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Crystal Methamphetamine Use and Sexual Risk Behaviors among HIV-Positive and HIV-Negative Men Who Have Sex with Men in South Florida

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ABSTRACT *Using data collected through venue-based sampling in South Florida from 2004 to 2005 as part of the Centers for Disease Control and Prevention-funded National HIV Behavioral Surveillance Among Men Who Have Sex with Men, we estimate the prevalence of crystal methamphetamine use and its association with high-risk sexual behaviors among a large and diverse sample of men who have sex with men (MSM) residing in South Florida. We also examine how these associations differ between HIV-positive and HIV-negative men. Bivariate analyses were used to assess the characteristics of study participants and their sexual risk behaviors by drug use and self-reported HIV status group. Of 946 MSM participants in South Florida, 18% reported crystal methamphetamine use in the past 12 months. Regardless of self-reported HIV status, crystal methamphetamine users were more likely to report high-risk sexual behaviors, an increased number of non-main sex partners, and being high on drugs and/or alcohol at last sex act with a non-main partner. Our findings indicate that crystal methamphetamine use is prevalent among the MSM population in South Florida, and this prevalence rate is similar, if not higher, than that found in US cities that have been long recognized for having a high rate of crystal methamphetamine use among their MSM populations. Notably, the use of crystal methamphetamine among both HIV-positive and HIV-negative MSM is associated with increased HIV-related risk behaviors.*

KEYWORDS *Crystal methamphetamine, MSM, HIV-positive, Injection drug users, Sexual risk behaviors*

INTRODUCTION

Crystal methamphetamine (aka "crystal meth," "Tina," "crystal"), a highly addictive stimulant, has become integrated into gay male sociosexual contexts, such as circuit parties, sex clubs, Internet dating, and bathhouses.[1–3] Use of crystal methamphetamine among men who have sex with men (MSM) gained popularity on the West Coast in the 1990s[4] with recent prevalence of 11–53% in Los Angeles[5] and 17–22% in San Francisco.[4] In recent years, crystal methamphetamine use has spread

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rapidly to the eastern regions of the United States.[1,4,6] Although South Florida (particularly Miami-Dade and Broward counties) has long been recognized as having intersecting epidemics of HIV and substance abuse among MSM,[7–9] little is known about the population's prevalence of crystal methamphetamine use. Fernandez and colleagues reported that 10% of Hispanic MSM in a 2003–2005 Miami study had used crystal methamphetamine in the past 6 months.[9] However, there have been no studies of the prevalence of crystal methamphetamine use among a diverse sample of MSM in South Florida.

MSM who use illicit substances, particularly crystal methamphetamine, represent a group at high risk for HIV/STD infection due to critical associations between risky sexual behaviors and illicit drug use.[3,5,7,10] Specifically, users of the drug report an increased number of sex partners,[11] an increased number of recent episodes of unprotected sex,[3,6,10,11] sex with partners of serodiscordant or unknown HIV status,[3,10] an increased likelihood of being infected with HIV or other STDs,[2,4,6] and psychological correlates including depression, loneliness, the avoidance of unpleasant emotions and physical pain, and sexual compulsivity.[1,2,4]

Previous studies have recognized that knowledge of HIV-positive serostatus leads to a reduction in risk behaviors; however, it is not clear if this holds for HIV-positive MSM who use crystal methamphetamine.[10] This paper examines the associations among crystal methamphetamine use, self-reported HIV status, and sexual risk behavior among MSM.

METHODS

Cross-sectional data were analyzed from the National HIV Behavioral Surveillance among Men Who Have Sex with Men (NHBS-MSM1) conducted from 2004 to 2005 in Miami-Dade and Broward counties. Venue-based time-space sampling was used to conduct face-to-face interviews with men 18 years of age and older. In addition to the national core NHBS questionnaire,[12] staff administered a local questionnaire assessing crystal methamphetamine use, depression, social support, and Internet use to find sex partners. A more detailed description of the NHBS-MSM1 study and methodology has been reported elsewhere.[12,13]

The present analysis describes crystal methamphetamine use among the study sample and assesses study participants' characteristics, sexual risk behaviors by drug use and HIV status group, and associations between crystal methamphetamine use, HIV status, and sexual risk behaviors, while controlling for demographic and psychosocial factors. All measures are based on self-report and all sexual risk and drug use measures assess behaviors occurring in the 12 months prior to the date of the interview.

Participants were classified into three categories based on drug use: "crystal users" (participants reporting using crystal methamphetamine), "non-crystal drug users" (participants reporting using illicit drugs other than crystal methamphetamine), and "non-drug users" (participants reporting no illicit drug use). Other illicit drugs (including prescription drugs used illegally) included other amphetamines, cocaine, crack, downers (e.g., Valium, Ativan, Xanax), pain killers (e.g., Oxycontin, Percocet), hallucinogens (e.g., LSD), club drugs (e.g., ecstasy, gamma hydroxybutyrate, ketamine), heroin, marijuana, and amyl nitrate. Only participants reporting use of illicit drugs were asked about use of Viagra/Levitra.

Demographic characteristics included age, race/ethnicity, education, sexual orientation, and foreign-born status.

Sexual risk behavior questions about the last sex act addressed partner type (main or non-main), type of sex (anal or oral, insertive or receptive), whether the respondent was high on drugs or alcohol, and condom use. Composite binary variables were created for sexual risk (see Table 1).

Internet activity to find sex partners refers to the use of gay/bisexual oriented Internet sites to meet sex partners.

Depression was assessed using the Center for Epidemiologic Studies Depression Scale (10 items); the score was dichotomized to denote "depression" ($\geq$10) and "non-depression" (<10).[14] *Social support* was assessed using the Multidimensional Scale of Perceived Social Support (12 items, score 1–5, α=0.91).[15] A higher score indicates more social support.

Statistical Analyses

Participants were described by self-reported HIV status and crystal methamphetamine use. *T* tests were used to test for differences in means. Kruskal–Wallis tests were used for continuous variables with non-normal distributions, and the medians and interquartile ranges (IQR) were reported. Chi-square tests or Fisher's exact tests were used for categorical variables. Per Bonferroni adjustment, we consider any comparison with a p value $\leq$0.002 to be significant.

RESULTS

Descriptive Comparisons by HIV and Crystal Use Status

Of the 946 respondents, 168 (18%) reported crystal methamphetamine use (all but two crystal users reported use of other drugs) and 165 (17%) reported being HIV-positive; HIV-positive respondents were more likely to report crystal methamphetamine use than HIV-negative respondents (32% vs. 15%, p<.0001). Primarily, participants were in their 30s and 40s (61%), Hispanic (42%) and non-Hispanic white (41%), had greater than a high school education (78.5%), and were US born (64%). HIV-positive participants were slightly older and slightly more likely to be non-Hispanic white. There were no differences in these demographic characteristics by crystal methamphetamine use (data not shown).

Sexual Risk Behaviors by HIV and Crystal Methamphetamine Use Status

Among the sample's HIV-positive men, crystal users compared to non-crystal users (non-crystal drug users and non-drug users) reported a higher rate of unprotected insertive and receptive anal sex at last sex act with a non-main partner. Among HIV-negative men, crystal users were more likely to report unprotected insertive anal sex with a non-main partner than their non-drug using counterparts. Both HIV-positive and HIV-negative crystal users were more likely to report being high on drugs/alcohol during their last sex act with a non-main partner than non-crystal users and non-drug users. HIV-positive and HIV-negative crystal users reported more use of Viagra/Levitra than their counterparts who used illicit drugs other than crystal methamphetamine. While none of the HIV-positive non-crystal drug users reported injecting drugs, approximately one-fifth (21%) of the HIV-positive crystal users reported injecting drugs. Both HIV-negative and HIV-positive crystal users were more likely than non-crystal users to use the Internet to find sex partners and to have been diagnosed with an STD. There were no significant differences between HIV-positive and HIV-negative crystal users and non-crystal users in perceived social

TABLE 1 Bivariate comparisons between crystal methamphetamine users and non-crystal drug users and between crystal methamphetamine users and non-drug users within HIV status groups ($N=946$)

	HIV+ ($N=165$)					HIV− ($N=781$)				
	Crystal methamphetamine users $N=53$ (32%)[a] N (%)[b]	Non-crystal drug users $N=52$ (32%)[a] N (%)[b]	Crystal users versus non-crystal drug users p value[c,d,e,f]	Non-drug users $N=60$ (36%)[a] N (%)[b]	Crystal users versus non-drug users p value[c,d,e,f]	Crystal methamphetamine users $N=115$ (15%)[a] N (%)[b]	Non-crystal drug users $N=277$ (35%)[a] N (%)[b]	Crystal users versus non-crystal drug users p value[c,d,e,f]	Non-drug users $N=389$ (50%)[a] N (%)[b]	Crystal users versus non-drug users p value[c,d,e,f]
Sexual risk in past 12 months										
Number of non-main partners: median (IQR)[d]	16 (5, 60)	4 (1.5, 9)	0.441	3 (0, 10)	0.002	10 (3, 27)	4 (1, 11)	0.111	3 (0,9)	<0.001
Unprotected insertive anal sex at last sex act with a non-main partner	16 (30.2)	4 (7.7)	0.003	3 (5.0)	<0.001	18 (15.6)	35 (12.6)	0.426	22 (5.7)	<0.001
Unprotected receptive anal sex at last sex act with a non-main partner	19 (35.9)	5 (9.6)	0.001	7 (11.7)	0.002	7 (6.1)	13 (4.7)	0.568	14 (3.6)	0.286[e]
High on drugs or alcohol during last sex act with a non-main partner	30 (56.6)	14 (26.9)	0.002	11 (18.3)	<0.001	62 (53.9)	96 (34.7)	<0.001	49 (12.6)	<0.001
Had at least one main and at least one non-main partner	38 (71.7)	22 (42.3)	0.002	25 (41.7)	0.001	65 (56.5)	127 (45.8)	0.054	182 (46.8)	0.067
Had at least one unprotected main and at least one unprotected non-main partner	20 (39.2)	3 (6.2)	<0.001	6 (11.5)	0.001	17 (15.6)	24 (9.9)	0.122	16 (4.6)	<0.001
Used Internet to find sex partners	25 (47.2)	11 (21.1)	0.005	18 (30.0)	0.061	57 (49.6)	69 (24.9)	<0.001	105 (27.0)	<0.001
Had STD diagnosis	13 (25.0)	4 (7.7)	0.017	5 (8.3)	0.017	19 (16.5)	24 (8.7)	0.024	24 (6.2)	<0.001
Psychosocial										
Depression	17 (32.1)	13 (25.0)	0.422	13 (21.7)	0.211	43 (37.4)	92 (33.2)	0.428	102 (26.2)	0.02
Perceived social support: median (IQR)[d]	4.3 (3.7,4.7)	4.4 (3.9,4.7)	0.548	4.6 (4.1,4.9)	0.017	4.2 (3.6,4.7)	4.3 (3.7,4.8)	0.827	4.3 (3.7,4.8)	0.11
Drug use in past 12 months										
Amphetamine use	46 (86.8)	3 (5.8)	<0.001	na	na	101 (87.8)	18 (6.5)	<0.001	na	na
Injection drug use	11 (20.8)	0 (0.0)	<0.001	na	na	10 (8.7)	7 (2.5)	0.012	na	na
Viagra/Levitra use	39 (73.6)	19 (36.5)	<0.001	na	na	55 (47.8)	67 (24.2)	<0.001	na	na

[a]Percent: denominator is N of HIV status group

[b]Percent: denominator is n of drug use group

[c]Categorical variables assessed by χ^2 test

[d]Continuous variables assessed by t test

[e]Categorical variables assessed by Fisher's exact test

[f]Per Bonferroni adjustment, we are considering any comparison with a p value ≤ 0.002 to be significant

support and depression. Crystal users (compared to non-drug users) were more likely to have a higher number of non-main partners and to have reported unprotected anal sex (insertive or receptive) with at least one main and one non-main partner.

DISCUSSION

Three findings emerged from this analysis. First, 18% of respondents reported crystal methamphetamine use in the previous 12 months, among the highest of previously reported use rates in the USA.[1,4–6,10] Second, crystal methamphetamine use is associated with elevated sexual risk behaviors among both HIV-negative and HIV-positive men. Third, we found evidence of continuing risk behaviors among HIV-positive crystal methamphetamine users with both their main and non-main sex partners.

The NHBS core questionnaire asked about all amphetamine use. While most of the amphetamine users in the national sample are likely crystal methamphetamine users,[6] it is possible that the NHBS core questionnaire data present a somewhat lower rate of amphetamine use than that which is occurring (87.5% of crystal users in our sample reported using amphetamines on the core questionnaire).

Our results demonstrate that crystal methamphetamine users were more likely to engage in high-risk sexual behaviors than non-users, including having multiple non-main sex partners, unprotected insertive and receptive anal sex, and sex while high on alcohol or drugs. Our finding that crystal methamphetamine users were more likely to report use of Viagra/Levitra than other drug users is consistent with previous studies' findings that crystal methamphetamine users may be at increased risk for sexual dysfunction and that MSM who use erectile dysfunction drugs with crystal methamphetamine have a high prevalence of HIV and engage in HIV-risk behaviors.[3] Our finding that crystal methamphetamine users were more likely (compared to other drug users and non-drug users) to report using the Internet to find sex partners is consistent with previous studies and suggests Internet-based prevention should be considered for MSM crystal users.

Our finding that crystal methamphetamine users were more likely to report being HIV-positive than non-crystal users is consistent with other studies reporting an association between crystal methamphetamine use and HIV seropositivity.[2,4,6]

Several study limitations should be recognized. These data are from a sample of men recruited from public venues in Miami-Dade and Broward counties and are not necessarily representative of MSM in these counties or other areas. These data are self-reported and, as such, stigmatized behaviors may have been underreported. The analysis was cross-sectional, so time order could not be established.

In conclusion, the high rates of crystal methamphetamine use presented in this study confirm the migration of this drug to the MSM community in South Florida. These findings raise additional concerns because of high-risk sexual behaviors which remain constant across both HIV-positive and HIV-negative crystal methamphetamine-using MSM.

REFERENCES

1. Halkitis PN, Green KA, Mourgues P. Longitudinal investigation of methamphetamine use among gay and bisexual men in New York City: findings from Project BUMPS. *J Urban Health*. 2005;82(1 Suppl 1):i18–i25.

2. Kurtz SP. Post-circuit blues: motivations and consequences of crystal meth use among gay men in Miami. *AIDS Behav*. 2005;9(1):63–72.
3. Mansergh G, Shouse RL, Marks G, et al. Methamphetamine and sildenafil (Viagra) use are linked to unprotected receptive and insertive anal sex, respectively, in a sample of men who have sex with men. *Sex Transm Infect*. 2006;82(2):131–134.
4. Shrem MT, Halkitis PN. Methamphetamine abuse in the United States: contextual, psychological and sociological considerations. *J Health Psychol*. 2008;13(5):669–679.
5. Reback CJ, Shoptaw S, Grella CE. Methamphetamine use trends among street-recruited gay and bisexual males, from 1999 to 2007. *J Urban Health*. 2008;85(6):874–879.
6. Koblin BA, Murrill C, Camacho M, et al. Amphetamine use and sexual risk among men who have sex with men: results from the National HIV Behavioral Surveillance study—New York City. *Subst Use Misuse*. 2007;42(10):1613–1628.
7. Darrow WW, Biersteker S, Geiss T, et al. Risky sexual behaviors associated with recreational drug use among men who have sex with men in an international resort area: challenges and opportunities. *J Urban Health*. 2005;82(4):601–609.
8. Webster RD, Darrow WW, Paul JP, Roark RA, Woods WJ, Stempel RR. HIV infection and associated risks among young men who have sex with men in a Florida resort community. *J Acquir Immune Defic Syndr*. 2003;33(2):223–231.
9. Fernandez MI, Bowen GS, Warren JC, et al. Crystal methamphetamine: a source of added sexual risk for Hispanic men who have sex with men? *Drug Alcohol Depend*. 2007;86(2–3):245–252.
10. Vaudrey J, Raymond HF, Chen S, Hecht J, Ahrens K, McFarland W. Indicators of use of methamphetamine and other substances among men who have sex with men, San Francisco, 2003-2006. *Drug Alcohol Depend*. 2007;90(1):97–100.
11. Semple SJ, Strathdee SA, Zians J, Patterson TL. Sexual risk behavior associated with co-administration of methamphetamine and other drugs in a sample of HIV-positive men who have sex with men. *Am J Addict*. 2009;18(1):65–72.
12. Sanchez T, Finlayson T, Drake A, et al. Human immunodeficiency virus (HIV) risk, prevention, and testing behaviors—United States, National HIV Behavioral Surveillance System: men who have sex with men, November 2003-April 2005. *MMWR Surveill Summ*. 2006;55(6):1–16.
13. Centers for Disease Control and Prevention (CDC). HIV prevalence, unrecognized infection, and HIV testing among men who have sex with men—five U.S. cities, June 2004-April 2005. *MMWR Morb Mortal Wkly Rep*. 2005;54(24):597–601.
14. Andresen EM, Malmgren JA, Carter WB, Patrick DL. Screening for depression in well older adults: evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). *Am J Prev Med*. 1994;10(2):77–84.
15. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *J Pers Assess*. 1988;52:30–41.