour l'anticorps HIV_1 été fait utilisant les méthodes Welcozyme anti HTLV III (Wellcome Diagnostics Dartford, England) ou Elavia I (Diagnostic Pasteur, Marnes la Coquette, France). ELAVIA Ac-Ab-Ak II à été employé pour la détection de HIV_2. Le test de confirmation employé était le blot occidental, utilisant LAV Blot I et LAV Blot II (Diagnostic Pasteur, Marnes la Coquette, France). Le taux de séroprévalence de HIV_1 chez les donneurs du sang était 0.51% tandis que celui de HIV_2 était 0.33%. Les taux de séroprévalence de HIV_1 et HIV_2 chez les voyageurs adultes étaient 1.64% et 0.55% respectivement. Chez les transfusés les taux comparatifs (y, inclus ceux avec des maladies malignes hématologiques) étaient de 1.23% chacun. Tous les cas positifs de HIV_2 dans ce groupe souffrait de l'anémie réfractaire. Chez ceux soupçonnés d'infection HIV_1 le taux de séroprévalence de HIV_1 etait 2.94% et personne de ce groupe avait le HIV_2.

La preuve d'infection par HIV_1 et HIV_2 à la fois a été obtenue. Chez 18.5% des individus séropositifs le degré de cette dualité d'infection chez les Nigérians séropositifs est similaire à celui des autres pays de l'Afrique de l'Ouest. Nous sugérons toute prise de sang destinée au test de HIV chez les Nigérians doit être testée à la fois pour le HIV_1 et le HIV_2. Les deux

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donneurs de sang avec évidence de dualité d'infection ont donné des adresses fictives. Il est donc impossible de les contacter. Le seul patient avec une dualité d'infection suffre de l'anémie réfractaire. Il est toujours sous observation mais il n'a pas encore developpé le SIDA.

Introduction

The main virus associated with Acquired Immune Deficiency Syndrome (AIDS) is Human Immunodeficiency Virus type 1 (HIV_1), which was discovered in 1983[1,2]. Recently, another variant called HIV_2 was isolated and shown to be more closely related to Simian Immunodeficiency Virus (SIV)[3-5]. However, HIV_2 shares 45% homology with HIV_1[6]. Seroprevalent rates of HIV_1 infection and AIDS due to HIV_1 have been reported to World Health Organisation (WHO) from 159 countries. In contrast, there is limited data on the seroprevalent rate of HIV_2 infection. It is currently believed that HIV_2 is endemic in some parts of West Africa such as Guinea Bissau and Cote d'Ivoire[8,9,10]. Some other reports have documented the co-existence of antibodies to the major viral proteins for HIV_1 and HIV_2 in some individuals[10].

We present here the first report in three Nigerians of the dual presence of antibodies to HIV_1 and HIV_2.

Method

Between July 1987 and December 1988, fresh sera from 6,385 individuals were screened for HIV_1 at the University College Hospital, Ibadan, Nigeria; 89.7% of those tested were blood donors 4.9% were international travellers plus volunteers, 3.8% were multiply transfused patients, those with haematological malignancies and patients suspected of having HIV infection. Individuals with high-risk behaviour (female sex workers) constituted 1.6% of the entire group.

Whenever HIV_2 kits became available, frozen sera (at -70°C) of some blood donors (1,200) were screened for HIV_2 but all the members (761) of the other groups above were simultaneously screened for both HIV_1 and HIV_2 using fresh sera.

HIV antibody screening was done using enzyme linked-immunosorbent assay (ELISA) kits. Antibodies to HIV_1 were detected using Wellcozyme anti-HTLV III (Wellcome Diagnostics, Dartford, England) or Elavia I (Diagnostics Pasteur, marnes La Coquette, France). ELAVIA Ac-Ab-Ak II was used to detect HIV_2. Repeatedly, reactive samples on ELISA were subjected to a confirmatory test.

The technique employed for confirming the presence of antibodies to HIV_1 and HIV_2 was western blot, using LAV Blot I and LAV Blot II kits respectively (Diagnostics Pasteur, marnes La Coquette, France). Criteria for a positive result on Western blot were bands showing antibodies to *env* and *gag* gene products, *env* and *pol* gene products or at least two *env* bands.

A sample was considered to show evidence of dual presence of antibodies to HIV_1 and HIV_2 if it was reactive on ELISA test for both HIV_1 and HIV_2 and also positive on western blot for both HIV_1 and HIV_2.

Results

Within a period of 18 months, 5,724 blood donors were screened for HIV_1 but only 21% (1,200) of the donors were randomly screened for both HIV_1 and HIV_2. This was due to inavailability of HIV_2 assay kits during the initial period of establishing an HIV screening/confirmatory centre in our hospital. The UCH screening/confirmatory centre for HIV detection was established in July 1987.

All the international travellers (226), volunteers (92), female sex workers (100) and all the patients (343) including those suspected of having HIV infection were screened for both HIV_1 and HIV_2.

Twenty-nine donors were positive for HIV_1 and 4 donors were positive for HIV_2 representing seroprevalent rates of 0.51% and 0.33% respectively (Table I). Two of these seropositive donors had evidence of dual infection with HIV_1 and HIV_2 (Table II).

Three of the adult travellers had antibodies to HIV_1 and a fourth was positive for HIV_2, giving seroprevalent rates of 1.64% and 0.55% respectively. In the multiply transfused group, seroprevalent rates for HIV_1 and HIV_2 were 1.44% each. Those suspected of having HIV infection had a seroprevalent rate for HIV_1 of 2.94% but no HIV_2 infection was detectable in this sub-group. All seropositive donors were males, three out of the 4 seropositive travellers were males, one was a female.

Table 1: Seroprevalent rate for HIV in sera obtained between July 1987 and December 1988 in UCH, Ibadan.

Subject	No. Screened for HIV-1	No. Positive for HIV-1 (%)	No. Screened for HIV-1 and HIV-2	No. Positive for HIV-2 (%)	No. Positive for HIV-1+2 (%)	Dual Infection rate amongst seropositives
Donors	5724	29(0.51)	1200*	4(0.33)	2(0.17)	20%
Travellers Children**	43	0	43	0	0	0
Adults	183	3(1.64)	183	1(0.55)	0	0
Volunteers	92	0	92	0	0	0
Suspected HIV infection	34	1(2.94)	34	0	0	0
Other patients	209	3(1.44)	100	3(1.44)	1(0.48)	17%
Risk Group	100	3(3.0)	100	1(1.00)	0	0
Grand Total	6,385	39(1.33)	1861	9(0.44)	3(0.09)	18.5%

(*6 were positive for HIV_1)
** Children < 15 yrs of age

Table 2: Antibodies to HIV_1 and HIV_2 gene products detected on western blot in the 3 cases showing evidence of dual infection

	HIV_1	HIV_2
Blood donor Y (36 yrs. male)		
env	160, 110	140, 105, 41
gag	55, 40, 25, 18	56, 26, 16
Polymerase	68, 34	68
Blood donor Z (20 yrs. male)		
env	160, 110, 41	140, 103, 41
gag	55, 40, 25, 18	56, 26
Polymerase	68, 34	68
Patient *AS* (32 yrs. male)		
env	160, 110, 41	41
gag	55, 25, 18	56, 26
Polymerase	68, 34	68, 36

Of the 3 seropositive patients with refractory anaemia one was a female, the others were males. One of these two males with refractory anaemia showed evidence of dual infection. He is still transfusion — dependent but has not yet developed AIDS, three years after showing serologic evidence of a dual infection.

Evidence of dual infection by HIV_1 and HIV_2 was obtained in 18.5% of the seropositive cases (this percentage was calculated using as denominator the number of seropositive cases in the population screened for both HIV_1 and HIV_2, i.e. 1,200 donors, 318 volunteers/travellers and 343 patients and 100 female sex workers).

Discussion

The seroprevalent rate for HIV infection amongst Nigerians in 1987 was 0.2% while in 1989 the seropositivity rate had climbed up to 0.42%[7]. These data were based largely on HIV_1 screening. There is a dearth of information on the incidence of HIV_2 infection in Nigeria.

In this study, we have demonstrated the presence of antibodies to both HIV_1 and HIV_2 in three Nigerians, representing 18.5% of the seropositive cases seen between July 1987 and December 1988 in UCH, Ibadan. The dual infection rate in HIV seropositive Nigerians is similar to that reported for some other West African countries. For instance, antibodies to both HIV_1 and HIV_2 occur in 14% of all seropositive individuals in Cote d'Ivoire[9]. In the absence of type-specific HIV pro-viral DNA detection by polymerase chain reaction (which we do not have facilities for in our centre), we are unable to rule out whether this dual reaction is due to a single infection generating broad immune response or to a third virus having HIV_1 and HIV_2 epitopes.

We can only infer a dual infection in our three cases because western blot assay showed antibodies to *gag*, *pol* and *env* proteins of both viruses. The implications of such a dual infection are not fully understood neither have effects of sequential infection versus simultaneous infection been determined.

We do not have enough data to determine the sequence of the dual infection in these cases but a simultaneous infection is more likely in the multiply transfused patient (AS). This patient is still transfusion-dependent but has not yet developed AIDS three years after showing serological evidence of a dual infection.

It is of interest to note that the seroprevalence of HIV_2 is highest in the multiply transfused patients, (most of whom would have received blood from individuals resident in Nigeria), strengthening the fact that HIV_2 is endemic in West Africa[8,9,10].

The highest incidence of HIV_1 in Nigerians is amongst the female prostitutes (3.0%) and in patients suspected of having HIV infection (2.94%).

The seroprevalent rate of HIV in Nigeria of 0.42% is at variance with the seroprevlence rate of 1.77% recorded in our centre for a similar period. This can be largely explained by the fact that our laboratory serves as a referral and confirmatory centre for at least four other screening centres in the region. In addition, majority of the 123,000 Nigerians screened so far are blood donors, some of whom were not screened for HIV_2. The seroprevalence rate of 0.51% for HIV_1 in blood donors screened at our centre compares favourably with the national seroprevalent rate (of 0.42%) for the same period.

We would strongly suggest that all blood samples for HIV tests in Nigerians should be screened for both HIV_1 and HIV_2. We have shown that the seroprevalence rate of HIV_1 is about three times that of HIV_2 and about 18.5% of seropositive sera may show a dual reaction.

The incidence of HIV infection in Nigeria has risen steadily since 1987, when HIV screening centres were established in the country. The seroprevalence rate of HIV in Nigeria was 0.2% in 1987, 0.42% in 1989 and is currently at 0.97%. When more data are gathered on both HIV_1 and HIV_2 infection, this rising trend may assume a steeper slope.

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