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Sexual Risk and HIV Infection Among Drug Users in New York City: A Pilot Study

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Abstract

Measures of sexual health were assessed during 2008–2009 in a New York City sample of 102 injection and noninjection users of heroin, cocaine, or crack. There was considerable overlap and transitioning between crack smoking and injecting. Crack users were also significantly more likely to be gay, lesbian, or bisexual than other drug users. In multivariate analysis, HIV infection was independently associated with crack use and with being gay or bisexual. In New York City, HIV prevention for drug users has focused on syringe access, safe injection, and drug user treatment, but further progress in HIV control will require strategies to address sexual health among people who use drugs. The study's limitations are noted.

Keywords

HIV; prevention; substance use; prevalence; risk behavior; HSV-2

INTRODUCTION

Heterosexual transmission of HIV among persons who use—but do not inject—drugs such as heroin and cocaine has been a concern since the start of the crack cocaine epidemic in the United States (Edlin et al., 1994). Although there has been a gradual decline in crack cocaine use since its peak in 1995 (Substance Abuse and Mental Health Services Association, 1997, 2004), the problem of sexual acquisition of HIV infection among noninjecting heroin and cocaine users has continued (Friedman et al., 2005; Gyarmathy, Neaigus, Miller, Friedman, & Des Jarlais, 2002). Crack use in particular continues to contribute to HIV transmission among both injecting and noninjecting drug users (IDUs and NIDUs respectively; Celentano & Sherman, 2009; DeBeck et al., 2009). Evidence also suggests that crack use may link injectors with both heterosexual and homosexual NIDUs. A study of 675 urban men who have sex with men (MSM) showed that 38% of African

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Declaration of Interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of this article.

American participants used crack, as did 24% of whites and 21% of Hispanics (Hatfield, Horvath, Jacoby, & Simon Rosser, 2009).

In a study in New York City, HIV prevalence rates of 12%–17% were observed among noninjecting users of heroin and cocaine (Des Jarlais, Arasteh et al., 2007). These rates are equal to current HIV seroprevalence among IDUs in New York City and higher than HIV seroprevalence among IDUs in 85 of the 95 largest metropolitan statistical areas in the United States (Friedman et al., 2005). High HIV seroprevalence among African American NIDUs in New York City was particularly troubling, with rates two to three times higher than in other racial/ethnic groups (Des Jarlais, Arasteh, et al., 2007).

There are multiple factors that contribute to the ongoing problem of HIV infection among heroin and cocaine users, including (1) the general difficulties in changing sexual behavior, heightened by drug-use-related factors (Wingood & DiClemente, 1998); (2) linkages between high- and low-HIV-prevalence drug user groups through drug use, sex, and social networks (Abdul-Quader, Heckathorn, McKnight, et al., 2006); and (3) high prevalence of other sexually transmitted infections (STIs) that facilitate HIV transmission (Celum et al., 2010; Coffin et al., 2010).

This article reports HIV and STI prevalence rates observed among New York City heroin, cocaine, and crack users enrolled in a pilot study of an intervention to promote sexual health.

METHODS

The setting for this study was Central Harlem, New York City, a community with large overlapping populations of heroin-, cocaine-, and crack-using drug users. The neighborhood is predominantly black and Hispanic (New York City Department of Health and Mental Hygiene, 2006). Thirty-five percent of its residents live below the poverty level, and within New York City, the neighborhood ranks in the top 10th percentile in terms of the number of heterosexual cases of HIV/AIDS per capita (New York City Department of Health and Mental Hygiene, 2009).

Recruitment occurred between December 2008 and May 2009. Recruitment and data collection were carried out in two stages. Respondent-driven sampling was used to recruit from the underlying network of heroin, cocaine, and crack users linked via drug, sexual, and social ties (Heckathorn, 1997). Seeds—current users of heroin, crack or cocaine—were identified via ethnographic observation and key informant interviews conducted by one of the authors (Holly Hagan) and the study project director who has more than 10 years' experience in research- and service-related field work with drug users in New York City. Seeds were offered three coupons to recruit other drug users. Recruitment was perpetuated by offering eligible recruits the opportunity to recruit three of their peers. In instructing participants in how to recruit, they were told that eligibility with respect to recent drug use would be determined by rapid urine testing for drug metabolites using the On-Trak test (Peace, Poklis, Tarnai, & Poklis, 2002). This was so that participants could inform those they were trying to recruit about what was involved in screening and also to avoid problems that can arise when recruiters bring in people who are not eligible.

All individuals who tested positive for these drugs ($N = 102$) were invited to join the first stage of the study, which consisted of a behavioral questionnaire administered via computer-assisted personal interview. Topics covered in the questionnaire included demographics, current drug use and drug use history, drug-use-related risk behavior, sexual behavior, STI/HIV knowledge, presence of symptoms indicating STIs, and use of health care and STI/HIV screening services. For example, the questionnaire asked, “With how many casual partners of the opposite sex have you had vaginal or anal intercourse during the past 1 month?” and “Have you been seen or received care at an STD clinic during the last year?” Many items were based on questionnaires that have been extensively field-tested in other studies of HIV epidemiology and prevention in drug users (Des Jarlais, Arasteh, et al., 2007; Garfein et al., 2007). A \$20 incentive was paid for completion of the interview.

Participants who reported unprotected vaginal or anal intercourse with more than one sex partner in the previous 30 days ($n = 64$, 63%) were eligible for the second stage of the study, which included collection of specimens for HIV and STI testing and participation in the pilot intervention, for which they were paid a second incentive of \$30. Urine specimens were screened for chlamydia and gonorrhea (COBAS AMPLICOR, Roche Diagnostic Systems, Branchburg, NJ), and blood was tested for HIV (HIV1/2 EIA with Western blot confirmation, Bio-Rad Laboratories, Waltham, MA), herpes simplex virus type 2 (HerpeSelect immunoblot, Focus Technologies, Cypress, CA), and syphilis (Rapid Plasma Reagin and Treponema Pallidum Particle Agglutination tests). Those with positive Rapid Plasma Reagin and Treponema Pallidum Particle Agglutination results were classified as confirmed syphilis, of unspecified status, as these tests do not distinguish between past, treated, and current infection. All those who tested positive for any infection were referred to a nearby public STD clinic for free follow-up and treatment. Study procedures were approved by the institutional review board of the National Development and Research Institutes, Inc.

This analysis focused on comparing 45 NIDUs (who had never injected) with 57 IDUs (who had ever injected) with respect to baseline characteristics; 62 participants (63% of the 102 recruited) were eligible to participate in the behavioral intervention and thus provided blood and urine specimens for screening. Chi-square test and t -test were used to determine statistical significance in univariate analysis. Logistic regression models were used to estimate the association between route of drug administration and HIV infection; the model included the 62 subjects for whom HIV test data were available. Data-based criteria were used to select which factors should be included in the model, i.e., those that changed the coefficient for the drug use administration term by more than 10% (Hosmer & Lemeshow, 1989).

RESULTS

The majority of the 102 drug users recruited for the first stage of this study were black (58% of IDUs, 76% of NIDUs) or Hispanic (37% of IDUs, 20% of NIDUs; Table 1). Approximately half were male, and the median age was 45. A large proportion were currently homeless (28% of IDUs, 38% of NIDUs). More than half reported that they had

completed high school or had a General Educational Development diploma. The majority reported receiving public assistance.

Most NIDUs were current crack smokers (78%), and the remainder used heroin by inhalation. IDUs mainly injected heroin alone (39%); 33% injected cocaine alone. A large proportion of IDUs also sniffed heroin (65%), snorted cocaine (35%), or smoked crack (56%). Most IDUs did not inject every day.

The majority of IDUs reported they were heterosexual (70%), whereas nearly half of NIDUs were gay, lesbian, or bisexual. NIDUs had a significantly greater lifetime number of sex partners versus IDUs (125 vs. 57 for women and 86 vs. 25 for men). There were no differences in the number of sex partners in the past 30 days. Unprotected vaginal or anal sex in the past 30 days was reported by 30% of IDUs and 40% of NIDUs. Thirty percent of IDUs versus 62% of NIDUs reported having sex with a current crack smoker in the past month. Injectors were more likely to report having sex with a current injector (32%) compared with NIDUs (13%, $p = 0.01$). Only one female participant reported having sex with an MSM partner in the past month.

A majority of participants were positive for antibodies to herpes simplex virus 2 (HSV-2; 81% of NIDUs vs. 69% of IDUs, $p < .01$). HIV prevalence was also quite high (66% in NIDUs vs. 31% in IDUs, $p < .01$). Confirmed syphilis of unspecified status was detected in 9% of IDUs and 3% of NIDUs. No subjects had gonorrhea, and relatively few had chlamydia. Only 12.5% of those who tested positive for HSV-2 had ever been told they had genital herpes. Thirty-six percent of HIV positives were unaware of their infection, although under-reporting due to stigma may have overestimated this. The majority of participants had been diagnosed with an STI in the past.

In univariate analysis, those who smoked or inhaled drugs were 4.2 times as likely to be HIV positive as those who had ever injected [95% confidence interval (CI) = 1.5–12.5; Table 2]. The association between crack use and HIV was of greater magnitude [odds ratio (OR) = 13.2, 95% CI = 2.7–64.5]. Being gay or bisexual was also strongly associated with HIV in univariate analysis (OR = 6.5, 95% CI = 2.2–19.4). In a multivariate model that included age, black race, and lifetime number of sex partners, crack use remained significantly associated with HIV infection (OR = 9.8, 95% CI = 1.7–56.6), as did being gay or bisexual (OR = 8.5, 95% CI = 1.3–57.3).

We examined the overlap between injection, crack use, and being gay or bisexual in a venn-type diagram (Figure 1), showing the relative proportions of crack smokers who have also injected (55%) and injectors who have also smoked crack (56%). Twenty-three percent of crack users who had never injected were gay or bisexual, versus 10% of crack users who had ever injected. Seventy percent of those who reported that they were bisexual had used crack in the previous month, versus 54% of those who self-identified as heterosexual and 95% of those who reported that they were gay or lesbian ($p < .01$). Twenty-five percent of bisexual participants reported selling sex for money or drugs in the past month, versus 13% of heterosexuals and 0% of gay or lesbian participants (ns).

DISCUSSION

The drug users recruited for this study would appear to be the ideal target of a sexual health intervention. Among the 102 drug users recruited in the first stage, 62% were eligible for the intervention; i.e., they reported recent unprotected sex with more than one partner. In this second-stage sample, 66% of NIDUs and 33% of IDUs were HIV positive, and only 64% of HIV positives were aware of their status. In addition, 75% had antibody to HSV-2, and only 12% had ever been told they had genital herpes. Thus, this method of recruitment led to a set of individuals who may greatly benefit from an intervention that seeks to reduce both HIV acquisition and transmission to uninfected partners and among whom efforts to address HSV-2 facilitation of HIV acquisition and transmission may be particularly important. The high prevalence of HSV-2 in this population is very similar to the rate (60%) observed in another New York City study of drug users and to the rates reported in other studies of crack users (Des Jarlais, Hagan, et al., 2007; Jones et al., 1998; Ross, Hwang, Leonard, Teng, & Duncan, 1999). Although it is understood that HSV-2 facilitates HIV transmission, it is unclear at this stage how to manage HSV-2 infection to reduce this risk (Celum et al., 2010).

The high prevalence of HIV in this sample was unexpected, as it was substantially higher than rates observed in other New York City studies of opiate users of 15%–20% (Des Jarlais, Arasteh, et al., 2007). The sample was also unique in the degree to which injectors, former injectors, noninjectors, and sexual minorities overlapped. Gay, lesbian, and bisexual participants were more likely to be crack users than were heterosexuals, and bisexuals were more likely to be involved in sex trade. As noted by Des Jarlais et al. in this issue, many injectors in New York City have stopped injecting and returned to smoking or inhaling drugs. This transition to noninjection drug use may have led to new social and sexual linkages between former injectors with high HIV prevalence and lower-prevalence noninjection users. Crack use, along with the buying and using of other drugs, may create linkages between sexual minorities and heterosexuals in New York. Crack use, in particular, appears to identify very high-risk subsets of drug users in New York City. This finding of great overlap between gay, lesbian, bisexual, and heterosexual injection and noninjection users of heroin and cocaine has several implications for the development of interventions, including that strategies should use social, sexual, and drug-use-related linkages to locate and intervene with persons at high risk of HIV acquisition and transmission. In addition, interventions should address multiple sources of risk for HIV exposure in a linked population.

Study's Limitations

Respondent-driven sampling (RDS) has been used to recruit drug users in a variety of settings, for a variety of purposes (Lansky et al., 2007; Uusküla et al., 2010). RDS is based on the notion that peers are best qualified to access and recruit members of hidden populations. RDS can also generate samples suitable for population estimation when certain procedures are followed and assumptions are met (Abdul-Quader, Heckathorn, Sabin, & Saidel, 2006). For this study, RDS was chosen for the purpose of reaching the hidden population of heroin and cocaine users in New York City. As a pilot study, the sample was small, and therefore the recruitment chains were short, with a maximum of three waves of

recruitment for any chain. Thus, RDS recruitment as used in this study cannot be evaluated in terms of whether it met the criteria for generating population estimates. The cross-sectional nature of the data also limits inference with respect to causal associations; however, the focus of this analysis was on detecting associations with prevalent infection and understanding the degree of risk among individuals linked by drug use.

CONCLUSIONS

Sexual HIV transmission among drug users has become an important focus of HIV epidemiology and prevention research in New York City and elsewhere (Des Jarlais, Arasteh, et al., 2007; Kral et al., 2001; Strathdee & Sherman, 2003). Few interventions have been shown to have a meaningful impact on sexual risk behavior in this population (Meador, Li, Des Jarlais, & Pilling, 2010). In New York City, HIV prevention for drug users has focused on syringe access, screening and education, and drug treatment, but few programs that are designed to reduce sexual risk in either IDUs or NIDUs exist. Progress in HIV control will require addressing STI screening and treatment and developing strategies that support safer sexual behavior. Although research has found that treatment of HSV-2 infection does not reduce acquisition or transmission of HIV, increasing awareness of HSV-2 infection and its link to HIV may lead to fewer instances of unprotected sex and fewer new HIV infections.

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Biographies

Holly Hagan, Ph.D., is a Senior Research Scientist at New York University College of Nursing and an infectious-disease epidemiologist. Dr. Hagan has been Principal Investigator for a number of studies funded by the National Institute on Drug Abuse on the etiology, prevention, and treatment of blood-borne viral infections in drug users. Her work related to hepatitis C virus (HCV) has earned her an international reputation, with her having led a series of longitudinal cohort studies of HCV seroconversion, a meta-analysis of research related to the epidemiology and prevention of HCV infection, and randomized controlled trials of interventions to reduce HCV infections and increase medical follow-up for infected drug users.

David C. Perlman, M.D., is Associate Chief, Infectious Diseases, at Beth Israel Medical Center in New York. He is also an Investigator in the Baron Edmond de Rothschild Chemical Dependency Institute and Director of the Infectious Disease Core in the Center for Drug Use and HIV Research. His research interests focus on clinical, epidemiologic, and health service aspects of tuberculosis, viral hepatitis, and other infections among HIV-infected persons and drug users in and out of drug treatment. Dr. Perlman is also a provider in Beth Israel's office-based methadone medical maintenance program. He is Professor of medicine at the AECOM. He received his medical degree from the AECOM, did his residency at the New York Hospital, and completed a fellowship in infectious diseases at the Montefiore/AECOM.

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GLOSSARY

Respondent-driven sampling

A version of snowball sampling, where study subjects recruit other potentially eligible individuals from their social network. Respondent-driven sampling allows researchers to draw estimates to characterize the underlying population from which eligibles are drawn. For more information, visit www.respondentdrivensampling.org/.

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FIGURE 1.

Diagram showing relative overlap among drug injection, crack cocaine use, and gay or bisexual orientation among heroin and cocaine users, New York City, 2008–2009.

TABLE 1

Comparison of IDUs versus NIDUs, New York City, 2008–2009 ($N = 102$)

<i>Demographics</i>	IDUs, $n = 57$		NIDUs, $n = 45$		p
Sex					
Male	31	54%	21	46%	<i>ns</i>
Female	26	46%	24	54%	
Race/ethnicity					
Black	33	58%	34	76%	.04
Hispanic	21	37%	9	20%	
White/mixed	3	5%	2	4%	
Mean age (<i>SD</i>)	47.9 (9.26)		45.4 (8.26)		
Residence in past 6 months					
Own place	35	61%	26	58%	<i>ns</i>
Someone else's place	12	21%	14	31%	
Shelter/welfare residence	7	12%	3	7%	
No fixed address	2	4%	1	2%	
Rented room	1	4%	1	2%	
Do you consider yourself to be homeless?					
No	41	72%	28	62%	<i>ns</i>
Yes	16	28%	17	38%	
Do you have a high school diploma or GED?					
Yes	30	53%	26	58%	<i>ns</i>
No	27	47%	19	42%	
More than high school					
Main source of income					
Public assistance	41	72%	34	76%	<i>ns</i>
Legal employment	10	19%	6	15%	
Sex for money/other illegal	4	9%	5	9%	
<i>Noninjection drug use in the past month</i>					
Smoked crack	32	56%	35	78%	.02

	IDUs, <i>n</i> = 57		NIDUs, <i>n</i> = 45		<i>p</i>
Sniffed heroin	37	65%	16	36%	<.01
Snorted cocaine	20	35%	24	53%	<i>ns</i>
Smoked heroin	2	4%	0	0%	<i>ns</i>
<i>Injection drug use in the past month</i>					
Injected heroin and cocaine together	13	23%			
Injected heroin alone	22	39%			
Injected cocaine	19	33%			
Injected crack cocaine or amphetamine	0	0%			
Number of times injected per day					
Less than once	30	53%			
Once	8	14%			
2–3	14	25%			
4–9	5	9%			
<i>Sexual behavior</i>					
Age at first sex	15.2 (3.6)		13.9 (3.1)		<i>ns</i>
<i>Sexual orientation</i>					
Straight, heterosexual	40	70%	21	47%	.01
Gay, lesbian	6	11%	15	33%	
Bisexual	11	19%	9	20%	
<i>Mean lifetime partners by sex of participant (SD)</i>					
Men	25.1 (4.1)		85.5 (36.8)		.02
Women	57.2 (16.1)		125.1 (39.2)		.01
<i>Mean opposite-sex partners in last 1 month (SD)</i>					
All	3.3 (5.3)		1.7 (1.4)		<i>ns</i>
Men	2.3 (2.2)		1.8 (1.7)		<i>ns</i>
Women	4.3 (7.4)		1.4 (0.7)		<i>ns</i>
<i>Mean same-sex partners in the last 1 month (SD)</i>					
Men	1.8 (0.7)		1.9 (0.8)		<i>ns</i>
Women	1.5 (0.7)		0		<i>ns</i>
Unprotected vaginal or anal sex in the last 1 month	32	56%	32	71%	<i>ns</i>
Had a sex partner in the last month who					

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	IDUs, <i>n</i> = 57	NIDUs, <i>n</i> = 45	<i>p</i>
smoked crack in the last month	17	28	.02
injected any drug in the last month	18	6	.01
<i>Reported history of HIV and STIs</i>			
Ever tested positive for HIV	6	14	.02
Ever told had genital herpes	4	2	<i>ns</i>
Ever told had another STI	21	22	.05
<i>STI/HIV test results</i>			
<i>(n</i> = 32)			
HIV positive	10	21	.66%
HSV-2 positive	22	26	81%
Syphilis	3	1	3%
Chlamydia	4	0	0%
Gonorrhea	0	0	0%

TABLE 2Factors associated with HIV infection, illicit drug users, New York City, 2008–2009 ($n = 64$)

	HIV infection	
	OR (95% CI)	AOR (95% CI)
Route of administration		
Smoking or inhalation	4.2 (1.5–12.5)	
Gay or bisexual	6.5 (2.2–19.4)	8.5 (1.3–57.3)
Crack use	13.2 (2.7–64.5)	9.8 (1.7–56.6)
Lifetime number of sex partners	1.002 (1.0–1.004)	1.001 (.9–1.003)
Black race	2.4 (0.8–6.9)	1.1 (0.2–5.2)
Age	1.01 (0.9–1.04)	1.01 (0.9–1.03)
Male gender	2.1 (0.7–13.3)	

Note: AOR, Adjusted odds ratio.