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Sexually Transmitted Infections in Men in Mumbai Slum Communities: The Relationship of Prevalence to Risk Behavior

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Objectives: **The objectives of this study were to identify sexually transmitted infection (STI) prevalence, assess behavioral and symptom correlates, and develop intervention strategies.**

Goal: **The goal of this study was to conduct one of the first community-based surveys of STI prevalence and risk behaviors among married men in India.**

Study Design: **In 2003, 2,408 randomly selected married men, aged 21 to 40 years, were administered a survey instrument with urine and blood samples collected from a random subset of 641.**

Results: **The most common current STI was gonorrhea (3.9%) with 6.1% of men being positive for an acute STI and 9.7% antibody-positive for *Treponema pallidum* or herpes simplex virus type 2. Risk behaviors were not associated with laboratory confirmed STIs, but did show an association with men's concerns about sexual performance derived from traditional Indian systems of medicine.**

Conclusion: **Culturally based symptoms can serve as effective markers for men involved in risky sexual behaviors and provide an opportunity to engage these men as they seek care for these symptoms at community-based service points.**

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INDIA IS EXPERIENCING AN HIV epidemic of significant proportions; and with a current estimate of 0.9% of the adult population infected with HIV, AIDS is predicted to emerge as the single most important cause of adult mortality in the coming decade.[1] In addition, selected areas of the country are also experiencing high rates of other sexually transmitted infections (STIs), which have implications both for levels of morbidity (and subsequent mortality) and for the relationship to increased HIV transmission.[2,3] However, the exact burden of STIs in India remains relatively unknown because there is no adequate and comprehensive surveillance system in operation. In the absence of a regularized surveillance system, community-based surveys can provide essential information on disease prevalence, contribute to the calculation of the burden of disease, and assist with identification of factors associated with the presence of infection.[4]

Despite their importance, community-based surveys assessing the prevalence of STIs are rarely undertaken as a result of a variety of factors, including cost and capacity. Moreover, when community-based surveys are carried out, they are usually focused on women. A global systematic review of community-based surveys carried out in low-income countries, with laboratory-confirmation of STI prevalence, found 11 such surveys with women and only 5 with men.[5] Two further community-based surveys of STI prevalence in men and women in rural and urban Bangladesh have been published recently.[6,7] Researchers in India have conducted 3 community-based surveys of the prevalence of reproductive tract infections, including STIs, in women,[8–10] but, to date, only one community-based survey of STI prevalence in men has been published.[11]

This article reports on a community-based survey of STI prevalence among men in 3 economically poor communities in the city of Mumbai. This research is linked to a larger study, RISHTA (an acronym for Research and Intervention in Sexual Health: Theory to Action and meaning "relationship" in Hindi and Urdu), evaluating the impact of a multilevel community-, provider-, and patient-based intervention to reduce men's sexually risky behavior and HIV and other STIs.[12] The RISHTA project builds on men's culturally based concepts of sexual health. Men in India, like elsewhere, frequently express concerns related to sexual dysfunction, including premature ejaculation, impotence, infertility, nocturnal emission ("wet dreams"), feelings of guilt associated with masturbation, and concerns about penis size.[13–15] South Asian and Indian culture amplifies these concerns through the concept of *gupt rog* ("secret illnesses" in Hindi), which primarily refers to culturally defined illnesses that have their etiology in "semen loss," particularly as a result of nocturnal emission and masturbation.[15]

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Ethnographic research has shown that men in the study communities perceive 3 clusters of symptoms: those that refer to sexual performance (*kamjori*); those that relate to semen inadequacy (*dhat*); and those symptoms such as burning urination, itching, sores, and pus discharge that are seen as related to having risky sex (*garmi*).[16] When treatment for these problems is sought, it is most frequently the private nonallopathic providers (*ayurvedic*, *unani,* and homeopathic providers) who address these concerns. The RISHTA project uses this concern about *gupt rog* as a means of involving men in risk reduction and clinical (syndromic) management for STIs through community education, provider training and provider–patient interaction.[17]

Description of Study Sites and Study Population

The project is ongoing in 3 Mumbai low-income, "slum" communities with a current population estimate of 700,000. The majority of the population comes from Uttar Pradesh and other poor states in northern India and rural Maharashtra and Tamil Nadu in the west and south. The study sample is focused on married men between 21 and 40, because one of the central aims of the larger study was to examine the role of the marital relationship in the dynamics of risk-taking behaviors and sexual health problems. The age range was selected based on the following rationale: surveys show that the majority of men in India initiate sex at marriage or just before marriage[15]; ethnographic data collected in the study communities and in other parts of India indicate that men increase their sexual risk behavior after marriage[14]; the planned intervention sought to include a focus on men's spousal relationships as a key factor in risk and risk reduction; and the selected age range represents a subgroup in which there is heightened sexual activity. The focus of this study is on married men for the following reasons: 1) evidence from other studies indicated that although a significant (but not a majority) of men had sexual experience before marriage, there was greater experience with multiple partners after marriage; 2) much of the premarital experience was temporally close to the time of marriage indicating experiential preparation for marital sex; 3) we sought to explore the potential for transmission from husbands to their primarily monogamous wives; and 4) the focus on married men allowed us to explore the impact of both pre- and extramarital sex on STI outcomes in terms of both lifetime and acute disease.

This study received Institutional Review Board approval from the 3 collaborating institutions: The University of Connecticut School of Medicine, the International Institute for Population Sciences, and the Institute for Community Research. Signed informed consent was obtained for all participants in the study.

Materials and Methods

Formative research was conducted involving in-depth interviews of 52 married men, a rapid assessment of all (N = 245) private allopathic and nonallopathic (*ayurvedic*, *unani,* and homeopathic) providers in the 3 communities, and in-depth interviews with 37 private providers. These qualitative data provided the foundation for the development and implementation of a baseline survey instrument that collected information on sociodemographics, sexual risk-taking, STI knowledge, reported symptoms, healthcare-seeking behaviors, marital relationships, and attitudinal scales concerning masculinity and social and community participation levels. The survey instrument was administered to 2,408 selected married men using a 2-stage systematic random sampling procedure. In the first stage, geographic subareas (lanes) were randomly selected and in the second stage, eligible households were systematically randomly selected. Power calculations based on available Mumbai-based clinical records suggested an STI prevalence of 16.7% indicating that a random subsample of approximately 640 men was sufficiently powerful for determining prevalence and examining risk factors.[18] We randomly selected 800 men for STI testing from the baseline survey sample of 2,408 estimating a 20% loss. The survey instrument was administered in face-to-face interviews by male interviewers.

Community leaders were informed about STI testing and supported the effort through public announcements and the contributing of facilities that provided privacy and toilet facilities. Men randomly selected for STI testing were informed at the time of the survey interview and asked to attend community-identified collection sites (temples, mosques, community halls, and schools). Men were examined by a trained physician; and a first-void urine sample and 5-mL venous blood sample were collected. All samples were stored in a cool box until they were transported (on the day of collection) to a local laboratory where the blood was separated and the urine sample was frozen at −20°C. Serum was tested for syphilis using rapid plasma reagin (Tulip Diagnostics, Verna, Goa, India) and treponema pallidum particle agglutination (TPPA) (Seroclia; Fujire Bio Inc., Tokyo, Japan). Serum was also tested for the presence of IgM and IgG antibodies to herpes simplex virus type 2 (HSV-2; Vircell, Santase Granada, Spain). Once a week, frozen urine samples were transported to India's National AIDS Research Institute in Pune (90 km) where they were tested to detect *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infection using the Multiplex Amplicor polymerase chain reaction assay (Roche Diagnostic Systems, Branchburg, NJ). Quality control for STI testing was maintained by 2 external laboratories (one within India and one outside). All men found positive for acute STIs were informed confidentially through a household visit and treated at the project's expense at the RISHTA office. Individual HIV testing was not conducted in the Baseline Survey as a result of the lack of treatment capacity in the study communities at the time of the initiation of the study and was stated as such in the consent form.

Data were analyzed using SPSS 12.0. Calculation of proportion and χ^2 tests were used to assess the significance of bivariate relationships. Multiple logistic regression was used to assess the significance of independent variable relationships on STI test results. Because the Pearson correlation coefficient provides the same significance levels as each of these 3 tests, the correlations among all the dependent and predictor variables are shown in Table 1 along with their significance levels.

The 2 STI status variables, acute STI (positive for at least one of *N. gonorrhoeae, Treponema pallidum, C. trachomatis*, or HSV-2) and lifetime (antibody-positive for *T. pallidum* or HSV-2), were analyzed as a function of 3 separate sets of predictor variables: 1) 8 risk behaviors variables, 2) 3 culturally based syndrome variables: *dhat*, *kamjori*, and *garmi* as well as total symptoms; and 3) 4 STI-like symptoms in a series of univariate multiple logistic regressions. Each dependent measure was analyzed separately 3 times: as a function of each of the multiple measures within each of the 3 sets. In addition, the 3 culturally based syndromes and total symptoms were also analyzed similarly as a function of the risk behaviors and the 4 STI-like symptoms. Odds ratios are presented and their 95% confidence interval bounds as well as 2-tailed significance levels of the final Wald tests. Acute STI and lifetime exposure variables were assessed, by use of the independent *t* test, to see whether those positive were significantly different in age from those who were negative with age treated as a continuous measure.

TABLE 1. Pearson Correlations Among All Predictor and Dependent Measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. STD acute prevalence																	
2. STD lifetime prevalence	0.20§																
3. Kamjori	−0.08*	0.01															
4. Dhat	−0.05	−0.02	0.20‡														
5. Garmi	−0.06	−0.01	0.27§	0.11‡													
6. Total syndromes	−0.10†	−0.01	0.61§	0.28§	0.69§												
7. Alcohol	−0.03	0.08+	0.02	0.00	0.05	0.04											
8. Sex materials	−0.02	−0.06	0.02	0.01	0.06	0.05	0.04										
9. Violent arguments	−0.03	0.00	−0.10‡	0.08†	−0.10†	−0.12‡	−0.09†	−0.14§									
10. Premarital sex: female	0.06	−0.10†	−0.13§	−0.08†	−0.20§	−0.20§	−0.19§	−0.06	0.13§								
11. Premarital sex: male	0.04	0.01	−0.08†	−0.02	−0.10‡	−0.07+	−0.03	−0.08†	−0.05	0.12‡							
12. Extramarital sex: female NSW	0.01	0.02	0.14§	0.05	0.10‡	0.11‡	0.10‡	0.02	−0.05	−0.18§	−0.10†						
13. Payment for sex with female	0.01	0.02	0.14§	0.05	0.10‡	0.11‡	0.11‡	0.02	−0.05	−0.18¶	−0.10†	1.00§					
14. Extramarital sex: male NSW	−0.02	0.10†	0.08†	0.10†	0.07*	0.07*	0.08†	0.08†	−0.01	−0.05	−0.19§	0.11‡	0.11‡				
15. Genital sore/"syphilis"	0.02	0.08†	0.08†	0.05	0.25§	0.17§	0.08†	0.08†	−0.04	−0.11‡	−0.13§	0.05	0.05	0.11‡			
16. Pus-like discharge	0.03	0.04	−0.03	0.04	−0.11‡	−0.07*	−0.03	−0.03	0.01	0.00	−0.02	−0.05	−0.05	0.01	−0.23§		
17. Burning/hot urination	−0.01	−0.01	0.20§	0.10†	0.46§	0.32§	0.00	0.07*	−0.02	−0.12‡	−0.09‡	0.05	0.05	0.04	0.12‡	−0.03	
18. Any STI-like symptom	−0.04	0.04	0.24§	0.10†	0.58§	0.40§	0.04	0.06	−0.06	−0.13§	−0.14§	0.10	0.10	0.13§	0.43§	−0.18§	0.78§

*$P < 0.10$.
†$P < 0.05$.
‡$P < 0.01$.
§$P < 0.001$.
STD indicates sexually transmitted disease; NSW = nonsex worker; STI = sexually transmitted infection.

Results

Our final sample of 641 men who were administered both the survey and STI testing was the result of 15.1% of men who were not available at home even after repeated visits or were unable to visit sample collection sites and 4.6% who declined STI testing. In addition, the testing of 3 men was confounded by laboratory procedure and misidentification. Because the entire baseline sample had completed an extensive survey interview, we were able to compare those who had STI testing with those who had refused, were unavailable, or were confounded. All key sociodemographic and risk factor variables showed no significant differences between the main study group and the STI testing group.

The Population

The population from which the sample is drawn is mixed Hindu (42%), Muslim (54%), and Christian (4%). Migrants from northern states and the rural south and west constitute 66% of the population of these communities. The typical pattern is for men to migrate and get established and then bring wives and children from the villages. As a result, 16% of married men were living without their wives ("married bachelors") at the time of the survey. Men have a mean education of 6 years with 18% illiterate. Men are primarily daily wage workers (38%), petty traders (23%), and salaried private workers (19%) with a mean income of Rs 3,272 per month (U.S. $72). Households consist primarily of one room with an average of over 6 people per household.

Prevalence of Infection and Distribution Among Different Age Groups

Using a base sample of 641 men who were administered the full range of STI tests, the most common current STI was gonorrhea (n = 25 [3.9%]); HSV-2 (n = 62 [9.7%]) was the most common on measures for lifetime exposure. For both acute and lifetime exposure, men who were STI positive were significantly older than those who tested negative for acute syphilis, gonorrhea, *T. pallidum*, and HSV-2 IgG with a trend toward significance for chlamydia (see Table 2). This relationship also holds when STIs are clustered into acute (rapid plasma reagin, IgM [HSV-2], *N. gonorrhea*, and *C. trachomatis*) and lifetime exposure (*T. pallidum* hemagglutination, IgG [HSV-2]).

Reported Risk-Taking Behaviors

Men were asked about the details of risk-taking behaviors, including sexual behaviors. Close to 30% (179 of 641 [28.0%]) reported weekly use of beer and/or English or country (homebrewed) liquor. Over 40% (273 of 641 [42.7%]) reported premarital sex with a woman and 2.5% (16 of 641) with a man. The mean age at first premarital sex was 18.6 years (N = 273) for those having first sex with a woman (not their wives) and 16.3 years for those having sex with a man (N = 16). For those men whose first sex is with their wives, the mean age was 22.4 (N = 366). More than one fourth of the men (179 of 641 [27.9%]) reported having had at least one episode of sexual intercourse with a woman outside of marriage, whereas 15.9% (102 of 642) reported extramarital sex in the last 1 year. Only a small percentage of men, 0.9% (6 of 642) reported extramarital sex with a man. Five percent (32 of 642) of men reported payment of women for sex within the past 12 months.

Power within marital relationships[19,20] was surveyed and men were asked about the incidence of violent arguments with their wives in the past 6 months. Over 80% (514 of 641 [80.2%]) reported that they had at least one violent argument with their wives in this time period and 33.9% (217 of 641) reported that they

TABLE 2. Prevalence of Acute and Lifetime Sexually Transmitted Infections in Men (aged 21–40 y)*

	Total (N = 641)	Age 21–25 (N = 94)	Age 26–30 (N = 183)	Age 31–35 (N = 177)	Age 36–40 (N = 185)	*P*
RPR+/TPPA+ (acute syphilis)	1.3 (8)	0.0 (0)	0.5 (1)	1.7 (3)	2.2 (4)	0.042
RPR-/TPPA+ (lifetime syphilis)	5.9 (38)	3.2 (3)	3.8 (7)	6.2 (11)	9.2 (17)	0.003
HSV-2 IgM+ (recent HSV-2 infection)	0.9 (6)	1.1 (1)	1.1 (2)	0.6 (1)	1.1 (2)	0.93
HSV-2 IgG+ (lifetime exposure to HSV-2)	9.7 (62)	5.3 (5)	8.7 (16)	9.0 (16)	13.5 (25)	0.034
Gonorrhea PCR+	3.9 (25)	2.1 (2)	1.6 (3)	4.5 (8)	6.5 (12)	0.034
Chlamydia PCR+	0.3 (2)	0.0 (0)	0.0 (0)	0.0 (0)	1.1 (2)	0.068
Any STI acute (GC, CT, RPR+/TPPA+, HSV-2 IgM)	6.1 (39)	3.2 (3)	3.3 (6)	6.2 (11)	10.3 (19)	0.004
Any STI lifetime (RPR-/TPPA+, HSV-2 IgG)	13.6 (87)	8.5 (8)	10.4 (19)	14.1 (25)	18.9 (35)	0.002

*Age analyzed as a continuous variable (Pearson's r) and presented in categories for greater comprehension.
RPR indicates rapid plasma reagin; TPPA = treponema pallidum particle agglutination; HSV-2 = herpes simplex virus type 2; PCR = polymerase chain reaction; STI = sexually transmitted infection; GC = *Neisseria gonorrhoeae*; CT = *Chlamydia trachomatis*.

had regularly or sometimes slapped, punched, or kicked their wives in the last 6 months.

Table 3 presents the multiple logistic regression results assessing the relationships between reported risk-taking behaviors and the presence of laboratory-confirmed STIs. Men who reported premarital sex with a woman were significantly more likely to be antibody-positive for *T. pallidum* or HSV-2 exposure. Extramarital sex with a man was significantly associated with antibody-positive for *T. pallidum* or HSV-2. Greater exposure to pornographic materials showed a trend toward increased likelihood of lifetime exposure to STI. All other relationships for lifetime exposure to *T. pallidum* and HSV-2 were nonsignificant and all relationships with acute STI were nonsignificant.

Culturally Based Symptoms and Their Correlates

The majority of men with an etiologically confirmed infection did not report any abnormal symptoms. Only 12.5% of men with confirmed syphilis reported any genital ulcer or sore either currently or in the last 3 months. Similar results were found in the cases of gonorrhea (8% of men with current dysuria, 12% with dysuria in the past 3 months, no men with reports of urethral discharge) and chlamydia (no men with any symptoms of dysuria or discharge either currently or in the last 3 months). Over one third (37%) of men with lifetime evidence of HSV-2 infection reported a history of ever having a genital ulcer. Self-reports of lifetime history of genital ulcer disease were the only symptom predictive of the presence of an etiologically confirmed infection (HSV-2 lifetime); none of the other self-reported symptoms (dysuria, urethral discharge) was predictive of the presence of infection (see Table 4).

Men were asked about whether they had any of 33 symptoms (identified through qualitative research) of *gupt rog* in the last 3 months. These symptoms were clustered into the 3 cultural categories: performance problems (*kamjori*), semen problems (*dhat*), and internal and external eruptions (*garmi*). There was no significant relationship between *gupt rog* clusters and laboratory confirmed acute or lifetime STIs (see Table 5).

However, when we examined the relationship between risk behaviors and the culturally based symptom clusters using multiple linear regression, we did find a number of significant relationships (see Table 6). In particular, gender-based violence was associated with *dhat* and *kamjori* with a trend toward greater total symptoms, premarital sex with a female partner with all clusters and total symptoms, extramarital sex with a female partner with *kamjori*, payment for sex with a female

TABLE 3. Multiple Logistic Regression OR, 95% CI, and Significance Levels for Acute and Antibody-Positive for *Treponema pallidum* or HSV-2 as a Function of STI Risk Behaviors

	Acute Prevalence (39 of 641 [6.1%])			Antibody-Positive for *T. pallidum* or HSV-2 (87 of 641, [13.6%])		
STI Risk Behavior	OR	95% CI	*P*	OR	95% CI	*P*
Alcohol (28.0)	0.85	0.39–1.88	0.70	1.36	0.82–2.24	0.23
Sex materials (17.7)	0.86	0.35–2.14	0.75	0.49	0.24–1.01	0.051
Violent arguments (80.4)	1.50	0.60–3.72	0.38	0.94	0.52–1.68	0.83
Premarital sex: female (42.7)	0.58	0.28–1.21	0.15	1.71	1.06–2.76	0.029
Premarital sex: male (2.5)	0.00	0.00–0.00	1.00	0.54	0.10–2.82	0.47
Extramarital sex: female (nonsex worker, 11.9)	1.43	0.53–3.90	0.48	0.95	0.47–1.91	0.88
Payment for sex with female in last year (5.0)	0.68	0.09–5.27	0.71	1.26	0.47–3.36	0.64
Extramarital sex: male (nonsex worker, 0.9)	0.00	0.00–0.00	1.00	8.09	1.38–47.38	0.020

OR indicates odds ratio; CI = confidence interval; HSV-2 = herpes simplex virus type 2; STI = sexually transmitted infection.

TABLE 4. Multiple Logistic Regression OR, 95% CI, and Significance Levels for Acute and Lifetime Sexually Transmitted Infection Prevalence as a Function of Culturally Based Syndromes (N = 641)

	Acute Prevalence (39 of 641 [6.1%])			Antibody-Positive for *Treponema pallidum* or HSV-2 (87 of 641 [13.6%])		
Culturally Based Syndromes	OR	95% CI	*P*	OR	95% CI	*P*
Kamjori (43.2)	0.57	0.27–1.21	0.14	1.12	0.70–1.82	0.64
Dhat (14.0)	0.61	0.18–2.05	0.42	0.85	0.43–1.70	0.65
Garmi (49.3)	0.74	0.37–1.48	0.40	0.94	0.58–1.50	0.78

OR indicates odds ratio; CI = confidence interval.

partner with total symptoms, and *garmi* and extramarital sex with a male with *dhat*.

Symptoms and Treatment-Seeking

Relatively high rates of men respond to *gupt rog* symptoms by seeking treatment. Of the 431 men reporting a symptom in the previous 3 months, 54.1% (N = 233) had sought care either through self-prescribed medication obtained from local pharmacies (chemists) without prescription or from local private providers, which in these communities consist of 90% nonallopathic (*ayurvedic*, *unani*, and homeopathic) providers and 10% allopathic providers. The highest rate of men seeking treatment were those who reported one of the symptoms of *garmi* (193 of 317 [60.9%]) with men reporting at least one symptom of *kamjori* in the second position (94 of 278 [33.8%]) and men reporting a *dhat* symptom showing the least treatment-seeking behavior (14 of 91 [15.4%]). We examined the association between treatment-seeking and laboratory-confirmed acute and lifetime STIs and found no significant difference for those seeking versus not seeking treatment.

Discussion

Although prevalence surveys of STIs in defined groups of men (men in certain occupational groups, for example) have previously been undertaken in India,[20,21] only one community-based survey of STIs in men is reported in the published literature, and it did not consistently use gold standard laboratory tests.[20] We believe this study is the one of the first comprehensive cross-sectional surveys of STI prevalence in a community-based sample of men in India using "gold standard" laboratory diagnostic techniques and that the results of this article provide an important contribution to the evidence base on the extent of some sexual health morbidities for men in Mumbai. Nonetheless, the results should be interpreted with caution and should not be overgeneralized. India is a vast country of over one billion people and by its very nature is characterized by heterogeneity.[21] In addition, the rates of acute STI and lifetime exposure to STI were lower than anticipated, leading to smaller numbers and less power in the examination of associations. Despite these caveats, the results of this study do carry important implications for all those concerned with the prevention and control of STIs in India.[22]

We found a relatively low prevalence of most STIs except in the case of gonorrhea, which was found in 3.9% of the study population of 641 men. Population-based surveys among women in India have found lower prevalence of gonorrhea (0.3–0.8% in 2 surveys) and the low prevalence of chlamydia (0.6–0.8%) has been noted in some other studies,[23] although some researchers report much higher rates of chlamydia.[8–10] Comparison of syphilis rates is hampered by a lack of standardized diagnostic definitions across studies in India.[2] Some studies report nontreponemal tests without confirmation and others do not distinguish between treponemal and nontreponemal test results. However, in general, surveys among target populations of Indian men have found rates similar to those reported in this study.[24]

Very few population-based surveys of the prevalence of HSV-2 have been undertaken in India; instead, most surveys have confined themselves to looking at the prevalence of infection in symptomatic facility-based populations.[2] One multicountry survey found HSV-2 rates ranging from 3.2% in the 25- to 29-year age group to 13.8% among 30 to 34 year olds.[24] The prevalence range in our sample was from 5.3% to 13.5%, increasing within 5-year

TABLE 5. Multiple Logistic Regression OR, 95% CI, and Significant Levels for Acute and Antibody-Positive for Treponema pallidum or HSV-2 as a Function of Self-Reported STI-Like Symptoms in the Last 3 Mo

	Acute Prevalence (39 of 641 [6.1%])			Antibody-Positive for *T. pallidum* or HSV-2 (87 of 641 [13.6%])		
STI-Like Symptoms in the Last 3 Mo	OR	95% CI	*P*	OR	95% CI	*P*
Any reported STI-like symptom (24.5)	0.11	0.01–1.26	0.076	1.58	0.63–3.97	0.34
Burning/hot urination (16.6)	5.53	0.55–55.66	0.15	0.61	0.23–1.60	0.32
Pus-like discharge from the penis (1.1)	0.00	0.00–0.00	1.00	0.00	0.00–0.00	1.00
Sores, pimples, or ulcers on genitals or self-reported "syphilis" (5.7)	5.15	0.95–27.83	0.057	1.90	0.68–5.26	0.22

OR indicates odds ratio; CI = confidence interval; HSV-2 = herpes simplex virus type 2; STI = sexually transmitted infection.

TABLE 6. Univariate and Multiple Logistic Regression OR, 95% CI, and Significance Levels for Culturally Based Syndromes as a Function of STI Risk Behaviors and Risk Behaviors

	Total Symptoms (67.3%)			Dhat (14.0%)			Kamjori (43.2%)			Garmi (49.3%)		
STI Risk Behavior	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*
Alcohol (28.0)	0.94	0.63–1.40	0.76	0.90	0.53–1.52	0.70	0.90	0.62–1.30	0.58	0.99	0.68–1.43	0.94
Sex materials (17.7)	1.13	0.71–1.82	0.60	1.09	0.60–2.00	0.77	0.94	0.61–1.44	0.77	1.15	0.75–1.76	0.53
Violent arguments (80.4)	1.50	0.99–2.29	0.057	0.46	0.27–0.79	0.004	1.56	1.02–2.39	0.040	1.41	0.93–2.14	0.11
Premarital sex: female (42.7)	2.08	1.44–3.01	<0.001	1.62	1.01–2.62	0.047	1.48	1.06–2.07	0.022	1.88	1.34–2.63	<0.001
Premarital sex: male (2.5)	1.95	0.40–9.52	0.41	0.64	0.15–2.72	0.55	2.10	0.67–6.54	0.20	2.84	0.74–10.87	0.13
Extramarital sex with a female (nonsex worker, 11.9)	1.69	0.90–3.18	0.10	1.12	0.57–2.21	0.75	1.90	1.14–3.18	0.014	1.48	0.87–2.51	0.15
Payment for sex with a female in last year (5.0)	5.30	1.22–22.94	0.026	2.20	0.90–5.37	0.083	1.39	0.64–3.01	0.41	3.22	1.26–8.20	0.014
Extramarital sex with a male (nonsex worker, 0.9)	0.00	0.00–0.00	1.00	6.17	1.07–35.56	0.042	3.93	0.44–35.16	0.22	2.65	0.28–25.10	0.40

OR indicates odds ratio; CI = confidence interval; STI = sexually transmitted infection.

age groups, which is lower than those reported from other areas, especially those with higher HIV rates.[24]

There is growing evidence of an increased risk of HIV transmission in the presence of HSV-2.[25,26] Although care should be exercised in reviewing and interpreting the HSV-2 data, it is still worthwhile to note that even 10% of the population at risk of lifetime exposure to a viral STI, which acts as a cofactor in HIV transmission, translates into an extremely large number of people at risk in a slum area of 700,000 people.

Age and Sexually Transmitted Infections

Bivariate analysis found age to be the factor most strongly related to the presence of both acute and chronic STIs. The latter result is to be expected (lifetime exposure would be expected to increase with age), but the finding that acute STIs (chlamydia, gonorrhea, and acute syphilis) were also more common in older age groups is somewhat unexpected. Young people are often assumed to be more at risk of STI transmission than those in older age groups. The finding of higher STI rates among the older age groups compared with the young highlights the need to both confirm this result in other populations (e.g., elsewhere in India) and to explicate this result. Possible explanations are that older men have more disposable income available to them (and hence more opportunity to find and engage in sex with other women), that the constrained environment of one-room residences, particularly with older children, makes marital sexual intercourse difficult leading men to extramarital sex, and that the complexities of migration and marital relationships creates social and sexual distance between spouses.

Risk Behaviors and Their Associations

Sexual risk-taking was measured through a series of questions about premarital and extramarital sexual relationships as well as the extent of payment for sex. Over 40% of men reported premarital sex, a figure that is higher than studies have reported in other parts of India.[22,27] There is a strong correlation between men who have premarital sex and those who have extramarital sex ($r = 0.405$, $P < 0.001$) in the study population. Premarital sex with a women, extramarital sex with a man, and extramarital sex with a male sex worker showed a significant relationship to lifetime STI exposure. However, none of these risk factors were significantly associated with the acute STIs that were measured.

The lack of significant correlations between sexual and related risk behaviors and acute STIs in this study is consistent with many other studies.[28] Aral states that "Untangling the role of behavior in the transmission of HIV and other STIs has proved difficult. Observational studies that explore the relation between behavioral and biomedical outcomes often fail to show a strong relation between behaviors and acquisition of STI."[29] The increasing number of studies that fail to show this lack of correlation suggests that there may be limited use in using biomedical markers to validate self-reports of risky behavior. However, self reported *gupt rog* symptoms *do* function as a marker of sexually risky behavior. This correlation and South Asian men's extensive treatment-seeking for *gupt rog* provides an opportunity for an entry point for preventive interventions such as STI education and behavioral change communication.

In this population of men living in slum communities in Mumbai, we have found relatively low levels of current STIs and lifetime exposure to STIs but relatively high levels of sexual risk-taking. We believe that this result suggests a community at risk for an HIV/STI epidemic. We have seen that identification of men with STIs in this population is extremely difficult; we could find only limited risk factors for laboratory-confirmed STIs, which could be used to predict men at risk, except age. Reported symptoms were mostly not associated with the presence of infection. In addition, we found that most infections were carried asymptomatically. Thus, these men would not be readily identified through programs aiming to improve patterns of health care-seeking among men with symptoms. In the absence of community-based screening programs, which help identify people with infection (but which are prohibitively costly to implement), we believe that HIV/STI control programs require a more innovative and holistic approach to identify those who are more likely to be at risk.

A key factor in this picture is the significant association between the Indian cultural categories of sexual health and risk behavior. Although risk behavior showed a very limited association with the presence of acute and lifetime infection, these culturally based, self-reported symptoms were strongly associated with risk-taking behaviors. Men in India consider these problems of highest priority, are highly motivated to address them, seek treatment primarily with nonallopathic providers; and the most frequent outcome of the treatment is the use of antibiotics.[30] Although this treatment approach is far from ideal, it does present an opportunity to implement case-finding strategies to diagnose and treat men with STIs in healthcare settings that can include both private and public allopathic and nonallopathic services.

Three elements are necessary to achieve this objective: the first is the upgrading of the treatment facility to be open to a broad range of men's health needs and concerns; second, the capacity of the providers in those settings to effectively address syndromic management and risk reduction without excessive and inappropriate use of antibiotics; and the third, the need in these locations to have an effective screening tool that can identify STIs in asymptomatic men. One example of such a rapid screening procedure may be the use of leucocyte esterase dipsticks[31] or other effective and affordable STI point-of-care screening tests, which, unfortunately, are still at the development and evaluation stages.[32]

While we await the development of an effective STI point-of-care test, there is much to be gained by upgrading the capacities of both the allopathic and nonallopathic systems in India. This strategy calls for interaction with the private sector currently attracting men and the development of innovative services that address men's needs in the public health sector. The RISHTA project has developed an experimental intervention to train community-based private nonallopathic providers in a more holistic approach to sexual health problems consistent with their discipline traditions and in syndromic management and behavioral risk reduction. Furthermore, in an effort to more effectively involve public allopathic services in addressing issues of men's sexual health, the project has developed an experimental "male health clinic" in a heretofore maternal and child health-oriented public urban health center in which the staff has also been trained with the nonallopathic providers. The creation of "upgraded" entry points for men already seeking care is a key stratagem in primary and secondary prevention; the results of these experimental efforts should have important implications for HIV prevention and STI control.

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