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Prevalence of Antibodies to Human Immunodeficiency Virus Type 1 and Condom Use among Outpatients at a Sexually Transmitted Disease Clinic in Rome

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To assess the prevalence of HIV-1 infection and study selected risk factors among patients attending a clinic for sexually transmitted diseases in Rome, 1442 outpatients seen consecutively between 20 February and 12 December 1989 were anonymously tested for anti-HIV-1. An evaluation of the trend of the HIV-1 infection was attempted by comparing the results of the present study with those obtained from a similar sample studied in 1986 in the same clinic. The overall estimated prevalence of anti-HIV-1 was 1.2 % among heterosexual non-drug user subjects and 16.1 % among homosexual or bisexual men. The anti-HIV-1 seropositivity was significantly higher in heterosexual subjects who reported sexual contact with intravenous drug users, as compared with those who did not report such exposure (12.5 % vs 0.8 %, $p < 0.005$). Comparing the present data with those of a study conducted in 1986 in the same clinic, a lower prevalence of anti-HIV-1 was found among heterosexual subjects (1.2 % in 1989 vs 6.0 % in 1986, $p < 0.001$). The availability after 1986 of several outpatient facilities attracting seropositive subjects and a change in the sexual behaviour of anti-HIV-1 positive subjects could explain this finding. Twenty percent of the heterosexual subjects and 62 % of the homosexual or bisexual men reported consistent use of condoms. In both heterosexual subjects and homosexual/bisexual men only the number of sexual partners in the previous year seemed to be related to the use of condoms, a higher proportion of subjects with two or more partners reporting the use of condoms, as compared with monogamous subjects (29.5 % vs 11.5 %, $p < 0.001$ and 68.0 % vs 37.0 %, $p < 0.005$). The infrequent use of condoms, in particular among heterosexual subjects, suggests that education campaigns conducted so far were partly effective.

Outpatients attending clinics for sexually transmitted diseases (STD) represent a sentinel population for monitoring the spread of the human immunodeficiency virus type 1 (HIV-1) infection through sexual contact (1). Early studies carried out in several cities in developed countries among patients attending STD clinics showed different prevalence rates ranging from 0.7 % in Antwerp to 3.4 % in non-drug addict heterosexual subjects in New York (2, 3).

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In a study conducted in a large STD clinic in Rome in 1986, we found a high prevalence of HIV-1 antibodies in non-drug user heterosexual subjects; 6.6 % of 467 males and 5 % of 261 females were seropositive. We also studied 148 homosexual-bisexual men, 22.3 % of whom had anti-HIV-1 antibodies (4). These data suggested that HIV-1 infection was spreading through heterosexual contact in the sexually active population, presumably by a disproportionate increase in the number of infections among the heterosexual partners of intravenous drug users and other high-risk subjects.

We report here the results of a seroepidemiologic study conducted in the population attending the same STD clinic in order to evaluate the trend of HIV-1 infection among active heterosexual subjects and homosexual or bisexual males in Rome

and to investigate the association between anti-HIV-1 prevalence and selected risk factors. Furthermore, condom use among these outpatients was studied.

Patients and Methods

A total of 1757 consecutive patients seen between 20 February and 12 December 1989 in a clinic for sexually transmitted diseases (STD) in Rome were asked to complete a standard precoded anonymous questionnaire, administered by a trained interviewer. Informed consent was obtained from all the study subjects. The questions were designed to obtain data on the following: age, sex, place of birth, residence, education, family size, past history of sexually transmitted diseases, use of intravenous drugs, history of transfusion with blood or blood products, sexual preference, number of sexual partners in the previous year, sexual contacts with intravenous drug users or seropositive partners, use of condoms in the previous year. Patients were defined as having a history of STD if they reported a previous diagnosis and/or had at the time of the interview a diagnosis of herpes virus type 2 (HSV2) genital infection, gonorrhea, syphilis, genital warts, chlamydial urethritis or cervicitis. Subjects without a history of STD had been referred to the clinic for infections of the urogenital tract associated with non-sexually transmitted agents (urinary tract pathogens) or dermatologic conditions of the genital area (eczema, psoriasis, lichen planus, dermatophytosis). Patients were defined as using a condom if they reported having used it "always" or "often" in the previous year.

A blood sample was obtained from 1442 patients (82 % of the total study population). For each study subject the anonymous questionnaire and the blood specimen were assigned the same code number. Thus, the results of the serologic test were linked to the patient's questionnaire, the anonymity of the subject being preserved. The patients did not receive their HIV test result. A commercially available enzyme immunoassay (EIA) (Abbott, USA) was used to test serum samples for anti-HIV-1 antibodies. Positive tests were confirmed by Western blot analysis (Biotech/Du Pont, USA). Masked replicates were tested in 10 % of the blood tests to assess laboratory reproducibility.

The 95 % confidence intervals for prevalence rates were calculated using the binomial probability distribution. The chi-square test or Fisher exact test were used to analyse statistical associations between anti-HIV-1 positivity and risk factors.

Results

The 1442 patients from whom a blood sample was obtained had a median age of 32 years (range 15–80); 1065 (74 %) were males, 209 (15 %) of whom were homosexual or bisexual. Of these 1442 subjects, 33 were aware of being seropositive at the outset of the study. Selected socio-demographic characteristics and HIV risk factors of the study population are shown in Table 1.

The 315 subjects not tested for HIV were similar to the study subjects with regard to socio-demographic characteristics and all risk factors considered with the exception of the history of STD. A significantly lower proportion of subjects who refused the blood test reported a history of STD as compared with the subjects who did not (37 % vs 47 %, $p < 0.005$). Forty-eight subjects of African origin (North Africa, Horn of Africa and Central/East Africa) were excluded from the analysis because no information was available

Table 1: Characteristics of the study population of 1442 patients attending the Rome STD clinic between 20 February and 12 December 1989.

	Number	(%)	Total
Socio-demographic characteristics			
Males	1065	(73.8)	1442
Females	377	(26.1)	1442
Low education status (≤ 8 years)	736	(51.6)	1426
Sexual preference			
Heterosexual	1189	(85.1)	1398
Homosexual-bisexual	209	(14.9)	1398
Risk factors			
Intravenous drug use	57	(4.0)	1428
Blood transfusion after 1975	34	(2.5)	1367
Sexual contact with intravenous drug users	60	(5.4)	1109
Sexual contact with seropositive partners	24	(2.2)	1077
Sexual contact with prostitutes	342	(38.3)	893
History of sexually transmitted disease	671	(46.5)	1442
Condom use in the previous year (always/often)	345	(25.5)	1352

Table 2: Anti-HIV-1 seroprevalence in heterosexual subjects and homosexual-bisexual men.

Variable[a]	No. (%) anti-HIV-1 positive	Total
Heterosexual subjects[b]		
Age 15–24 years	1 (0.5)	217
Age ≥ 25 years	12 (1.4)	846
Sexual contact with intravenous drug users	3 (12.5)	24
Sexual contact with seropositive partners	1 (14.3)	7
Blood transfusion after 1975	0 (–)	24
Sexual contact with prostitutes	3 (1.2)	259
History of sexually transmitted disease	7 (1.6)	445
Two or more partners in the previous year	4 (0.8)	505
No defined risk factor	4 (0.8)	502
Overall	13 (1.2)	1063
Homosexual-bisexuasl men[c]		
Age 15–24 years	1 (4.8)	21
Age ≥ 25 years	30 (17.5)	171
Sexual contact with intravenous drug users	1 (25.0)	4
Sexual contact with seropositive partners	2 (28.6)	7
Blood transfusion after 1975	1 (50.0)	2
Sexual contact with prostitutes	3 (10.7)	28
History of sexually transmitted disease	24 (17.4)	138
Two or more partners in the previous year	26 (16.1)	161
Overall	31 (16.1)	192

[a] Variables not mutually exclusive.
[b] 48 intravenous drug users excluded.
[c] 8 intravenous drug users excluded.

Table 3: Anti-HIV-1 seroprevalence in STD clinic out-patients[a]: comparison of results obtained in 1986 and 1989.

	1986			1989		
	No. (%) anti-HIV-1 positive	Total	95 % confidence interval	No. (%) anti-HIV-1 positive	Total	95 % confidence interval
Heterosexual males	31 (6.6)[b]	467	4.5–9.0	8 (1.1)[b]	738	0.1–3.1
Heterosexual females	13 (5.0)[c]	261	2.0–9.0	5 (1.5)[c]	325	0.04–4.5
Homosexual-bisexual males	33 (22.3)[d]	148	15.9–29.4	31 (16.1)[d]	192	11.2–21.6

[a] 56 intravenous drug users are excluded.
[b] $p < 0.001$.
[c] $p < 0.05$.
[d] Not significant.

about the time of immigration. However, of the 46 tested 1 (2 %) was seropositive.

Of the 56 subjects who acknowledged the use of intravenous drugs, 19 (34 %) were anti-HIV-1 positive.

Among the heterosexual patients, excluding the intravenous drug users, the overall prevalence of anti-HIV-1 was 1.2 %; no association was found with age and sex. The HIV-1 seropositivity was significantly higher among subjects who reported having sexual contact with an intravenous drug user, as compared with those who did not (3/24, 12.5 % vs 7/867, 0.8 %, $p < 0.005$). No association was found between anti-HIV-1 presence and a history of STD or a history of two or more sexual partners in the previous year. Finally, the prevalence among the 502 subjects who did not report any previous risk behaviour was 0.8 % (Table 2).

Table 4: Rate of condom use (always/often) among heterosexual subjects (48 intravenous drug users are excluded).

Variable		No. (%) reporting condom use	Total	P value
Anti-HIV-1 positive	Yes	2 (18.2)	11	> 0.05
	No	202 (20.1)	1007	
No. of sexual partners	1	71 (11.5)	617	< 0.001
	≥ 2	160 (29.5)	542	
STD (past or present)	Yes	110 (22.9)	481	< 0.05
	No	122 (17.9)	681	
Sexual contact with intravenous drug users	Yes	7 (26.9)	26	> 0.05
	No	186 (18.9)	983	
Sexual contact with prostitutes	Yes	78 (27.0)	289	> 0.05
	No	92 (21.1)	436	

Table 5: Rate of condom use (always/often) among homosexual-bisexual males (8 intravenous drug users are excluded).

Variable		No. (%) reporting condom use	Total	P value
Anti-HIV-1 positive	Yes	17 (77.3)	22	> 0.05
	No	89 (61.0)	146	
No. of sexual partners	1	10 (37.0)	27	< 0.005
	≥ 2	102 (68.0)	150	
STD (past or present)	Yes	87 (66.4)	131	> 0.05
	No	26 (53.1)	49	
Sexual contact with intravenous drug users	Yes	3 (60.0)	5	> 0.05
	No	46 (62.2)	74	
Sexual contact with prostitutes	Yes	18 (60.0)	30	> 0.05
	No	67 (60.4)	111	

Among the homosexual or bisexual men, excluding the intravenous drug users, the overall anti-HIV-1 prevalence was 16.1 %. No significant association of seropositivity with increasing age or with the other risk factors considered was found in this group (Table 2).

On comparison of the present data with the results of the seroprevalence study carried out in 1986 in the same STD clinic, a statistically significant difference was found between the anti-HIV-1 prevalence in heterosexual males and females (Table 3). Comparing only those subjects who at the time of the interview were diagnosed as having one of the STDs listed above (166/728 in 1986 and 181/1063 in 1989), the prevalence of anti-HIV-1 was 10.2 % in 1986 and 1.7 % in 1989 ($p < 0.01$).

The use of condoms was assessed in 1163 heterosexual subjects and 180 homosexual or bisexual men. Twenty percent of the heterosexual subjects and 63 % of the homosexual or bisexual men reported consistent use of condoms. The use of condoms was not related to the anti-HIV-1 status in heterosexual or homosexual/bisexual patients (Tables 4 and 5).

The use of condoms among heterosexual subjects and homosexual or bisexual men was also analysed stratifying by number of sexual partners in the previous year, history of STD, and sexual contact with intravenous drug users and prostitutes. A significantly higher proportion of heterosexual subjects and homosexual/bisexual men having had two or more sexual partners in the previous year reported the use of condoms, as compared

with subjects with only one partner (29.5 % vs 11.5 %, $p < 0.001$, and 68.0 % vs 37.0 %, $p < 0.005$, respectively). The use of condoms was more common among heterosexual subjects with a history of STD as compared with those with a negative history (22.9 % vs 17.9 %, $p < 0.05$). No difference in condom use was seen between subjects who reported sexual contact with intravenous drug users and prostitutes and subjects who did not.

Discussion

Repeated serologic studies in STD clinics provide an opportunity for monitoring the HIV-1 seroprevalence in selected populations and have been recommended by the World Health Organization as part of HIV surveillance programmes based on sentinel populations (1).

The prevalence of antibodies found among heterosexual subjects in this study (1.2 %) is similar to that found in 962 male (1 %) and 949 female (0.7 %) heterosexual subjects attending an STD clinic in South-East England (5). In a study conducted in New York (6) the seroprevalence in a population of persons who denied all known risk factors was 1 %, similar to the 0.8 % prevalence estimated in our study. In the same study conducted in New York, intravenous drug use, male-to-male sexual intercourse and sexual contact with an intravenous drug user were the most important risk factors for HIV infection among the clinic patients.

In the assessment of risk factors potentially involved in heterosexual transmission, a strong association was found between the presence of antibodies to HIV-1 and a history of sexual contact with an intravenous drug user or a seropositive partner. No association was found with a history of transfusion of blood or blood products in the period since 1975, a history of STD, a history of sex with prostitutes or the number of sexual partners in the previous year.

Of the 192 subjects reporting male-to-male intercourse, 31 (16.1 %) had anti-HIV-1 antibodies. This rate was similar to that found three years before. This figure might in fact be an overestimate of the prevalence of anti-HIV-1 antibodies among homosexual and bisexual males in Italy, since those attending an STD clinic represent a selected population with high-risk behaviour. Although one of two transfused homosexual/bisexual males was anti-HIV-1 positive, no significant association was found between seropositivity and a history of blood transfusion since 1975 or other risk factors considered.

In our study no association was detected between seropositivity and a history of STD, although some recent studies emphasise on the role of STD, particularly those associated with genital ulcers, in the transmission of HIV-1 (7, 8).

The use of condoms was not common among the heterosexual subjects attending the STD clinic. In fact, only 20 % of them reported consistent use of condoms in the previous year, as compared with 63 % of the homosexual/bisexual men. However, those who had more than one sexual partner in the previous year were more likely to report consistent condom use than monogamous subjects. The number of sexual partners was more strongly related to the use of condoms than the type of partner (drug user or prostitute). In a study conducted in San Francisco in 1989 a higher proportion of heterosexual subjects reported the use of condoms, as compared with our finding, but neither the total number of partners nor a history of STD nor the educational level of the patient was related to the use of condoms (9). The infrequent use of condoms, in particular among heterosexual subjects more likely to indulge in sexual intercourse without protection, suggests that counselling and education should be actively offered to patients attending STD clinics.

The anti-HIV-1 seroprevalence of 6 % estimated in 1986 among heterosexual patients attending the same STD clinic was much higher than that estimated in 1989 in the present study. This change in HIV-1 prevalence is difficult to interpret. A likely explanation is that availability and accessibility of several specialized AIDS outpatient facilities, established after 1986 in the area of Rome, may have selectively attracted individuals who were aware of being seropositive or at risk for HIV-1 infection. An alternative explanation is that a substantial change in the sexual behaviour of HIV-1 seropositive subjects could have reduced the spread of the infection through heterosexual contact. The concurrent decrease in the proportion of heterosexual subjects diagnosed as having an STD at the time of the study in 1989 as compared with the proportion observed in 1986 (22.8 % in 1986 vs 17.0 % in 1989, $p < 0.01$) could in part support this hypothesis.

However, any assumptions on behavioural changes should be made with caution and need further investigation.

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References

1. **World Health Organization:** Global programme on AIDS: use of HIV surveillance data in national AIDS control programmes. WHO/GPA/SFI/90.1. WHO, Geneva, 1990.
2. **Piot P, Kreiss JK, Ndinya-Achola JO, Ngugi EN, Simonsen JN, Csmeon DW, Tealnan M, Plummer FA:** Heterosexual transmission of HIV. AIDS 1987, 1: 199–206.
3. **Rabkin CS, Thomes PA, Jaffe MW, Schultz S:** Prevalence of antibody to HTLV-III/LAV in a population attending a sexually transmitted diseases clinic. Sexually Transmitted Diseases 1987, 14: 48–51.
4. **Mele A, Verani P, Caprilli F, Gentili G, Stazi MA, Rezza G, Sernicola L, Franco E, Prignano G, Pasquini P:** High prevalence of antibodies to human immunodeficiency virus in heterosexual persons attending a sexually transmitted disease clinic in Italy. European Journal of Clinical Microbiology and Infectious Diseases 1989, 8: 238–241.
5. **Collaborative Study Group:** HIV infection in patients attending clinics for sexually transmitted diseases in England and Wales. British Medical Journal 1989, 298: 415–418.
6. **Chiasson MA, Stoneburnes RL, Lifson AR, Hildebrandt DS, Ewing WE, Schultz S, Jaffe HW:** Risk factors for human immunodeficiency virus type I (HIV-1) infection in patients at a sexually transmitted disease clinic in New York City. American Journal of Epidemiology 1990, 131: 208–220.
7. **Stamm WE, Handsfield HH, Rompalo AM, Ashley RL, Roberts PL, Corey L:** The association between genital ulcer disease and acquisition of HIV infection in homosexual men. Journal of the American Medical Association 1988, 260: 1429–1433.
8. **Quinn TC, Glasser D, Cannon RO, Matuszak DL, Dunning RW, Kline RL, Campbell CH, Israel E, Fauci AS, Hook EW:** Human immunodeficiency virus infection among patients attending clinics for sexually transmitted diseases. New England Journal of Medicine 1988, 318: 197–203.
9. **Centers for Disease Control:** Heterosexual behaviours and factors that influence condom use among patients attending a sexually transmitted disease clinic in San Francisco. Morbidity and Mortality Weekly Report 1990, 39: 685–689.