IN PRACTICE

Gender differences in the prevalence of sexually transmitted infections and genital symptoms in an urban setting in southern India

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Objectives: To examine gender differences in sexual behaviour, the prevalence of laboratory-detected sexually transmitted infections (STIs) and self-reported genital symptoms in urban Chennai, Tamil Nadu, India.
Study design: The data were based on a cross-sectional survey (n = 1649) of residents from low-income communities in Chennai. Data were collected during community-wide health camps comprising physical examinations, interviews and laboratory testing between March and June 2001.
Results: The population was young, sexually active, with a low prevalence of STI. The most commonly detected STI was Herpes simplex virus type 2 (HSV2; 13.2%). Women had a higher prevalence of HSV2, but were more likely than men to be asymptomatic. Most of the self-reported genital symptoms could not be linked to a laboratory-detected STI. >10% of the cohort had a history of an ulcerative STI and >5% had an inflammatory STI.
Conclusions: Given a high prevalence of HSV2 in the study population, interventions targeting HSV2 transmission may be particularly relevant for this population.

Sexually transmitted infections (STIs) are common in developing countries,[1] posing a major health burden for women aged 15–44 years[2] who are more likely to be asymptomatic and have serious complications, such as pelvic inflammatory disease, leading to infertility and ectopic pregnancies.[3] There has been increasing evidence for the synergy between STI and HIV infection. Studies have established that women have a higher biological risk for contracting STIs and HIV than men, with a higher probability of transmission from men to women than vice versa.[3] After adjusting for sexual behaviour, STIs have been shown to increase the transmissibility of HIV through sexual contact by 3–5 times ,[4 5] as STI and HIV alter the transmission or manifestations of the other.[6] Consequently, STI prevention and control is a priority in HIV prevention efforts in the developing countries, including India, which has the second highest number of HIV-infected people in the world after South Africa.[7–12]

Owing to a lack of a fully-functional STI surveillance system in India, prevalence estimates for STI are varied.[13] For example, one study detected an STI prevalence of 22% in women attending a reproductive health clinic in New Delhi,[14] and the overall community-based prevalence of STI among women and men was 8.3% in a ''probability proportional to size'' cluster survey in three randomly selected districts in Tamil Nadu.[15] In studies based on random community-based samples, *Trichomonas vaginalis* was the most commonly found STI (5%),[15 16] followed by *Neisseria gonorrhoeae* (3–4%),[15 16] *Chlamydia trachomatis* and *herpes simplex* virus type 2 (HSV2) (1–1.4%),[15 17] and *Treponema pallidum* (syphilis) being the least prevalent (about 0.3%).[15 16 18]

STI transmission patterns have conformed to the cultural patterns of gender expression in the Indian society,[13] such as culturally imposed silence about discussing sex,[19] unequal norms about sexual morality, rights, power and educational opportunities between the sexes,[19–23] and changing traditions.[24 25] For married women in India, HIV and STI transmission has been largely attributed to a spouse who had multiple partners,[5 26 27] male resistance to condom use and women's inability to negotiate safer sex.[28]

The current data are derived from an epidemiological survey conducted in preparation for a prospective National Institute of Mental Health collaborative STI–HIV prevention trial in Chennai, which has been designed to test the efficacy of community popular opinion leaders in disseminating prevention messages to their peers. This cross-sectional preliminary survey presents a unique opportunity to study the gender differences in the prevalence of symptoms and diagnoses of STI in a community-based random sample of low-income women and men living in Chennai. The specific aims of this paper are to examine gender differences in the number of sexual partners, determine STI prevalence in this cohort and compare self-reports of STI symptoms with laboratory diagnosis.

PARTICIPANTS AND METHODS

Site

The site of this cross-sectional study was Chennai, Tamil Nadu, India, on the southeast coast of India, in urban communities designated as ''slum communities'' by the Tamil Nadu Slum Clearance Board

Data collection and analyses

Data were collected through a community-based behavioural assessment survey between March and June 2001. Of the 976 slums listed by the Tamil Nadu Slum Clearance Board, 30 were selected based on size (<300 families/slum) and interest of local residents' in implementing and managing the study. All residents of the selected 30 slum communities were enumerated in a census survey. Subsequently, 65 households were selected from each community using

Abbreviations: HSV, herpes simplex virus; NIMH, National Institute of Mental Health; STI, sexually transmitted infection

systematic random sampling and one 18–40-year-old person from each of the selected households was selected by simple random sampling to participate in a survey nested in health camps that were conducted free of charge for all slum residents, which included free physical examinations, laboratory testing, standard medicines and appropriate referrals.

After completing voluntary informed consent, selected participants at the health camps provided information on their health status, sexual behaviour, STI history and health-seeking behaviours. Of the total 1950 eligible people, 1649 (84.6%) participated in interviews and provided biological specimens for laboratory testing. Information was collected in Tamil language by trained same-sex interviewers using computer-assisted personal interviewing technology. Participants were requested to provide blood, urine and cervical samples for women, and all underwent HIV pretest counselling. The informed consent forms and all other procedures were approved by the institutional review boards of the Johns Hopkins University Bloomberg School of Public Health (Baltimore, Maryland, USA) and the YR Gaitonde Centre for AIDS Research and Education (Chennai, Tamil Nadu, India).

Stata V.8.0 (Stata Corporation, College Station, Texas, USA) was used to analyse quantitative data. Means and proportions yielded descriptive statistics. χ^2 tests and Mantel–Haenszel common odds ratio estimates (from simple and multivariate logistic regression) were computed for bivariate and multivariate analysis. Detailed analysis was undertaken after stratifying the data by sex to examine differences with regard to STI symptoms. Additionally, self-reported symptoms were compared with laboratory diagnosis for both women and men. Demographics and prevalence of STI were determined in the total study population; however the analysis comparing the presence of STI with symptoms was restricted to sexually active participants. Information was incomplete for 29 participants, hence they were omitted from analysis, yielding a final sample of 1620 participants.

Laboratory methods

Amplicor multiplex polymerase chain reaction test (Roche Diagnostics, Branchburg, New Jersey, USA) was used to detect *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. *Trichomonas vaginalis* infection was detected using the InPouch culture kit (Biomed Diagnostics, White City, Oregon, USA), and HerpeSelect 2 ELISA (MRL; Focus Technologies, Los Angeles, California, USA) was used to detect immunoglobulin (Ig) G to HSV2 using 1.1 as the cut-off point as per the manufacturer's instructions. RPR (Span Diagnostics, Surat, Gujarat, India) and TPPA (Serodia, Fujirebio, Japan) were used to test for and confirm *Treponema pallidum* infections. For HIV diagnosis, a double Enzyme Linked Immuno Sorbent Assay was performed using Abbott HIV 1.2.0 (Murex Biotech Limited, Kent, UK) and Genscreen HIV 1/2 V.2 (Biorad Laboratories, Marnes La Coquette, France), and all dual-positive and discordant specimens were confirmed using western blot analysis (Biorad Laboratories, Marnes La Coquette, France).

RESULTS

Demographics

The cohort was 53% female, with a mean age of 28 (standard deviation 6.77) years; the age distribution in the sample was similar in men and women (table 1). Women were more likely be married than men (77.8% *v* 62.7%, p<0) and were less educated than men (p<0.001)

Sexual partners

In all 77% of men reported lifetime sexual activity compared with 89% of women (p<.001; table 1). Women and men in the sample differed significantly on the number of lifetime sexual partners and regular partners in the year preceding the interview (p<.001). Almost half (47%) of men reported ⩾2 lifetime partners compared with only 7% of women (odds ratio (OR): 12.9, 95% confidence interval 8.85 to 18.87, after controlling for age, marital status, education); and men were more likely to report >1 regular partner than women (4.2% *v.* 0.1%, p<0.001). Of the women who had sex in the last year, only 3 (0.6%) reported sex with a casual partner compared with 20.9% of men who had sex with a casual partner in the past year.

Table 1 Demographics and number of sexual partners from a random sample of men and women (n = 1620) from low-income communities of Chennai, Tamil Nadu, India, from March to June 2001

Characteristics	Men (n = 770)	Women (n = 850)	Total (n = 1620)
Age* (years)			
18–25	290 (37.7)	329 (39.1)	619 (38.4)
26–30	181 (23.5)	226 (26.8)	407 (25.3)
31–35	146 (19.0)	153 (18.2)	299 (18.6)
36–40	152 (19.8)	134 (15.9)	286 (17.8)
Marital status†			
Never married	271 (35.2)	103 (12.1)	374 (23.1)
Currently single	16 (2.0)	86 (10.2)	102 (6.3)
Married	483 (62.7)	661 (77.8)	1144 (70.6)
Education†			
Incomplete primary	117 (15.2)	267 (31.4)	384 (23.7)
Completed primary	179 (23.2)	129 (15.2)	308 (19.0)
High school graduate	178 (23.1)	202 (23.8)	380 (23.5)
College or graduate degree	296 (38.4)	252 (29.6)	548 (33.8)
Sexual activity in lifetime†			
Yes	592 (76.9)	753 (88.6)	1345 (83.0)
No	178 (23.1)	97 (11.4)	275 (17.0)
Lifetime sexual partners†,‡			
1	310 (52.6)	699 (93.3)	1009 (75.4)
⩾2	279 (47.4)	50 (6.7)	329 (24.6)
Sexual partners in the past year†			
0	95 (16.1)	63 (8.4)	158 (11.75)
1	412 (69.6)	686 (91.1)	1098 (81.6)
⩾2	85 (14.4)	4 (0.5)	89 (6.6)
Regular sexual partners in past year†§			
0	29 (5.9)	0 (0.0)	29 (2.4)
1	445 (89.9)	689 (99.9)	1134 (95.7)
⩾2	21 (4.2)	1 (0.1)	22 (1.9)
Casual sexual partners in past year¶			
0	40 (43.5)	1 (33.3)	41 (43.2)
1	20 (21.7)	1 (33.3)	21 (22.1)
⩾2	32 (34.8)	1 (33.3)	33 (34.7)

Values are n (%).
*Data missing for age on nine respondents.
†p<0.001.
‡Sexually active respondents only, data missing for seven participants (n = 1338).
§Sexually active respondents, who had sex in past year, 495 men (missing data for two men) and 690 women.
¶Sexually active respondents, who have had sex in past year with other than just regular partner, 92 men (missing data for 12 men) and 3 women (one refused to answer).

Prevalence of self-reported STI symptoms and STI

Overall, 13.3% and 2.3% of the respondents reported a genital discharge and genital sores, respectively, in the week before study visit, and the prevalence of symptoms differed by sex

Table 2 Prevalence of genital discharge, sores, genital inflammatory infections (gonorrhoea, chlamydia and trichomoniasis), genital ulcerative infections (herpes simplex virus 2 and syphilis) and HIV in the study population (n = 1620) of men and women from a community-based sample in Chennai, Tamil Nadu, India

	Men (n = 770)	Women (n = 850)	Total (n = 1620)
Genital discharge*†	15 (2.1)	180 (23.5)	195 (13.3)
Genital sores*†	25 (3.6)	9 (1.2)	34 (2.3)
Overall STI prevalence‡	89 (11.6)	144 (16.9)	233 (14.4)
Gonorrhoea	3 (0.4)	3 (0.4)	6 (0.4)
Chlamydia	4 (0.5)	2 (0.2)	6 (0.4)
Trichomoniasis§	Not tested	45 (6.7)	45 (6.7)
HSV2*†	78 (10.1)	136 (16.0)	214 (13.2)
Syphilis	8 (1.0)	9 (1.1)	17 (1.0)
HIV¶	8 (1.0)	2 (0.2)	10 (0.6)

Values are n (%)
*Missing data on self-reported discharge or sores in the past week on 69 men and 84 women.
HSV, herpes simplex virus; STI, Sexually transmitted infections.
†$p<0.001$.
‡Not including HIV or trichomoniasis in women.
§ Data on trichomoniasis laboratory results missing on 174 women.
¶$p<0.05$.

(table 2); however, laboratory-detected STI did not differ by sex (table 2). The most common STIs were HSV2 (13.2%) and trichomoniasis (6.7% in women), whereas all the others were present in $\leqslant$1% of the study population. Multivariate analyses showed that women were much more likely to report genital discharge (OR 11.8, 95% CI 6.2 to 22.3), whereas men more often reported genital sores (OR 3.5, 95% CI 1.4 to 8.8) after controlling for age, marital status, education and number of partners in the past year.

Key messages

- Low-income urban communities in Chennai, Tamil Nadu, India, have a high prevalence of herpes simplex virus type 2(HSV2), which is higher in women than in men.
- Women in this setting have a higher biological and social vulnerability to sexually transmitted infection and HIV infection.
- Screening and treatment for HSV2 infections may be particularly appropriate for low-income urban settings in south India, and could potentially reduce HIV transmission.

Comparison of self-reported symptoms with laboratory results for STI prevalence among sexually active respondents

Subsequent analyses were conducted on a subsample of only sexually active respondents. In all, 15 (2.7%) of the men who were sexually active reported genital discharge in the week preceding the interview, but none tested positive for either gonorrhoea or chlamydia; whereas, none of the men who tested positive for chlamydia or gonorrhoea (0.6%) reported a discharge in the prior week. Although 22.3% of the sexually active women reported genital discharge in the past week, 6% did not test positive for chlamydia, gonorrhoea or trichomonas. However, only 22.2% of the women actually having these STIs (6.6% of the women in the study) showed symptoms. For women, 33.3% of gonococcal infections were symptomatic, 22.5% of trichomoniasis were symptomatic, whereas none of the chlamydial infections was symptomatic.

Table 3 Gender-based and combined prevalence of sexually transmitted infection, by symptoms, among the sexually active study respondents, in a random sample of men and women (n = 1345) from low-income communities of Chennai, Tamil Nadu, India, from March to June 2001

	Men		Women		Total	
	Asymp	Symp	Asymp	Symp	Asymp	Symp
STIs causing discharge						
Total (n = 1227)*	531 (97.3)	15 (2.7)	529 (77.7)	152 (22.3)	1060 (86.4)	167 (13.6)
No infection (NG, CT and Trich −ve)§	528 (97.2)	15 (2.8)	31 (77.5)	9 (22.5)	559 (95.9)	24 (4.1)
Only NG (NG +ve, CT and Trich −ve)	0 (0)	0 (0)	2 (66.7)	1 (33.3)	2 (66.7)	1 (33.3)
Only CT (CT +ve, NG and Trich −ve)	2 (100.0)	0 (0)	1 (100.0)	0 (0)	3 (100.0)	0 (0)
Only Trich (Trich +ve, NG and CT −ve)	0 (0)	0 (0)	31 (77.5)	9 (22.5)	31 (77.5)	9 (22.5)
Any discharge STI (NG or CT or Trich +ve)	3 (100.0)	0 (0)	35 (77.8)	10 (22.2)	38 (79.2)	10 (20.8)
STIs causing sores						
Total (n = 1228)†	524 (96.0)	22 (4.0)	674 (98.8)	8 (1.2)	1198 (97.6)	30 (2.4)
No infection (HSV2 and syphilis −ve)§	457 (97.0)	14 (3.0)	543 (98.7)	7 (9.3)	1000 (97.9)	21 (2.1)
Only HSV2 infection (HSV2 +ve, and syphilis −ve)	61 (88.4)‡	8 (11.6)‡	122 (99.2)	1 (0.8)	183 (95.3)	9 (4.7)
Only syphilis infection (Syphilis +ve and HSV2 −ve)	4 (100.0)	0 (0)	5 (100.0)	0 (0)	465 (97.1)	14 (2.9)
Any sore STI (HSV2 or syphilis +ve)	67 (89.3)	8 (10.7)	131 (99.2)	1 (0.8)	198 (95.7)	9 (4.3)

Values are n (%).
-ve, negative; +ve, positive; Asymp, asymptomatic; CT, chlamydia; HSV2, herpes simplex virus type 2; NG, gonorrhoea; STI, sexually transmitted infection; Symp, symptomatic; Trich, trichomoniasis.
*Missing data on 118 sexually active respondents for the presence of genital discharge in the past week.
†Missing data on 117 sexually active respondents for the presence of genital sores in past week.
‡$p<0.05$.
§Reference groups.

In all, 4% of sexually active men reported genital sores in the past week compared with 1.2% of women. However, 3.0% of the men and 9.3% of the women who reported sores in the past week did not test positive for HSV2 or syphilis. Only 10.7% of the men and 0.8% of the women who had HSV2 antibodies or syphilis showed symptomats.

DISCUSSION

This study describes the prevalence of STI and genitourinary symptoms in a community-based random sample of primarily young sexually active women and men from low-income communities in India. Men were much more likely than women to have >1 lifetime sexual partners, and to have concurrent regular and casual partner. Despite measures to conduct interviews in private cubicles in the health camps to ensure confidentiality, there is also the possibility that women under-reported their number of sexual partners owing to social desirability bias, which is a possible limitation in all studies of this nature.

The most common STI in this cohort was HSV2 infection in men and women, and trichomoniasis in women. A large proportion of men and women reported the presence of genital discharge and sores in the past week without finding the most commonly diagnosed genitourinary symptoms. We are unable to conclude from these findings, whether frequent reports of symptoms without laboratory confirmation was due to the inability to correctly recognise symptoms or that most symptoms were due to other infections (eg, bacterial vaginosis or genital mycoplasma), sexual trauma or other conditions. However, the findings highlight the benefit of screening programmes that do not rely on reports of morbidity.[29 30]

One of the most important findings is that 13% of this community-based cohort tested positive for HSV2 antibodies, which was a much higher prevalence than found in a previous community-based study in Tamil Nadu (1.0% men and 1.4% women).[15] However, both studies show a higher HSV2 prevalence in women, underscoring the need for attention to the detection and treatment of HSV2 infections in India.

Although most women reported only one lifetime partner, they tended to often have HSV2 and trichomoniasis detected, pointing to their vulnerability to infections from their partners, because of both biological and social factors. The high prevalence of HSV2 may increase susceptibility to HIV and other genital infections in this population.[31–33] A possible limitation of this study is that recent studies have questioned whether cut-offs for FOCIS HSV2 tests ought to be higher.[34–36] However, the focus of this paper was to describe gender differences in the prevalence of STIs and morbidity in this southern Indian urban cohort that was clearly at high risk on the basis of self-report and other STI markers. Further studies on a culturally appropriate behavioural intervention in this population will need to consider using higher readings for HSV2 end points to avoid the overestimation of HSV2 prevalence and incidence in this population.

Given the unequal gender relationships in the Indian society, it is possible that despite knowledge of extramarital risky sexual behaviours of their male partners, many women were often unable to negotiate safe sexual practices, resulting in increased susceptibility to infection. Additionally, owing to lack of symptoms, women may have not been able or motivated to seek treatment for infections. These findings indicate a need for prospective STI screening to detect silent infections in women. Interventions oriented to altering risk-taking behaviours in men in these communities may facilitate HIV–STI prevention and control, for them and their female partners.

In summary, the early detection and treatment of STI through screening, and behavioural interventions focusing on men, along with public health education and the promotion of health-seeking behaviours, are critical for the ultimate success of STI–HIV prevention programmes in southern India.

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