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HIV Prevalence and Risk among Heterosexual Methamphetamine Injectors in California

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Abstract

This CDC-funded study compares HIV prevalence and risk behavior among heterosexual methamphetamine (n=428) and non-methamphetamine (n=878) injectors in California, USA during 2001–2003. While HIV was not highly prevalent among methamphetamine injectors (3%), sexual and injection risk behaviors were highly prevalent (ranging from 21% to 72%). In multivariate analyses, methamphetamine injectors had higher odds than non-methamphetamine injectors of unprotected vaginal intercourse and sex with five or more sexual partners in the past six months, and of distributive and receptive syringe sharing in the past thirty days. There was no significant difference in HIV sero-status by methamphetamine use. Suggestions are made for designing HIV prevention programs.

Keywords

Methamphetamine; IDU; HIV; heterosexual; epidemiology; sexual risk

INTRODUCTION

The World Health Organization (WHO) considers methamphetamine (MA) use a global health problem, with an estimated 35 million users worldwide (World Health Organization, 2006). It is a rapidly growing health problem in the United States. Nationally, drug treatment admissions for MA quadrupled between 1993–2003, with rates rising from 13 to 56 per 100,000 population (Substance Abuse and Mental Health Administration, 2006). According to the Substance Abuse and Mental Health Services Administration (SAMHSA), MA-related emergency department (ED) mentions rose 40% between 1995 and 2002 (Substance Abuse and Mental Health Administration, 2004). While the methamphetamine epidemic in the United States was concentrated on the West Coast throughout the 1970's, 1980's, and

1990's, MA has now spread both to the South and the East. For example, Newark, New Orleans and Baltimore each experienced a 500% increase in the rate of MA-related ED mentions between 1985–2002.

Concurrently, there has been an intensification of MA use on the West Coast (Boddiger, 2005; Brecht, O'Brien, von Mayrhauser, & Anglin, 2004). In California, the rate of admissions for MA-related substance abuse treatment more than tripled between 1993 and 2003, from 66 to 212 admissions per 100,000 population, which is four times the national rate (Substance Abuse and Mental Health Administration 2006). California cities consistently rank at the top in rates of ED mentions for MA in the SAMHSA reporting system (Substance Abuse and Mental Health Administration, 2004).

The past decade's upsurge in MA use in the United States has been thoroughly documented in gay and bisexual male urban communities. Links between MA use, unsafe sex and HIV/STI transmission have been established in numerous studies of men who have sex with men (MSM). Among MSM, associations have been found between MA use and unprotected anal intercourse (UAI), (Bogart et al., 2005; Mansergh et al., 2001; Rusch, Lampinen, Schilder, & Hogg, 2004; Shoptaw, Peck, Reback, & Rotheram-Fuller, 2003) UAI with HIV+ or unknown-status partners, (G. Colfax et al., 2005; G. N. Colfax et al., 2001) multiple sexual partners, (Hirshfield, Remien, Walavalkar, & Chiasson, 2004; Shoptaw et al., 2003) sexual disinhibition, (Gorman & Halkitis, 2003; Mansergh et al., 2001) HIV prevalence (Chesney et al., 2003; Wohl et al., 2004) and sexually transmitted infection (STI) incidence (Chesney et al., 2003; Wohl et al., 2004). MA use has also been associated with poor adherence to HIV treatment (G. Colfax & Shoptaw, 2005; Reback, Larkins, & Shoptaw, 2003) and increased HIV viral load (Ellis et al., 2003).

Research regarding MA use and sexual risk among heterosexuals has been less abundant as compared to gay and bisexual men, but points towards elevated HIV risk. A study of heterosexual non-injectors from HIV test sites in California compared individuals who reported MA use during their last sexual encounter to those who did not. Compared to non-MA users, MA users had a greater number of partners, were less likely to use condoms, more likely to have anal intercourse, more likely to report sex trade involvement and more likely to report a history of STIs (Molitor, Truax, Ruiz, & Sun, 1998). Sex with an injection drug user (IDU) is also more common among MA users (CDC, 2006; Molitor et al., 1998). In a risk reduction intervention for HIV-negative, MA-using heterosexuals, 39% reported one or more anonymous sex partners in the past two months (Semple, Patterson, & Grant, 2004) and 28% reported having had an STI in the past two months (Semple, Patterson et al., 2004). Condoms were used in less than a third of sexual encounters. Additionally, a study conducted in North Carolina found methamphetamine use during heterosexual encounters appears to increase sexual risk-taking, especially when both partners are using it. These encounters in which both partners used methamphetamine seemed to be substantially more likely than other encounters to involve anal intercourse and sex with a new partner (Zule, Costenbader, Meyer, & Wechsberg, 2007).

Because of the dual potential infection routes associated with injection drug use and MA-associated risky sex, MA injectors are at high risk for HIV and other blood-borne diseases. There have only been a handful of studies of heterosexual MA injectors. These studies show that MA users have greater numbers of sexual partners, more frequent intercourse and less reported condom use than non-MA injectors (Braine, Des Jarlais, Goldblatt, Zadoretzky, & Turner, 2005; CDC, 2006; Molitor et al., 1999). Our own study of female MA injectors in San Francisco found that female MA injectors were significantly more likely than non-MA injectors to report unprotected anal intercourse, multiple sexual partners, receptive syringe sharing and sharing of syringes with more than one person in the past six months (Lorvick,

Martinez, Gee, & Kral, 2006). In addition, MA injection has been independently associated with syringe sharing in this and another recent study (Braine et al., 2005; Lorvick et al., 2006). However, these studies only considered MA injection in a single community or region. Injection and sexual risk among MA injectors may be a function of local conditions, such as availability of the drug or law enforcement practices. This paper examines the prevalence of HIV, sexual, and injection risk in a large, statewide, prospective sample of heterosexual injection drug users throughout California from 2001 to 2003, comparing those who inject methamphetamine to those who inject other illicit drugs.

METHODS

Recruitment

This is an analysis of data from the California Syringe Exchange Program study (Cal-SEP), which has been described in detail elsewhere (R.N. Bluthenthal et al., 2008; A. H. Kral, Anderson, Flynn, & Bluthenthal, 2004). Briefly, Cal-SEP was designed to assess the impact of California Assembly Bill 136 which legalized syringe exchange programs (SEPs) in California counties that declared local states of health emergencies due to the HIV epidemic among injection drug users (IDUs) (R.N. Bluthenthal et al., 2008). We conducted three annual cross-sectional surveys collecting information from two sources- (1) interviews and HIV testing from clients of SEPs and (2) program operations data from Executive Directors of SEPs. Twenty-three of 24 California-based SEPs existing in 2000 participated in our study; we added an additional program in the second wave to reach 24 SEPs. These SEPs operated in 16 urban and rural California counties (Alameda, Contra Costa, Fresno, Humboldt, Los Angeles, Marin, Mendocino, Monterey, Sacramento, San Diego, Santa Cruz, Santa Clara, San Francisco, San Mateo, Santa Barbara, and Sonoma). Three annual cross-sectional samples of around 25 SEP clients were recruited from each SEP from 2001–2003 (N=1,584). Eligibility to participate in the study was limited to SEP clients who reported having injected drugs in the past 30 days. The current analysis reported herein regards a subset of CalSEP participants who were heterosexual (n=1,306), as described in greater detail below.

While it would have been optimal to conduct random sampling of SEP clients, logistical difficulties, limited budget, and concerns by SEP Directors that it would cause commotion with their clients led us to use convenience sampling. To achieve as representative a sample as possible, our goal at each SEP was to recruit clients proportional to the amount of clients each of its sites usually serves. For example, if a SEP had two sites (A and B) and 80% of its overall client base is generally reached at Site A, then we would aim to recruit 20/25 (80%) of study participants at that SEP from Site A and 5/25 (20%) from Site B. At each SEP, clients were approached by Project Coordinators once they had completed their utilization of the SEP and asked to participate only when there was an available interviewer. There was no waiting list and there was equal likelihood of being approached at the beginning, middle or end of the SEP operating hours. Participation was allowed in subsequent years, but none of the study participants reported such duplication in years 2 or 3.

Study Procedures

After providing a brief description of the study, including the purpose of the study and that they would undergo HIV testing and a 45 minute interview, study staff determined the eligibility of a study participant (current SEP client and active IDU in the past 30 days). If they were interested in participation, they underwent an informed consent process. All study methods were approved by the Institutional Review Boards at the RAND Corporation, University of California, San Francisco, and University of California, Davis. Eligible participants who provided informed consent were enrolled in the study and were

immediately interviewed and counseled by demographically diverse, trained interviewer/counselors in private or semi-private space (rooms in SEP offices, cars, park benches, temporary tents, and sidewalks). Since some SEPs provided delivery of services to participants' homes or other locales, study staff would accompany SEP staff and conduct the interview at the participant's home or other locale.

Participants were interviewed using a standard, structured quantitative questionnaire, with questions about demographic factors, drug use practices (including MA use), sexual practices and orientation, use of SEP and other social services, HIV/hepatitis knowledge, and satisfaction with SEP services. The questions captured information within a recent window of time consistent with most literature on IDUs, such as the past six months (eg. sexual behaviors), past month (eg. injection behaviors), or "current" (eg. homelessness, drug treatment). Interviewers asked questions face-to-face and used a software program on laptop computers to input answers using a computer assisted personal interview (QDS, NOVA Research, Bethesda, MD, USA). Prior research has shown that this type of computer-assisted technology helps to reduce the likelihood of data entry errors by coordinating skip patterns and running consistency and range checks (Bateson & Hunter, 1991; Costigan & Thomson, 1992; Sainsbury, Ditch, & Hutton, 1993). On average, interviews lasted approximately 45 minutes.

Upon completion of the survey, study participants were counseled regarding their risk behaviors using harm reduction philosophies of incremental behavior change, given HIV pre-test counseling, and referred to medical and social services as needed. All participants underwent HIV testing using the Orasure oral test. A small 1.5×2.5 cm synthetic sponge on a stick, like a lollipop, is placed between the cheek and the gum in their mouth and allowed to absorb gingival crease secretions for three to five minutes. It is then placed in a transport solution (preservative) and shipped to a qualified laboratory (California Diagnostics, Irvine, CA) for ELISA and Western Blot confirmation of presence or absence of HIV-1 antibodies. The test is FDA-approved for HIV testing, and has test characteristics (sensitivity, specificity, and predictive value) very similar to plasma antibody tests (all well above 99%) (Granade et al, 1998).

Study participants were paid United States \$10 for their contribution to the study and were asked to return for HIV test results disclosure and counseling one to two weeks after the interview at the same locales where testing occurred.

HIV Testing and Laboratory Methods

Orasure specimens were analyzed for HIV antibodies using enzyme immunoassay (EIA). Repeatedly EIA-positive specimens were confirmed using Western blot assay (Wb). Criteria for a seropositive Wb result were the presence of reactive bands at two of the following locations: p24, gp41, and gp120/160 as described by the Centers for Disease Control and Prevention (CDC, 1989).

Main Variables

The assessment included items on HIV risk behavior (i.e. injection and sexual risk practices), medical history, incarceration history, and utilization of SEPs and other social or medical services. The variables used for the present analysis are described below.

Methamphetamine Injection—For methamphetamine, speedball (heroin and cocaine mixed), heroin, powder cocaine, and crack cocaine, respondents reported whether they had injected the drug and/or used the drug without injecting, in the last 30 days. Response options were "yes" and "no." We considered anyone a methamphetamine injector who

reported having injected methamphetamine in the past 30 days, regardless of other drug use. We considered anyone who reported injecting other drugs but not methamphetamine in the past 30 days as non-methamphetamine injectors.

Socio-demographic characteristics—Socio-demographic characteristics included age, gender, race/ethnicity, income from all sources, and homeless status. Income was dichotomized into < \$600 per last 30 days and ≥ \$600 per last 30 days.

HIV status—HIV status was determined through laboratory testing of Orasure specimen as explained above.

Injection risk behaviors—To determine receptive syringe sharing practices, we asked, “In the last 30 days, how many times did you inject using syringes/needles that you know had been used by someone else (including a close friend or lover)?” To determine distributive syringe sharing practices, participants were asked, “In the last 30 days, how many times did you give or loan syringes/needles that you had used to someone else (including a close friend or lover) who then used them?” Response options for both questions were recoded to “yes” if the response was 1 or more and “no” if their response was 0.

Current sexual partnerships—Participants were asked the number of male, female, and transgendered sexual partners that they had and whether they had been paid money or drugs for sex in the last six months (yes/no). For a measure of recent multiple sexual partnerships, we classified everyone who reported five or more sexual partners in the last six months as having multiple partners. This was done to assess people who reported many sexual partners. Sex work was defined as reporting any sex for money or drugs. Participants were also asked whether they had a steady sexual partner and if so, whether their partner injects drugs.

Sexual behavior and condom use—Participants who reported having male and/or female partners were asked if they had vaginal, oral, or anal sex with each of their male and/or female partners in the past six months. To assess condom use, participants reporting vaginal or anal sex were asked the percentage of time that they used latex condoms for these activities in the past six months. Responses were dichotomized into 0–99% condom use (“never/sometimes”), or 100% condom use (“always”). Participants who were not sexually active in the past six months were not included in calculations of any of the condom use variables.

Statistical Analysis

As this analysis concerns IDUs who are heterosexual, we restricted analyses to study participants who (1) reported no same-sex sexual partners in the past 6 months AND (2) self-identified as “heterosexual.” This is a very strict operational definition of “heterosexual,” as it incorporates both behavior and sexual identity. Descriptive statistics (e.g., means, frequencies, variability) were examined for all study variables. Bivariate and multivariate analyses were focused on determining statistical differences among methamphetamine and non-methamphetamine injectors for the main sexual and injection related outcomes. Logistic regression was conducted to assess the adjusted association between methamphetamine and non-methamphetamine injectors in HIV prevalence, sexual risk, and injection risk outcomes, controlling for confounding and effect modifying variables that were significant ($p < 0.05$).

RESULTS

Demographics

The majority of heterosexual MA injectors in this California sample was white, over 30 years old, and had incomes over \$600 per month (Table 1). Half were homeless and approximately one-third were on parole or probation at time of interview. Poly-drug use was very common among this sample of MA injectors, with about half injecting heroin and about one quarter smoking crack cocaine. The median number of MA injections in past month was 11 injections. In comparison to non-methamphetamine injectors, those who injected methamphetamine were more likely to be white, younger, have less than 10 year injection career, homeless, on parole, and to inject cocaine. MA injectors were less likely than non-methamphetamine injectors to smoke crack cocaine and inject heroin.

HIV Prevalence, Sexual Risk, and Injection Risk

In this sample, only three percent of heterosexual MA injectors tested HIV antibody positive, which did not differ from non-MA injectors (Table 2). Of those who tested HIV positive, only 4 did not report knowing that they were HIV positive. Sexual risks were common among heterosexual MA injectors. One fifth of the sample reported anal intercourse. About three quarters reported any unprotected vaginal intercourse. Eleven percent of men and 17% of women reported 5 or more sexual partners in the past 6 months. The majority of the sample reported having a steady sex partner. The majority of steady sex partners were also IDUs. Nearly one-third of MA injectors reported receptive syringe sharing and distributive syringe sharing in the past month. MA injectors were more likely to report all of these sexual and injection risk behaviors than non-MA injectors. In multivariate analysis (Table 3), the adjusted odds ratio (AOR) was statistically significantly higher for MA injectors than non-MA injectors for any unprotected vaginal sex in past 6 months (AOR=2.3; 95% confidence interval [CI]= 1.8, 3.0), having five or more sexual partners in past 6 months (AOR=2.3; 95% CI=1.6, 3.5), receptive syringe sharing in past 30 days (AOR=2.1; 95% CI=1.5, 2.8), and distributive syringe sharing in past 30 days (AOR=1.9; 95% CI=1.4, 2.6) when controlling for potentially confounding variables. There was no statistically significant relationship between MA injection and HIV antibody status.

DISCUSSION

The prevalence of sexual and injection-related risk was very high among heterosexual MA injectors as compared to non-MA injectors. About half reported unprotected vaginal intercourse and a fifth engaged in heterosexual anal sex. The level of sexual risk is similar to other studies which show that heterosexual MA users have more sexual partners and are more likely to have anal intercourse than non-MA users (CDC, 2006; Semple, Grant, & Patterson, 2004). In particular, MA use has been associated with anal sex in studies of heterosexual men (Krawczyk, Molitor, Dahlgren, Stopka, & Truax, 2006) and women (Lorvick et al., 2006; Reynolds, Latimore, Fisher, & Jaffe, 2006). Because anal intercourse is more likely than vaginal sex to lead to HIV transmission, it will be important to conduct qualitative research to uncover contextual factors and consider in-depth the association between MA use and anal sex. We recently began a NIDA-funded study of female MA users in San Francisco, which includes a qualitative component that will investigate the context of anal sex risks. It is very rare that HIV prevention programs targeting heterosexuals even consider risks associated with anal sex. It is imperative that such efforts begin to dialogue about anal sex and its attendant risks. Previous intervention and prevention programs that have targeted anal sex risk with success could inform interventions with heterosexuals.

Our study uncovered that the majority of heterosexual MA injectors are in a relationship with a steady sex partner, and that most of these partners were also IDUs. Semple also found that steady sex partners were common among this population (Semple, Patterson et al., 2004). It would also be important to learn more about interpersonal relationships of MA injectors, which could be achieved through studies of couples. Sex outside of the main relationship constitutes a major risk for STI/HIV transmission and warrants further investigation.

Drug use practices among heterosexual MA injectors in California warrant further investigation. Our study found fairly moderate frequency of MA injection among this sample of heterosexual MA injectors. The median number of reported injections in the past month was 11 injections. However, we found high levels of polydrug use, with about half injecting heroin and a quarter smoking crack cocaine. This implies that prevention programs such as drug treatment need to address polydrug use, rather than assume injectors either use *only* MA or heroin or crack cocaine. We also found very high prevalence of sharing of injection equipment, which is particularly disturbing as this sample was recruited from syringe exchange programs. Our prior investigations into factors associated with syringe sharing in this sample have found that many SEPs are providing an insufficient number of syringes to their clients (R. N. Bluthenthal et al., 2007; A. H. Kral et al., 2004). There may be operational characteristics of SEPs that would make them better serve the needs of MA injectors, such as delivery or late operating hours (A.H. Kral & Bluthenthal, 2003).

While HIV prevalence was low in 2001–2003 among heterosexual MA injectors in this California-based sample, sexual and injection related risks are common. These low levels of HIV prevalence among IDUs in California are similar to other epidemiological studies conducted in California cities (Carpenter, Longshore, Annon, Annon, & Anglin, 1999; Fisher, Reynolds, Jaffe, & Perez, 2006; Garfein et al., 2004; A. H. Kral et al., 2001). Given the high prevalence of sexual and injection risks among MA injectors in California, HIV prevalence may not remain low. It will be important to monitor HIV prevalence among IDUs in California in case it starts to increase. It will also be important to conduct HIV sero-epidemiological studies in other U.S. States, especially those with large numbers of MA injectors.

Our study has several limitations which need to be considered when interpreting its results. First, given that the primary purpose of this manuscript is to assess the prevalence of HIV and risk behaviors, it should be noted that the study is limited in that the sample is not drawn at random and is subject to various selection biases. The most important selection bias is that we recruited injection drug users from syringe exchange programs, which have been proven to reduce injection-related risks and HIV. As such, it is likely that the prevalence estimates for HIV and injection risks are artificially low, making it impossible to generalize these findings beyond SEP users. Given the clandestine nature of drug use in the US, it is not possible to conduct random sampling of illicit drug users. This is the first statewide sample of IDUs in California, making it a unique and important epidemiological dataset. Second, in assessing the relationship between demographic and drug use factors and sexual and injection risks, we are limited to assessing associations due to the cross-sectional nature of the study design. We cannot infer causality due to this limitation. Third, with the exception of HIV antibody status, all variables are self-reported making them subject to biases associated with social desirability and difficulties related to the ability to recall past events. Previous studies of IDUs have found good reliability with respect to the measures we used to assess the main outcomes in this study (Needle et al., 1995; Weatherby, Needle, Cesari, & et al., 1994). Lastly, the majority of the data collection sites were in urban areas, limiting the generalizability of the results to mostly urban areas. Given that we recruited study participants from SEPs, we were limited to areas where SEPs have been implemented in

California. Two non-urban areas were part of the study (Mendocino and Humboldt Counties). Lastly, this study was limited by its reliance solely on quantitative epidemiological methods. Had we also utilized qualitative anthropological methods, we would have been able to contextualize and triangulate our findings, ensuring that they include concepts beyond linear processes and phenomena that characterize strictly epidemiological observational studies.

Despite these limitations, this study provides the first statewide estimates of the prevalence of HIV and risk behaviors among heterosexual MA injectors. The methods used in this study may help to serve other locales and states as they embark upon evaluations of the impact of the MA epidemic that is spreading across the US. It appears that there are very high levels of sexual and injection risks among heterosexual MA users. While this has not yet led to a large HIV epidemic in this population in California, this may not be the case in other states with different HIV prevention environments.

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Table 1

Demographic Characteristics of Heterosexual^{*} Methamphetamine and Non-methamphetamine Injectors in California, USA during 2001–2003 (n=1,306)

Characteristic	Methamphetamine injection (n= 428)	Non methamphetamine injection (n=878)
<u>Race/ethnicity</u> ^{**}		
Caucasian	73	40
African American	8	28
Latino	19	27
Other	0	5
<u>Age</u> ^{**}		
<30	20	9
30–39	27	16
40 – 49	37	39
>=50	16	37
Homeless ^{**}	53	44
Income > \$600 last month	62	63
Currently on parole ^{**}	37	29
More than 10 years since onset of injection drugs ^{**}	66	82
Other drug/alcohol use past 30 days		
Heroin injection ^{**}	52	95
Speedball injection (heroin and cocaine mixed)	33	34
Cocaine (including crack) injection ^{**}	28	22
Crack cocaine smoking ^{**}	21	34

^{*} Heterosexual is defined as both behaviorally and self-identified.

^{**} p<.05

Table 2

HIV Prevalence, Sexual Risk, and Injection Risk by Gender among Heterosexual* Methamphetamine Injectors in California, USA during 2001–2003 (N=1,306)

Outcome Variables	Methamphetamine injection (n=428)	Non methamphetamine injection (n=878)
Any anal sex with opposite sex partners**	21	9
Any unprotected vaginal sex**	72	53
Number of sexual partners past 6 months**	17	30
0 sexual partners	43	43
1 sexual partner	28	20
2 to 4 sexual partners	13	7
> 4 sexual partners		
Sex work**	21	7
Steady sex partner in past 6 months**	77	61
Steady sex partner injects drugs**	54	45
Injection Risk (past 30 days)		
Receptive syringe sharing**	28	19
Distributive syringe sharing**	30	25
HIV antibody positive	3	3

* Heterosexual is defined as both behaviorally and self-identified.

** p<.05

Table 3

Multivariate ^{*} Association Between Methamphetamine Injection and HIV Prevalence, Sexual Risk, and Injection Risk Gender among Heterosexual ^{**} Injection Drug Users in California, USA during 2001–2003 (N=1,306)

Outcome Variables	Adjusted Odds Ratio of Methamphetamine Injection	95% Confidence Interval
HIV antibody positive	1.6	(0.83, 3.2)
Any unprotected vaginal sex past 6 months	2.3	(1.8, 3.0)
5 or more sexual partners past 6 months	2.3	(1.6, 3.5)
Receptive syringe sharing past 30 days	2.1	(1.5, 2.8)
Distributive syringe sharing past 30 days	1.9	(1.4, 2.6)

^{*} Each of these five multivariate models retained only potential confounding variables that were statistically significant ($p < 0.05$). Methamphetamine injection in past 30 days (vs. other illicit drug injection) is the explanatory variable in each model.

^{**} Heterosexual is defined as both behaviorally and self-identified.