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Screening for Sexually Transmitted Infections at a DeAddictions Service in South India

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Abstract

Objectives: To estimate the lifetime prevalence of four sexually transmitted infections (STIs) and to identify correlates of these infections among patients seeking care for a substance use disorder at a specialized DeAddictions unit in southern India.

Methods: Consecutive inpatients (n = 361; 97% male; M age = 36.7 years) admitted to DeAddictions Unit of the National Institute of Mental Health and Neuro Sciences in Bangalore, India, participated in a structured interview to obtain demographic, psychiatric, sexual behavior, and substance use data; and provided a blood sample for serologic testing for HIV, chlamydia, syphilis, and Hepatitis B.

Results: One-quarter of all patients tested positive for at least one STI. Lifetime seroprevalence rates were 12.9% for syphilis, 10.3% for chlamydia, 3.1% for Hepatitis B, and 1.1% for HIV. Analyses did not reveal any consistent pattern of associations between STI status and sociodemographic, psychiatric, and sexual behavioral characteristics.

Conclusions: All patients should receive a comprehensive sexual assessment during standard care; for those patients who report risky sexual practices, we recommend voluntary counseling and serologic testing for STIs. Although we do not recommend universal testing for STIs at this time, this should be revisited based upon national epidemiologic surveillance data.

Keywords

Sexually transmitted infection; HIV; Hepatitis; chlamydia; syphilis; India

1. Introduction

Persons experiencing alcohol and other drug addictions appear to be more likely than non-addicted persons to be infected with a sexually transmitted infection (STI). For example, Cook et al. (2002) recruited 240 sexually active adolescents from clinical and community settings and found that the prevalence of herpes simplex virus-2 infections was higher among females with an alcohol use disorder (AUD; 19%), compared to those without an AUD (10%) (adjusted odds ratio = 8.1). Cook and Clark (2005) conducted a systematic review of published literature

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on the association between problematic alcohol consumption and STIs, and reported that 8 of 11 studies found a significant association between alcohol consumption and at least one STI.

Evidence regarding the association between HIV and drug abuse can also be found (Aceijas et al., 2004). Much of this evidence comes from patients who have engaged in sharing of injection needles and other drug use paraphernalia. Fewer studies have examined the relationship between HIV (and other STIs) and abuse of non-injectable drugs, but several studies also suggest an increased vulnerability to HIV and other STIs among persons who use non-injectable drugs (Bachmann et al., 2000, Poulin et al., 1999, Shoptaw et al., 2003). At least one study has not found an increased risk of STIs (Liebschutz et al., 2003), so additional research is needed.

Given associations between STIs and alcohol / drug abuse in *developed* countries, it is plausible that such associations may also exist in *developing* countries. One developing country that has been identified as the next possible global epicenter for HIV is India. India may already have the greatest number of HIV infections (5.1 million) of any country in the world (Solomon et al., 2004, Godbole and Mehendale, 2005, UNAIDS, 2004). Because India has the world's second largest population (and is projected to have the world's largest population by the year 2050), some fear that India may become a major epicenter of the HIV pandemic. Globally, HIV is the second leading cause of disability-adjusted life years, an indicator of the burden of disease (Michaud et al., 2001).

In addition to HIV, several other STIs are believed to be prevalent in India. Surveillance data are sparse, however, due to recent recognition of STIs as a major public health problem, stigma and discrimination associated with the STIs, and limited availability of diagnostic facilities and other resources (Desai et al., 2003). Moreover, the presence of STIs increases the risk of HIV infection (Wasserheit, 1992). Thus, in formation regarding the prevalence of HIV and other STIs is essential to effective HIV and STI control and prevention in India (Risbud, 2005).

To our knowledge, no research has examined whether persons in treatment for alcohol and drug addiction in India are at elevated risk for infection with HIV and other STIs (Godbole and Mehendale, 2005). Therefore, the primary purpose of this study was to estimate the lifetime prevalence of four STIs (viz., HIV, chlamydia, syphilis, hepatitis B) among both men and women seeking treatment for a substance use disorder at a specialized DeAddictions Unit at a teaching and research hospital in southern India. The secondary purpose of this study was to identify sociodemographic and behavioral correlates of infection. Overall, information about the prevalence and correlates of STIs can help policy makers, health care providers, and researchers to allocate resources to those most in need, and improve understanding of the possible determinants of STIs in this population.

2. Methods

2.1. Setting

The study was conducted at the 60-bed inpatient DeAddictions Unit of the National Institute of Mental Health and Neuro Sciences (NIMHANS) in Bangalore, India. NIMHANS is a 600-bed state psychiatric hospital that serves patients from urban, semi-urban, and rural areas, particularly from southern India. Patients admitted to the inpatient DeAddictions Unit were eligible to participate if they were: (a) at least 18 years of age, (b) diagnosed with a substance use disorder, (c) judged to be able to complete the assessment by clinical and research staff, (d) not acutely psychotic or otherwise unable to participate meaningfully in the study, and (e) able to provide informed consent.

2.2. Procedures

All procedures and materials for this cross-sectional study were reviewed and approved by the Institutional Review Boards of the NIMHANS and Syracuse University, and by the Indian Council of Medical Research.

2.2.1. Recruitment. Consecutive admissions to the DeAddictions Unit from April to October, 2001 were reviewed with the clinical team to determine their eligibility, and to be certain that each person was clinically stable and able to participate meaningfully in the research. The research staff then approached all eligible patients to explain the study, answer questions that the patient might have, and invite the patient to participate. (All research staff were physicians with an interest in substance abuse treatment, psychiatry, public health, and/or HIV/AIDS, who had received training from the investigators prior to working with patients.) Confidentiality was emphasized with assurances that information would be shared with the treating team only with consent from the individual. Patients who were interested in participating provided informed consent.

2.2.2. Interview. Interviews were conducted by well-trained and supervised medical professionals who (a) took the time to establish rapport with patients, (b) provided reassurances regarding confidentiality before conducting the interview, and (c) used the language most comfortable for the patient. These strategies were designed to ease the cognitive burden on the patients, to facilitate candid reporting, to afford greater cultural sensitivity, to avoid potential problems associated with patient endurance, and to avoid misunderstandings associated with language or literacy concerns. The interviews began with an assessment of demographic characteristics, and then proceeded to questions regarding substance use and sexual behavior. We used three standardized measures, and all patient responses were recorded by the Interviewer on a standardized booklet.

First, to assess alcohol use, we employed the *Alcohol Use Disorders Identification Test* (Saunders et al., 1993). The AUDIT, a 10 item screening measure yields scores that range from 0-40, identifies drinkers at risk for alcohol abuse and dependence. The AUDIT was constructed for use in developing countries (Saunders et al., 1993), and has been found to be reliable and valid in psychiatric settings throughout the world (Maisto et al., 2000), including India (Carey et al., 2003a).

Second, to assess drug use, we used the short version of *Drug Abuse Screening Test* (Skinner, 1982), which identifies drug-use related problems in the previous year. The DAST is reliable and valid in both clinical and non-clinical settings (Maisto et al., 2000). Research conducted with Indian participants corroborates the unidimensional structure, internal consistency, and validity of the DAST (Carey et al., 2003a). In addition, patients were asked if they smoked commercially-prepared cigarettes and/or beedis, and if they chewed tobacco and/or betel nut.

Third, to assess sexual risk behavior, we used the *HIV-Risk Screening Instrument* (HRSI) (Gerbert et al., 1998). Ten items assess sexual activity (e.g., “Have you had anal sex — a man puts his penis into the anus of another person — with any of your sexual partners”), drug use risk behavior (e.g., “Have you ever injected street drugs, steroids, or vitamins with a needle”), number of sexual partners (e.g., “Have you had two or more sexual partners”), and other risk behaviors (e.g., “Have you ever had sex with someone so that they [sic] would give you money or drugs?”) that discriminate between low-and high-risk groups for contracting HIV. Modifications (e.g., providing definitions of some words, such as *anal* sex and steroids) were made to make the HRSI appropriate to the Indian context (Carey et al., 2003b). A score of zero reflects low risk, whereas a score of one or more reflects higher risk for HIV infection. To allow comparisons with previous research, we assessed behavior during the past year as well

as 10-year risk behavior. The interviewer also asked questions regarding four STI-related symptoms (i.e., genital discharge, pain while urinating, genital sores, genital swelling) in the past year.

2.2.3. Specimen collection. When the interview was completed, blood samples were collected by a trained phlebotomist. The blood specimen involved 5 ml of blood in a plain vial collected without any anticoagulant. The clotted blood samples were centrifuged at 1000 xg for 20 min and the serum separated and stored in aliquots at -20° C until laboratory tests were completed.

2.2.4. Laboratory testing. All laboratory tests followed standard procedures. Thus, for HIV 1 and 2, we used a commercial ELISA kit (Bicohem, Canada). Reactive samples were subjected to a confirmatory Western Blot test (Immunetics, USA). For syphilis, we used a commercial particle agglutination test kit (Serodia, Japan) to detect antibodies to *Treponema pallidum*. Specimens showing agglutination in the confirmatory test were considered positive indicating current or past infection with this organism. For Chlamydia, we employed a commercial ELISA kit (Novum Diagnostica) for the detection of IgG antibodies to Chlamydia. A sample having an Optical Density (OD) value 10% over that obtained with a cut-off sample was considered positive indicating current or past infection. For Hepatitis B, we used a commercial ELISA kit (DiaSorin, Italy) for the detection of surface antigen in serum samples. Samples giving OD values within 10% of cut-off value were considered positive.

2.2.5. STI treatment and care. Patients who tested positive for any STI were informed of their infection, counseled, and referred for continued medical and psychosocial care.

2.2.6. Data management and analyses. Data were double entered, and compared for accuracy. Discrepancies were compared against the raw data to correct clerical errors. To provide prevalence estimates, simple percentages were calculated. Initially, we intended to implement a series of logistic regression models to identify correlates of STIs. However, due to the low base rates of positive test results in these data, logistic regression could not be implemented. In particular, estimation of logistic regression models with outcome variables that have low base rates yields estimated regression coefficients that tend toward infinity (with equally large standard errors and confidence intervals), particularly when specific covariates/categories have no variability in the outcome variable (Hosmer and Lemeshow, 2000). Therefore, bivariate analyses were used to provide estimates of the degree of correlation between each STI and demographic, psychiatric, substance use, and behavioral risk variables. Furthermore, due to the low predicted cell sizes, we used Fisher's Exact tests to compare infected and not-infected groups. Initial gender comparisons were made; however, due to the small number of women included in the study, subsequent comparisons were made using data provided by males only.

3. Results

During the study period, there were 493 admissions to the DeAddictions Unit. Of these patients, 50 were discharged early; 40 could not be interviewed because they left the hospital against medical advice; 38 were unable to comprehend and respond to the interview because of an acute psychiatric problem; and 4 were not eligible for reasons such as readmission, age older than 65 years, language problems, or need for immediate transfer to another medical units. Thus, 361 patients with problems primarily related to substance use were available and consented to participate in the study.

Patients (98% male) mean age was 36.7 years (SD = 9.2). Patients preferred language was 37% Kannada, 18% Telugu, 23% Tamil, 3% Hindi, and 19% others. Religious affiliation was 82% Hindu, 6% Muslim, 10% Christian, and 2% other. Most had some formal education with 36% having completed primary level education, 30% high school, 10% pre-university, and 14%

university; only 59% reported earning wages from a job. Among all patients, 252 (70%) were married and living with their spouse, 25 (7%) were married but living apart, and 84 (23%) were not married, divorced, or widowed. Approximately 66% lived in an urban area, 19% in a rural area, and 15% in a semi-urban area. Forty-five percent lived in their own home, with the remaining patients living in their family home (38%), the home of another person (14%), an institution or a halfway home (less than 1%) or were homeless (1.1%).

Most patients (n = 319; 88%) were diagnosed with an alcohol use disorder, 20 (6%) had an opioid use disorder, 6 (2%) had a cannabinoid use disorder, 1 (0.3%) had a sedative/hypnotic use disorder, and 15 (4%) had a multiple substance use disorder. Only seven patients injected drugs in the past year, and eleven reported injection drug use during their lifetime. A minority (n =34; 9%) were dually-diagnosed with a psychiatric disorder. The duration of illness was < 6 months in 43 (12%) cases, 6 to 12 months in 19 (5%) cases, 1 to 5 years in 109 (30%) cases, and more than 5 years in 190 (53%) cases. The mean number of previous psychiatric admissions was 0.6 (SD = 1.3).

3.1. HIV

HIV data were missing for 5 participants. Four of the 356 patients tested were infected with HIV (1.1%;95% CI = 0.3, 2.9). Patients testing positive included only men with a mean age of 29.5 years (SD = 5.1), all of whom were diagnosed with only an alcohol use disorder.

Bivariate comparisons contrasted patients diagnosed with HIV and those who tested negative. Comparisons for *demographic, psychiatric, and substance use variables* are presented in Table 1. No women tested positive for HIV, but this gender comparison was not statistically significant. Among men, none of these variables were significantly correlated with HIV status. Bivariate comparisons for *behavioral risk variables* and self-reported STI data are presented in Table 2. Among these variables, only having paid for sex in the past 10 years was significantly correlated with HIV status (Fisher's $p < .01$), with men who paid for sex showing significantly higher rates of HIV positive status compared to men who did not pay for sex.

3.2. Chlamydia

Chlamydia test data were missing for 11 participants. Thirty-six of the 350 patients tested positive for lifetime exposure to Chlamydia (10.3%; 95% CI = 7.3, 14.0). Patients testing positive included men (n = 33) and women (n = 3) with a mean age of 37.0 years (SD = 8.9). The diagnostic breakdown for those who tested positive was: alcohol use disorder (n = 32), cannabinoids use disorder (n = 1), and multiple substance use disorder depression (n = 3). Two patients were also diagnosed with a psychiatric disorder.

Bivariate comparisons contrasted patients diagnosed with Chlamydia and those who tested negative. Bivariate comparisons for *demographic, psychiatric, and substance use variables* are presented in Table 1. The rate of infection among men and women was not significantly different. Among men, none of these variables were significantly correlated with a positive Chlamydia test result. Bivariate comparisons for *behavioral risk variables* and self-reported STI data are presented in Table 2. None of these variables was correlated with a positive Chlamydia test.

3.3. Syphilis

TPPA test data were missing for 5 participants. Forty-six of the 356 patients tested positive for lifetime exposure to Syphilis (12.9%; 95% CI = 9.6, 16.9). Patients testing positive included men (n = 45) and women (n = 1) with a mean age of 37.7 years (SD = 8.5). The diagnostic breakdown for those who tested positive was: alcohol use disorder (n = 45), opioid use disorder (n = 1). Four patients were also diagnosed with a psychiatric disorder.

Bivariate comparisons contrasted patients diagnosed with Syphilis and those who tested negative. Bivariate comparisons for *demographic, psychiatric, and substance use variables* are presented in Table 1. Infection rates did not differ between men and women. Among men, marital status (Fisher's $p < .01$), primary substance use diagnosis (Fisher's $p < .01$), duration of illness (Fisher's $p < .05$), AUDIT score (Fisher's $p < .05$), and DAST score (Fisher's $p < .01$) were all correlated with a positive Syphilis test result. In particular, married men, men diagnosed with an alcohol use disorder, a significant AUDIT score, and DAST score were all associated with higher rates of Syphilis infection. Interpretation of duration of illness is more difficult, with men diagnosed in the past 1-5 years showing lower rates of Syphilis infection compared to individuals diagnosed for shorter and longer periods of time. Bivariate comparisons for *behavioral risk variables* and self-reported STI data are presented in Table 2. None of these variables was correlated with a positive Syphilis test result.

3.4. Hepatitis B

Hepatitis B test data were missing for 5 participants. Eleven of the 356 patients tested were positive for Hepatitis B (3.1%; 95% CI = 1.6, 5.5). Patients testing positive included men ($n = 10$) and women ($n = 1$) with a mean age of 30.1 years (SD = 7.0). The diagnostic breakdown for those who tested positive was: alcohol use disorder ($n = 8$), opioid use disorder ($n = 2$), and cannabinoid use disorder ($n = 1$). One patient was also diagnosed with a psychiatric disorder.

Bivariate comparisons contrasted patients diagnosed with Hepatitis B and those who tested negative. Bivariate comparisons for *demographic, psychiatric, and substance use variables* are presented in Table 1. The rate of infection among men and women was not significantly different. Among men, none of these variables were significantly correlated with a positive Hepatitis B test result. Bivariate comparisons for *behavioral risk variables* and self-reported STI data are presented in Table 2. Among these variables, only having multiple sexual partners in the past year was significantly correlated with a positive result (Fisher's $p < .01$), with men who reported multiple partners having higher rates of Hepatitis B infection compared to men with zero or one sexual partner.

3.5. All STIs

Of the 356 patients tested for at least three STIs, 88 were infected with at least one STI (24.7%; 95% CI = 20.3, 29.5); when analyses were restricted to only those patients who provided data for all four STIs, 88 of the 350 (25.1%; 95% CI = 20.7, 30.0) were infected with at least one STI. Nine of the 356 patients (2.5%; 95% CI = 1.2, 4.5) were diagnosed with more than one STI.

Comparisons of patients diagnosed with any STI with those who tested negative revealed several differences. Bivariate comparisons for *demographic, psychiatric, and substance use variables* are presented in Table 1. Any STI was significantly correlated with gender (Fisher's $p < .05$), with women being more likely to test positive for at least one STI compared to men. Remaining comparisons made among men only indicated that AUDIT score (Fisher's $p < .05$) and DAST score (Fisher's $p < .05$) were both correlated with at least one positive test result. In particular, men with a clinically significant AUDIT score and a clinically non-significant DAST score were more likely to test positive for at least one STI. Comparisons for *behavioral risk variables* and self-reported STI data are presented in Table 2. None of these variables was correlated with a positive test result.

4. Discussion

This report provides the first, large-scale investigation of the prevalence of HIV and three other serious STIs among men and women seeking treatment for a substance abuse disorder at the eAddictions Unit of the National Institute of Mental Health and Neuro Sciences (NIMHANS) in Bangalore, India. Strengths of the study include the use of consecutive admissions screening (avoiding a self-selection bias), biological confirmation of STI status, assessment using standardized laboratory procedures and clinical measures with known psychometric properties, special sensitivity to language and culture, and a relatively large and diverse sample; these strengths enhance confidence in the validity and representativeness of the findings.

Results indicated lifetime seroprevalence rates of 12.9% for syphilis, 10.3% for chlamydia, 3.1% for Hepatitis B, and 1.1% for HIV. Nearly one-quarter of all patients tested positive for at least one STI. The STI rates observed in this study exceed those found in a recent samples of patients in substance abuse settings in the U. S. (Liebschutz et al., 2003) and Canada (Poulin et al., 1999), and also exceed rates found in community samples in India. For example, in a recent study of the prevalence of anti-Chlamydial antibodies in Tamil Nadu, 2.4% were determined to be infected (Joyee et al., 2004). The rate of HIV infection (1.1%) also appears to be higher than rates reported for the general Indian population (i.e., 0.7-0.9%; Solomon et al., 2004). Such comparisons must be made cautiously, however, due to sampling and other methodological differences. However, if the estimates obtained with the current sample are representative, these findings suggest that patients being treated for a substance use disorder in India are at slightly elevated risk for STIs, including HIV. Ongoing surveillance of HIV and other STIs in India can help to clarify the nature of the epidemic, and guide policy efforts.

Several explanations can be offered to explain why persons who abuse alcohol and other drugs may be vulnerable to STIs. For example, alcohol and other drug use impairs judgment, and may lead to poor decisions regarding sexual behavior. Adults with a substance abuse disorder often cannot work, and often live in circumstances and environments that are especially risky, or may need to exchange sex for food, shelter, or safety. Indeed, epidemiological studies document the increased risk associated with poverty and other forms of social disadvantage (Farmer, 1999, Berkman and Kawachi, 2000). Drug use can compromise the interpersonal and social skills needed to negotiate for safer sexual relationships, and may lead to less stable sexual partnerships, partner concurrency, sexual bartering, and risky sexual behavior, all of which increase their vulnerability for STIs. Further research on the mechanisms by which alcohol and drug use may increase risk for STIs is needed.

A secondary purpose of this research was to identify sociodemographic and behavioral correlates of STIs. Because the sample contained few female patients (n = 9), the study had limited statistical power to detect gender differences on the individual STIs. However, when diagnosis with *any* STI was considered, women were more likely to be infected (56%) than were men (24%). The higher estimate among women is consistent with data indicating that women are more biologically vulnerable to STIs (Nicolosi et al., 1994, Padian et al., 1997). Continued study of the unique risks of women, with larger samples of females with substance use disorders, is needed.

Overall, however, analyses did not reveal a consistent pattern of patient demographic, psychiatric, and behavioral characteristics that were associated with having a STI. Although a few significant associations did emerge (e.g., between duration of illness and syphilis), such associations did not replicate across STIs; thus, it appears prudent to interpret the inconsistent pattern of associations as reflecting chance associations, until future research demonstrates a more consistent pattern. Overall, then, data from this large sample did not identify a profile based on demographic, psychiatric, or behavioral characteristics that covary with STI risk.

The results are important, but need to be interpreted cautiously given the limitations of our research. First, our sample included only a few women. Our sample reflects the much lower prevalence of substance use problems among women in India, relative to developed countries (i.e., Indian men are nearly 10 times more likely than Indian women to regularly use alcohol; Neufeld et al., 2005). However, in this time of rapid cultural change and globalization, it is possible that rates of substance use among Indian women may increase, and careful attention to this matter is recommended. Second, our data were collected from a specialized DeAddictions unit at a large teaching and research hospital. Given the specialized nature of this institution, these results should be replicated in other setting and parts of the country before generalization to the larger population of patients seeking treatment for a substance use disorder is warranted. Third, these data were collected in 2001; given the dynamic nature of the HIV epidemic, inferences about current prevalence should be made cautiously. Fourth, we did not test for other STIs, such as herpes simplex virus, human papilloma virus, candida, trichomonas, chancroid, and non-specific genital inflammations such as bacterial vaginosis. Had we tested for these infections, it is likely that a higher percentage of study participants would have been found to be infected with an STI. Fifth, the tests that we did use indicate lifetime exposure; thus, our methods do not allow us to provide point prevalence estimates for acute exposure to chlamydia or syphilis. Such estimates are likely to be significantly lower, and should be addressed in future research. Finally, due to the low base rates of some STIs, it was not possible to complete multivariate analyses that controlled for the effects of other predictors.

Several recommendations appear justified on the basis of these findings. First, we recommend that all patients receiving treatment for an alcohol or other drug problem receive a comprehensive sexual health assessment as a part of standard clinical care. This assessment should include a detailed sexual history, with attention to signs and symptoms of STIs as well as risk behavior. Second, we recommend that addictions specialists receive ongoing training in human sexuality so that they can conduct such assessments, and better assist patients who have concerns or require special attention. Given the stigma still associated with HIV and other STIs, such training will help to lower provider-related barriers to optimal care. Third, we recommend that patients who report a history of multiple partners, exchanging money for sex or sex for money (or other resource needs), anal sex, injection drug use, and men who have sex with men be encouraged to undergo voluntary counseling and testing for HIV and other STIs. We recommend this even in the absence of a presenting sexual concern because STIs are often asymptomatic. Fourth, given the low prevalence of HIV observed in our sample relative to other population sub-groups (e.g., commercial sex workers, STI clinic patients) and the finite resources available for health care, we do not — *at this time* — recommend universal HIV testing for patients receiving substance use treatment at settings similar to the one where our data were collected. This recommendation is similar to that reached for the U.S. (Liebschutz et al., 2003), and is also consistent with recent cost-effectiveness analyses regarding when such universal screening is warranted (Paltiel et al., 2005). *This recommendation should be revisited regularly*, however, and informed by surveillance of HIV in the general Indian population. We encourage research that samples from a variety of settings in order to determine STI rates in the larger population of treatment seekers. HIV in particular is a dynamic epidemic, and requires continued vigilance to avert a worsening epidemic.

In conclusion, the findings of this study suggest that 25% of patients in treatment for an alcohol or drug abuse disorder have been infected with a STI in their lifetime. More than 1% were infected with HIV. Based upon bivariate analyses of patient demographic, psychiatric, or behavioral characteristics, we did not find a consistent risk pattern or profile associated with STIs. These findings warrant replication but lead to a set of clinical and public health recommendations to benefit Indian patients in treatment for a substance abuse disorder.

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Table 1

Bivariate Associations Between STI Infection Rates and Demographic, Psychiatric, and Substance Use Characteristics

	n[a]	HIV	Chlamydia	Syphilis	Hepatitis B	Any STI
Demographic Variables						
Gender						
Female	9/9	0 (0.0%)	3 (33.3%)	1 (11.1%)	1 (11.1%)	5 (55.6%)*
Male	347/341	4 (1.2%)	33 (9.7%)	45 (13.0%)	10 (2.9%)	83 (23.9%)*
Age						
18-28	71/71	3 (4.2%)	6 (8.5%)	5 (7.0%)	4 (5.6%)	16 (22.5%)
29-38	140/135	1 (0.7%)	12 (8.9%)	22 (15.7%)	5 (3.6%)	35 (25.0%)
39-48	100/99	0 (0.0%)	14 (14.1%)	13 (13.0%)	1 (1.0%)	26 (26.0%)
48+	36/36	0 (0.0%)	1 (2.8%)	5 (13.9%)	0 (0.0%)	6 (16.7%)
Level of Education						
No Formal Education	35/34	0 (0.0%)	3 (8.8%)	6 (17.1%)	1 (2.9%)	8 (22.9%)
High School	228/225	4 (1.8%)	22 (9.8%)	34 (14.9%)	6 (2.6%)	61 (26.8%)
College	84/82	0 (0.0%)	8 (9.8%)	5 (6.0%)	3 (3.6%)	14 (16.7%)
Marital Status						
Unmarried	105/102	3 (2.9%)	6 (5.9%)	6 (5.7%)**	5 (4.8%)	18 (17.1%)
Married	242/239	1 (0.4%)	27 (11.3%)	39 (16.1%)	5 (2.1%)	65 (26.9%)
Living Environment						
Rural	119/119	1 (0.8%)	10 (8.4%)	17 (14.3%)	6 (5.0%)	31 (26.1%)
Urban	228/222	3 (1.3%)	23 (10.4%)	28 (12.3%)	4 (1.8%)	52 (22.8%)
Living Situation						
Own Home	159/155	1 (0.6%)	13 (8.4%)	20 (12.6%)	2 (1.3%)	33 (20.8%)
Others' Home	188/186	3 (1.6%)	20 (10.8%)	25 (13.3%)	8 (4.3%)	50 (26.6%)
Occupation						
Unemployed	60/57	0 (0.0%)	4 (7.0%)	7 (11.7%)	3 (5.0%)	13 (21.7%)
Nonprofessional	172/169	3 (1.7%)	20 (11.8%)	25 (14.5%)	5 (2.9%)	46 (26.7%)
Professional	115/115	1 (0.9%)	9 (7.8%)	13 (11.3%)	2 (1.7%)	24 (20.9%)
Psychiatric Variables						
Diagnosis						
Alcohol Use Disorder	308/303	4 (1.3%)	30 (9.9%)	45 (14.6%)**	7 (2.3%)	77 (25.0%)
Other Substance Use	39/38	0 (0.0%)	3 (7.9%)	0 (0.0%)**	3 (7.7%)	6 (15.4%)
Dual Diagnosis						
No	314/309	4 (1.3%)	31 (10.0%)	41 (13.1%)	9 (2.9%)	77 (24.5%)
Yes	33/32	0 (0.0%)	2 (6.3%)	4 (12.1%)	1 (3.0%)	6 (18.2%)
Duration of Substance UseDisorder						
< 6 Months	41/41	0 (0.0%)	5 (12.2%)	6 (14.6%)*	2 (4.9%)	10 (24.4%)
6-12 Months	19/19	0 (0.0%)	2 (10.5%)	3 (15.8%)*	1 (5.3%)	6 (31.6%)
1-5 Years	106/104	2 (1.9%)	8 (7.7%)	6 (5.7%)*	3 (2.8%)	19 (17.9%)
> 5 Years	181/177	2 (1.1%)	18 (10.2%)	30 (16.6%)	4 (2.2%)	48 (26.5%)
Substance Use Variables						
Cigarette Smoking						
No	202/200	1 (0.5%)	21 (10.5%)	30 (14.9%)	7 (3.5%)	52 (25.7%)
Yes	145/141	3 (2.1%)	12 (8.5%)	15 (10.3%)	3 (2.1%)	31 (21.4%)
Beedis Smoking						
No	136/134	1 (0.7%)	13 (9.7%)	14 (10.3%)	5 (3.7%)	28 (20.6%)
Yes	211/207	3 (1.4%)	20 (9.7%)	31 (14.7%)	5 (2.4%)	55 (26.1%)
Chewing Tobacco						
No	264/259	2 (0.8%)	24 (9.3%)	37 (14.0%)	7 (2.7%)	64 (24.3%)
Yes	83/82	2 (2.4%)	9 (11.0%)	8 (9.6%)	3 (3.6%)	19 (22.9%)
Betel nut Use						
No	256/254	4 (1.6%)	21 (8.3%)	30 (11.7%)	8 (3.1%)	58 (22.7%)
Yes	91/87	0 (0.0%)	12 (13.8%)	15 (16.5%)	2 (2.2%)	25 (27.5%)
AUDIT Score						
< 8	28/28	0 (0.0%)	0 (0.0%)	0 (0.0%)*	2 (7.1%)	2 (7.1%)*
8+	319/313	4 (1.3%)	33 (10.5%)	45 (14.1%)*	8 (2.5%)	81 (25.4%)*
DAST Score						
< 2	288/285	3 (1.0%)	29 (10.2%)	44 (15.3%)**	8 (2.8%)	75 (26.0%)*
2+	59/56	1 (1.7%)	4 (7.1%)	1 (1.7%)**	2 (3.4%)	8 (13.6%)*

*, $p < .05$

**, $p < .01$

***, $p < .001$.

[a] All variables — other than gender — include data from males only; thus, results for HIV, Syphilis, Hepatitis B, and Any STI are based on $n = 347$, and sample size is represented by the number on the left side of the slash in the column; Chlamydia results are based on $n = 341$, andsample size is represented by the number on the right side of the slash in the column. Some variables may not reflect these overall sample sizesdue to missing data.

Table 2

Bivariate Associations Between STI Infection Rates and Behavioral Risk Variables

	n[a]	HIV	Chlamydia	Syphilis	Hepatitis B	Any STI
Behavioral Risk Variables						
Last Sexual Activity						
Never	29/29	0 (0.0%)	3 (10.3%)	3 (10.3%)	2 (6.9%)	7 (24.1%)
Past Year	270/266	2 (0.7%)	29 (10.9%)	38 (14.1%)	6 (2.2%)	67 (24.8%)
Last 10 Years	42/40	2 (4.8%)	1 (2.5%)	3 (7.1%)	2 (4.8%)	8 (19.1%)
Lifetime	6/6	0 (0.0%)	0 (0.0%)	1 (16.7%)	0 (0.0%)	1 (16.7%)
Paid for Sex, Past 10 Years						
No	282/277	1 (0.4%)*	26 (9.4%)	38 (13.5%)	7 (2.5%)	65 (23.1%)
Yes	65/64 3	(4.6%)	7 (10.9%)	7 (10.8%)	3 (4.6%)	18 (27.7%)
Paid for Sex, Past Year						
No	330/324	3 (0.9%)	29 (9.0%)	44 (13.3%)	8 (2.4%)	77 (23.3%)
Yes	17/17	1 (5.9%)	4 (23.5%)	1 (5.9%)	2 (11.8%)	6 (35.3%)
Been Paid for Sex, Lifetime						
No	321/315	4 (1.3%)	32 (10.2%)	41 (12.8%)	10 (3.1%)	78 (24.3%)
Yes	20/20	0 (0.0%)	1 (5.0%)	3 (15.0%)	0 (0.0%)	4 (20.0%)
Been Paid for Sex, Past Year						
No	345/339	4 (1.2%)	32 (9.4%)	45 (13.0%)	10 (2.9%)	82 (23.8%)
Yes	2/2	0 (0.0%)	1 (50.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)
Multiple Partners, Past 10 Years						
No	239/236	1 (0.4%)	24 (10.2%)	32 (13.4%)	5 (2.1%)	56 (23.4%)
Yes	108/105	3 (2.8%)	9 (8.6%)	13 (12.0%)	5 (4.6%)	27 (25.0%)
Multiple Partners, Past Year						
No	323/318	3 (0.9%)	28 (8.8%)	44 (13.6%)	7 (2.2%)*	75 (23.2%)
Yes	24/23	1 (4.2%)	5 (21.7%)	1 (4.2%)	3 (12.5%)*	8 (33.3%)
Men who have sex with men, Past 10 Years						
No	340/334	4 (1.2%)	32 (9.6%)	45 (13.2%)	10 (2.9%)	82 (24.1%)
Yes	6/6	0 (0.0%)	1 (16.7%)	0 (0.0%)	0 (0.0%)	1 (16.7%)
Men who have sex with men, Past Year						
No	343/337	4 (1.2%)	32 (9.5%)	45 (13.1%)	10 (2.9%)	82 (23.9%)
Yes	3/3	0 (0.0%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	1 (33.3%)
Anal Sex, Past 10 Years						
No	324/318	4 (1.2%)	31 (9.8%)	44 (13.6%)	9 (2.8%)	79 (24.4%)
Yes	23/23	0 (0.0%)	2 (8.7%)	1 (4.4%)	1 (4.4%)	4 (17.4%)
Anal Sex, Past Year						
No	335/329	4 (1.2%)	31 (9.4%)	45 (13.4%)	9 (2.7%)	80 (23.9%)
Yes	12/12	0 (0.0%)	2 (16.7%)	0 (0.0%)	1 (8.3%)	3 (25.0%)
Self-reported STI Variables						
STI Symptoms Reported						
No	335/330	3 (0.9%)	32 (9.7%)	44 (13.1%)	9 (2.7%)	80 (23.9%)
Yes	12/11	1 (8.3%)	1 (9.1%)	1 (8.3%)	1 (8.3%)	3 (25.0%)
STI Lifetime						
No	308/305	3 (1.0%)	32 (10.5%)	36 (11.7%)	9 (2.9%)	72 (23.4%)
Yes	33/30	1 (3.0%)	1 (3.3%)	8 (24.2%)	1 (3.0%)	10 (30.3%)
STI Past Year						
No	342/336	3 (0.9%)	33 (9.8%)	45 (13.2%)	10 (2.9%)	82 (24.0%)
Yes	5/5	1 (20.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (20.0%)

*, $p < .05$

**, $p < .01$

***, $p < .001$.

[a] All variables only include male participants. Results for HIV, Syphilis, Hepatitis B, and Any STI are based on $n = 347$, and sample sizeis represented by the number on the left side of the slash in the column; Chlamydia results are based on $n = 341$, and sample size is represented bythe number on the right side of the slash in the column. Some variables may not reflect these overall sample sizes due to missing data.