

## Risk factors for HIV infection in people attending clinics for sexually transmitted diseases in India

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### Abstract

**Objective**—To investigate the risk factors for HIV infection in patients attending clinics for sexually transmitted diseases in India.

**Design**—Descriptive study of HIV serology, risk behaviour, and findings on physical examination.

**Subjects**—2800 patients presenting to outpatient clinics between 13 May 1993 and 15 July 1994.

**Setting**—Two clinics and the National AIDS Research Institute, in Pune, Maharashtra State, India.

**Main outcome measure**—HIV status, presence of sexually transmitted diseases, and sexual behaviour.

**Results**—The overall proportion of patients infected with HIV was 23.4% (655/2800); 34% (184) of the women and 21% (459) of the men were positive for HIV infection. Of the 560 women screened, 338 (60%) had a reported history of sex working, of whom 153 (45%) were infected with HIV-1. The prevalence of HIV-1 infection in the 222 women who were not sex workers was 14%. The significant independent characteristics associated with HIV infection based on a logistic regression analysis included being a female sex worker, sexual contact with a sex worker, lack of formal education, receptive anal sex in the previous three months, lack of condom use in the previous three months, current or previous genital ulcer or genital discharge, and a positive result of a Venereal Disease Research Laboratory test.

**Conclusions**—In India the prevalence of HIV infection is alarmingly high among female sex workers and men attending clinics for sexually transmitted diseases, particularly in those who had recently had contact with sex workers. A high prevalence of HIV infection was also found in monogamous, married women presenting to the clinics who denied any history of sex working. The HIV epidemic in India is primarily due to heterosexual transmission of HIV-1 and, as in other countries, HIV infection is associated with ulcerative and non-ulcerative sexually transmitted diseases.

### Introduction

Since the first reported cases of HIV infection diagnosed in India a considerable increase in the prevalence of HIV infection has been detected in high risk populations of sex workers and attenders of clinics for sexually transmitted diseases, particularly in the western state of Maharashtra.<sup>1-5</sup> We present the first description of the data from an ongoing investigation to identify the risk factors for HIV-1 infection in these high risk populations.

### Subjects and methods

Between 13 May 1993 and 15 July 1994 patients attending two clinics for sexually transmitted diseases in Pune, India, were offered serological screening for the presence of HIV infection. After informed consent, participants answered a structured questionnaire which included data on demographics, medical history, sexual behaviour, reproductive history for female patients, and knowledge of HIV and AIDS. Each participant was then examined by a physician for the presence of sexually transmitted diseases and given appropriate antibiotics.

Serum samples were initially screened with a commercially available enzyme linked immunosorbent assay (ELISA) for detection of antibodies to HIV-1 and HIV-2 (Recombigen HIV1/HIV2, Cambridge Biotech, Galway, Republic of Ireland). Specimens that yielded positive results by this method were confirmed by using a rapid test for HIV-1 and HIV-2 (Recombigen HIV1/HIV2 Rapid Test Device, Cambridge Biotech) and by HIV-1 or HIV-2 western blot (Cambridge Biotech). Syphilis serology was determined by standard Venereal Disease Research Laboratory non-treponemal test (VDRL antigen, Span Diagnostic, Surat, India) on all samples. The presumptive clinical diagnosis of sexually transmitted disease was based on a detailed physical examination and was made by the examining physician without knowledge of whether the participants were infected with HIV.

The proportion of patients who were positive for antibodies to HIV-1 at screening was calculated by age, sex, parity, occupation, and other biological, demographic, and clinical variables and were compared by using  $\chi^2$  statistics and Fisher's exact test. Odds ratios for seropositivity and confidence intervals were computed. Multivariate analyses were performed with logistic regression to determine characteristics independently associated with prevalent seropositivity. The variables included in the logistic regression were those generally significant in the univariate analysis. In addition, several variables that were highly correlated were either combined (for example, previous or current genital ulcer) or excluded (for example, number of lifetime sexual partners, which was correlated with sex working).

### Results

Of the 2800 patients screened for HIV-1 and HIV-2, 655 (23.4%) were initially positive for antibodies to HIV, of whom 609 (93%) were positive for HIV-1. Only 12 (0.4%) of 2800 were positive for HIV-2, and 34 (1.2%) were dually reactive. Four hundred and fifty nine (20.5%) of 2240 men and 184 (32.9%) of 560

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women were positive for HIV-1 or dually reactive. Table I shows the univariate analysis of risk factors for HIV-1 infection. Sixty per cent (338) of the women were sex workers, and 90% (2010) of the men reported a history of contact with a sex worker within the previous three months. Our analysis identified a high

prevalence of HIV-1 of 14% (31/222) in women who were not sex workers. Of these 222 women, 183 (82%) were monogamous and married, of whom 24 (13%) were positive for HIV-1. Twenty of these women presented with genital symptoms, and two presented as contacts of men with a sexually transmitted disease. Other potential risks for transmission of HIV-1 were rare, with use of injected drugs reported in only one participant and a total of 55 (2%) of 2978 participants reporting a history of blood transfusion.

Only 24% (682) of the men and women reported any use of condoms during the previous three months, and 84% (2343) of the patients presented to the clinics for relief of active genital symptoms. Fifty three per cent (1471) of the participants reported a history of a genital ulcer, and 27% (761) a history of genital discharge. Chancroid was the most common clinical diagnosis among both men and women (33% (739) and 20% (112), respectively).

Other factors associated with a higher prevalence of HIV-1 infection in the univariate analysis included older age, not living with family, receptive anal sex within three months, lack of formal education, lack of knowledge of AIDS, use of condoms within three months, lifetime number of sexual partners, having received a tattoo since 1985, a self reported history of genital ulcer or discharge at the time of screening, and a positive result of a Venereal Disease Research Laboratory test. After sex working and other risk behaviours were controlled for, users of condoms had a significantly lower risk of HIV-1 infection.

Table II shows the adjusted odds ratios for characteristics independently associated with prevalent HIV-1 infection based on logistic regression. These include being a female sex worker, men who have had contact with a sex worker, lack of formal education, receptive anal sex, having received a tattoo since 1986, current or previous genital ulcer or genital discharge, and a positive result of a Venereal Disease Research Laboratory test.

TABLE I—Univariate analysis of prevalence of HIV-1 infection

Characteristic	No of subjects	Prevalence of HIV-1 (%)	Odds ratio (95% confidence interval)	P value
Overall	2800	23.0		
Sex/risk group:				
Female/non sex worker*	222	14.0	1.0	
Female/sex worker	338	45.3	5.1 (3.4 to 7.7)	<0.001
Male/no exposure to sex worker	227	18.5	1.4 (0.8 to 2.3)	0.24
Male/used sex workers	2010	20.7	1.6 (1.1 to 2.4)	0.02
Age (years):				
< 20	403	16.1	1.0	
20-29	1627	24.6	1.7 (1.3 to 2.3)	<0.001
≥ 30	770	23.1	1.6 (1.1 to 2.1)	0.006
Marital status:				
Never married	1413	22.0	1.0	
Married	1260	22.1	1.0 (0.8 to 1.2)	>0.5
Widowed/divorced	127	41.7	2.5 (1.8 to 3.7)	<0.001
Living with family:				
Yes	1814	17.9	1.0	
No	979	32.3	2.2 (1.8 to 2.6)	<0.001
Formal education:				
None	676	32.7	1.0	
Some	2122	19.9	0.5 (0.4 to 0.6)	<0.001
Ever heard of AIDS:				
No	1360	25.9	1.0	
Yes	1438	20.2	0.7 (0.6 to 0.9)	<0.001
Lifetime number of sexual partners:				
1	449	14.2	1.0	
2-9	1249	18.6	1.4 (1.0 to 1.9)	0.05
10-99	637	24.0	1.9 (1.4 to 2.6)	<0.001
100-999	168	32.1	2.8 (1.9 to 4.3)	<0.001
≥ 1000	290	47.9	5.5 (4.0 to 7.7)	<0.001
Lifetime sexual orientation:				
Heterosexual	2469	23.1	1.0	
Homosexual/bisexual	328	22.6	1.0 (0.7 to 1.3)	>0.5
Anal sex in past 3 months:				
None	2711	22.7	1.0	
Insertive only	48	18.8	0.8 (0.4 to 1.6)	>0.5
Receptive	41	43.9	2.7 (1.5 to 4.9)	0.003
Condom use in past 3 months:				
No	2096	21.5	1.0	
Yes	682	27.3	1.4 (1.1 to 1.7)	0.002
Tattooed after 1985:				
No	2121	21.3	1.0	
Yes	677	28.2	1.5 (1.2 to 1.8)	<0.001
Medical injection in past 6 months:				
No	1169	22.9	1.0	
Yes	1628	23.0	1.0 (0.8 to 1.2)	>0.5
History of blood transfusion after 1985:				
No	2743	22.9	1.0	
Yes	55	27.3	1.3 (0.7 to 2.3)	>0.5
History of genital ulcer:				
No	1319	19.6	1.0	
Yes	1471	25.8	1.4 (1.2 to 1.7)	<0.001
History of genital discharge:				
No	2030	21.6	1.0	
Yes	761	26.5	1.3 (1.1 to 1.6)	0.006
History of genital warts:				
No	2721	22.8	1.0	
Yes	64	29.7	1.4 (0.8 to 2.5)	0.25
Ever been pregnant (women only):				
No	159	37.7	1.0	
Yes	398	30.4	0.7 (0.5 to 1.1)	0.12
Using contraception (women only):				
No	270	30.4	1.0	
Yes	288	35.1	1.2 (0.9 to 1.8)	0.28
Circumcised (men only):				
No	2106	20.8	1.0	
Yes	121	13.2	0.6 (0.3 to 1.0)	0.06
Genital discharge present:				
No	1826	20.3	1.0	
Yes	939	27.7	1.5 (1.3 to 1.8)	<0.001
Genital warts present:				
No	2615	23.0	1.0	
Yes	153	24.8	1.1 (0.8 to 1.6)	>0.5
Ulcerative lesion present:				
No	1425	22.2	1.0	
Yes	1351	23.7	1.1 (0.9 to 1.3)	0.37
Results of Venereal Disease Research Laboratory test:				
Negative	2194	21.7	1.0	
Positive	591	27.6	1.4 (1.1 to 1.7)	0.003

## Discussion

Since 1986 the prevalence of HIV infection in female sex workers and patients attending clinics for sexually transmitted disease in India has continued to rise.<sup>6,7</sup> Prevalence of HIV infection among sex workers in Pune has increased from 6% in 1989<sup>2</sup> to over 45% in our current 1993-4 study. By 1992 the prevalence of HIV among patients attending clinics for sexually transmitted disease in Bombay had increased to 11% and was 10% in Pune,<sup>2,4</sup> and overall was 23% in our study. Our data identified two key groups at risk: female sex workers and men who had contact with sex workers. Also of concern is the high prevalence of HIV-1 (13%) observed in monogamous, married women, suggesting that the HIV epidemic in India has begun to affect other risk groups.

The association of other sexually transmitted diseases and HIV infection has been previously reported by numerous studies.<sup>8</sup> This may be particularly important for India in light of some studies reporting that 50-60% of patients attending urban clinics for sexually transmitted disease in India have genital ulcer disease<sup>9,10</sup> and serological studies showing that up to 9% of some high risk groups yielded positive results on a Venereal Disease Research Laboratory test.<sup>11-13</sup> In our study, a positive result was present in 21% of the men and 22% of the women. A significant proportion of the participants in our study had a current or previous history of genital ulcer disease or genital discharge, which were found to be independently associated with prevalent HIV-1 infection. In addition, high risk sexual behaviour, including lack of condom use and high number of sexual partners, is

TABLE II—Logistic regression analysis of prevalence of HIV-1 infection\*

Characteristic	Adjusted odds ratio (95% confidence interval)	P value
Sex/risk group:		
Female/non sex worker*	1.0	
Female/sex worker	3.70 (2.19 to 6.26)	<0.001
Male/no exposure to sex worker	1.35 (0.79 to 2.32)	0.27
Male/used sex worker	1.71 (1.12 to 2.62)	0.01
Formal education:		
None	1.0	
Some	0.76 (0.60 to 0.96)	0.02
Anal sex in past 3 months:		
None	1.0	
Insertive only	0.84 (0.40 to 1.77)	0.65
Receptive	3.52 (1.74 to 7.11)	<0.001
Condom use in past 3 months:		
Never	1.0	
Sometimes/always	0.75 (0.58 to 0.97)	0.03
Tattooed after 1985:		
No	1.0	
Yes	1.31 (0.06 to 1.62)	0.01
Current or previous genital ulcer:		
No	1.0	
Yes	1.26 (1.01 to 1.58)	0.045
Current or previous genital discharge:		
No	1.0	
Yes	1.29 (1.06 to 1.56)	0.01
Circumcised:		
No	1.0	
Yes	0.61 (0.35 to 1.06)	0.08
Results of Venereal Disease Research Laboratory test:		
Negative	1.0	
Positive	1.33 (1.07 to 1.65)	0.01

\*Logistic regression model included all covariates shown and was adjusted for age (<20, 20-29, ≥30) and living with family.

common and associated with prevalent HIV-1 infection in patients attending clinics for sexually transmitted disease in Pune.

Although previously described risk factors for HIV infection, such as homosexuality, use of injected drugs, or transfusion, were rare in our study, 13% of the men described themselves as bisexual, and receptive anal intercourse was independently associated with HIV infection. In addition, 23% of the men and 29% of the women had received a tattoo since 1986, which was also found to be an independent risk factor for prevalent HIV-1 infection in our study. Sex specific analysis suggests that tattooing is associated with sex working in women, but the association of tattooing and HIV infection in men seems to be independent of other risk factors. Our data alone are insufficient to explain this finding, but it suggests that further study

of the potential for HIV-1 transmission in these settings by contaminated needles or equipment may be warranted in India.

Since the first descriptions of the HIV epidemic in India, there have been reports of HIV-2 infection in western India.<sup>14</sup> Several studies have suggested that HIV-2 infection may represent 3% to 9% of all HIV infection in Bombay and other parts of Maharashtra.<sup>14-16</sup> These studies have also reported dually reactive serology in 6% to 29% of all HIV infection. One report has suggested a higher rate of HIV-2 infection, approaching 16% in sex workers in Bombay.<sup>17</sup> Our study has confirmed that the prevalence of HIV-2 (1.2%) remains much lower than that of HIV-1 (23%) in clinics for sexually transmitted disease in Pune.

These data provide a comprehensive analysis of prevalent HIV-1 infection in one of the largest studies of people at high risk in India. We have provided current evidence of the association between sexually transmitted diseases, high risk sexual behaviour, and HIV-1 infection in India. These findings strongly suggest that the pattern of the HIV epidemic is similar to that seen in other parts of the world. The dramatic increase in prevalence of HIV-1 in these high risk groups suggests there is an urgent need for comprehensive and national efforts in India to control sexually transmitted diseases and to provide intensive education on HIV and AIDS targeted at changing high risk behaviour.

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Conflict of interest: None.

### Key messages

- HIV infection is increasing dramatically in patients attending clinics for sexually transmitted disease in India
- Genital ulcer diseases are common in such clinics and were associated with a higher risk of HIV infection
- High risk sexual behaviour is also common among clinic attenders
- The risk factors for HIV infection and the increasing prevalence of HIV-1 suggest a similar pattern in India to that seen in epidemics in other countries with high rates of transmission of HIV
- There is an immediate need for comprehensive and national efforts to control sexually transmitted diseases and to provide intensive education on HIV and AIDS targeted at changing high risk behaviour in India

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## Complications with shunts in adults with spina bifida

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### Abstract

**Objective**—To assess the incidence of malfunction of shunts in adults with spina bifida who have shunts to control hydrocephalus.

**Design**—A retrospective review of the medical notes and contact by questionnaire of adults with spina bifida to assess symptoms, function of shunts, frequency of operative procedures, and follow up.

**Subjects**—110 patients with shunts who attended Lord Mayor Treloar College for the physically disabled between 1978 and 1993.

**Results**—The average (range) number of revisions of shunts per person was 3.6 (0-28). Although 37 patients underwent an emergency operation for revision in their first year of life, there was a continuing low incidence, increasing in the early teenage years, which persisted into the third decade. Intervals between emergency revisions varied: 202/320 occurred within one year of the last shunt operation, 56 occurred after five years, 24 after 10 years, and 15 after 15 or more years. Fifteen patients had chronic intermittent headaches, of whom four died and three suffered severe morbidity. Thirteen died; three had raised intracranial pressure, and four died suddenly; these deaths were presumed to be related to their shunts. Up to the age of 16 there was 100% hospital follow up, but after that only 40% of young adults underwent review, including review of their shunt function.

**Conclusion**—Shunts to control hydrocephalus may fail after many years without symptoms. This is difficult to diagnose and if missed may lead to chronic morbidity and death. As hospital follow up of this group is falling, both general practitioners and hospital doctors must be aware that a shunt may malfunction after prolonged quiescent periods.

### Introduction

In a school population with many children with spina bifida and hydrocephalus a persisting incidence of malfunction of shunts, especially in the early teenage years, was observed. Two of these patients were stated to have arrested hydrocephalus and non-functioning shunts, hence causing delay and increased difficulty in making the diagnosis. Four patients died from shunt malfunction, two proved and two suspected. We therefore carried out a review of the whole group including all the school leavers to assess the importance of long term shunts in adults and whether complications with shunts continued to occur.

### Method

We reviewed pupils who had attended Lord Mayor Treloar College for the physically disabled between 1978 and 1993. Of the 215 pupils with spina bifida, 179 (83%) had shunts. A questionnaire was sent to these 179 students or their families for completion and

permission to review their medical notes. Contact was attempted initially via the Association for Spina Bifida and Hydrocephalus, and to those who did not respond a further attempt was made directly to their last known address at the time they left the college.

### Results

Eighteen people refused to participate or allow examination of their medical notes; 39 did not respond to either attempt at contact; and 12 could not be traced as questionnaires were returned by the post office. The remaining 110 who were reviewed reflected the general age and sex distribution of the group (mean (range) age 21.5 (14-31) years, male:female ratio 1:1.3 in reviewed group; 24.3 (14-32) years, 1:1.3 in non-reviewed group).

As shunts have been replaced the ratio of ventriculo-atrial to ventriculo-peritoneal shunts has fallen from about 25:1 to 2:1. The mean (range) number of operations per person for revision of shunts was 3.6 (0 to 28), but the mode was only one. Of these revisions, 72 were prophylactic and 320 were emergency operations. Thirty seven subjects required emergency revision operations in their first year, the incidence falling to 4% (4/110) at 10 years, only to rise in the early teenage years to 13%, returning to a 4% incidence persisting into the third decade. The table shows the distribution in years of the time lag between emergency revisions and their last shunt operation and the total percentage occurring after intervals of 5, 10, and 15 years.

**Headaches**—Fifteen patients had complained of chronic intermittent headaches; 10 of these were alive and well but two continued to have headaches despite invasive investigations. One young woman diagnosed as having migraine gradually developed paraesthesia and weakness in her arms then became quadriplegic and collapsed. A blocked shunt was found at operation. Of the two other patients found to have blocked shunts and high intracranial pressures, one died at operation, the other died postoperatively. One 19 year old girl, having been told that if she had further symptoms she should have an operation to revise her shunt, died suddenly; raised intracranial pressure was reported at postmortem examination. A young man diagnosed as having chronic sinusitis deteriorated and died while waiting for a sinus operation. There was no post-mortem examination.

**Deaths**—There were 13 deaths in the series. Three died from proved shunt complications. Four died suddenly, shunt malfunction being suspected but not proved; two as described above, and two teenagers who were well and free of symptoms died in bed at night, but no cause of death was found at postmortem examinations. Six deaths were not related to shunts.

**Hospital follow up**—We found that up to the age of 16 years there was a 100% review of the shunt function as part of the care of the whole patient. After they left

Time since last emergency operation for revision of shunt in group of subjects with spina bifida and hydrocephalus

Time since operation (years)	No of subjects
≤1	202
1	24
2	11
3	9
4	18
5*	11
6	6
7	7
8	5
9	3
10†	3
11	5
12	3
13	1
14	1
15‡	6
16	0
17	3
18	0
19	1
20	1
Total	320

\*For 5 years onwards 56/320 (17.5%).

†For 10 years onwards 24/320 (7.5%).

‡For 15 years onwards 11/320 (3.5%).

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