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Crystal methamphetamine use and HIV medical outcomes among HIV-infected men who have sex with men accessing support services in New York

Matthew B. Feldman*, Jacinthe A. Thomas, Emily R. Alexy, Mary K. Irvine

New York City Department of Health and Mental Hygiene, Bureau of HIV/AIDS Prevention and Control, 42-09 28th Street, Queens, NY 11101-4132, United States

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ABSTRACT

Background: Drug use poses multiple challenges to maintaining physical health among HIV-infected individuals, particularly with regard to disease progression. Few studies, however, have examined the association between the use of crystal methamphetamine ("crystal meth") and HIV disease progression specifically among HIV-infected men who have sex with men (MSM). Understanding this relationship among HIV-infected MSM is particularly critical because of the high rates of crystal meth use reported in the population.

Methods: Associations between recent crystal meth use and poor HIV medical outcomes (viral load>200 copies/mL, CD4 count <350 cells/mm^3) were analyzed for 2896 HIV-infected MSM enrolled in Ryan White Part A programs in the greater New York metropolitan area between November 2010 and June 2012.

Results: Crystal meth use (reported by 4%) was independently associated with unsuppressed viral load (AOR = 1.8, CI = 1.1–2.9) in multivariate analyses controlling for sociodemographic characteristics. There was no significant relationship between crystal meth use and low CD4 counts.

Conclusions: To date, little research has examined how crystal meth use influences HIV medical outcomes among HIV-infected MSM. This analysis showed a significant independent association between crystal meth use and unsuppressed viral load among MSM in an HIV service population. Future studies should examine biological and psychosocial mediators, moderators and confounders of this relationship to inform intervention development for MSM crystal meth users in HIV care settings.

1. Introduction

Drug use and HIV/AIDS represent two intertwining epidemics that have disproportionately impacted men who have sex with men (MSM). In 2010, the Centers for Disease Control and Prevention (CDC) reported that MSM accounted for 63% of estimated new HIV infections in the United States and 78% of infections among all newly infected men (CDC, 2013a). In 2011, diagnosed infections attributed to male-to-male sexual contact (65%, including male-to-male sexual contact and injection drug use) and those attributed to heterosexual contact (27%) accounted for approximately 92% of diagnosed HIV infections in the United States (CDC, 2013b).

HIV-infected MSM have reported elevated rates of crystal methamphetamine ("meth") use that range from 10% to 23% (Hatfield et al., 2009; Mayer et al., 2010; Morin et al., 2005; Purcell et al., 2005; Schwarcz et al., 2007; Skeer et al., 2012; Wohl et al., 2008). There is also evidence that rates of crystal meth use are significantly higher among HIV-infected MSM (19–32%) compared to HIV-negative MSM (12–17%; Buchacz et al., 2005; Forrest et al., 2010; Mansergh et al., 2006; Schwarcz et al., 2007; Whittington et al., 2002). In a sample of 4602 MSM, reported use of crystal meth significantly decreased from 2003 to 2006 among HIV-negative MSM, but not among HIV-infected MSM (Vaudrey et al., 2007).

Drug use may present significant challenges to maintaining physical health among people living with HIV, particularly with regard to accelerating disease progression (Carrico, 2011). There is evidence that drug use significantly impacts HIV medical outcomes, including viral load and CD4 counts, both of which are critical indicators of the clinical progression of HIV (HIV Surrogate Marker Collaborative Group, 2000) and the risk of onward transmission (Cohen et al., 2011).

Studies have found that crystal meth use is significantly associated with unsuppressed or increased viral load (Ellis et al., 2003; Fairbairn et al., 2011; King et al., 2009), although one study found

* Corresponding author. Tel.: +1 347 396 7479.
E-mail address: mfeldman3@health.nyc.gov (M.B. Feldman).

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that current amphetamine use was not significantly associated with viral load suppression (Cofrancesco et al., 2008). To our knowledge, however, only one study to date has examined the relationship between crystal meth use and HIV medical outcomes specifically among HIV-infected MSM. In a sample of 2789 HIV-infected MSM on ART, there were small, negative associations between crystal meth use and CD4 counts (Shoptaw et al., 2012). The impact of both of these epidemics on MSM underscores the importance of understanding the association between crystal meth use and HIV medical outcomes in this population.

Data from New York City (NYC) illustrate the need to address the potential impact of crystal meth use on HIV medical outcomes among MSM. In 2012, MSM accounted for 68% of the new HIV diagnoses among men in NYC (NYC Department of Health and Mental Hygiene [DOHMH], 2013). In a repeated, cross-sectional study of MSM in NYC from 2002 to 2007, HIV-infected MSM were significantly more likely than HIV-negative MSM to report crystal meth use when the data were collapsed across years (15.4% vs. 6.5%; Pantalone et al., 2010).

The NYC DOHMH routinely collects demographic, psychosocial, and behavioral data on HIV-infected individuals that are reported by Ryan White Part A service providers. The NYC HIV surveillance registry (the Registry) contains comprehensive information on HIV diagnoses and HIV-related laboratory test results for people living with HIV in NYC. Together, these data sources provide a valuable opportunity to examine the relationship between crystal meth use and HIV medical outcomes in one of the largest epicenters of the HIV epidemic. The aims of this analysis were: (1) to examine differences in sociodemographic and clinical characteristics between HIV-infected MSM enrolled in Ryan White Part A services with and without crystal meth use; and (2) to examine the association between crystal meth use and HIV medical outcomes (unsuppressed viral load, low CD4 counts) in this client population.

2. Methods

2.1. Client population

The client population for this analysis included 2896 HIV-infected MSM 18 years of age and older who received Ryan White Part A-funded services at provider agencies in the greater New York metropolitan area and: (a) completed at least one substance use assessment between November, 2010 and June, 2012; and (b) had a viral load and/or CD4 measurement reported to the Registry with a test date in the 3 months prior to the most recent substance use assessment between November, 2010 and June, 2012. Any substance use assessment on which there was no valid response to the question about recent crystal meth use was excluded from the analysis.

2.2. Data

The Registry was used as the data source for viral load, CD4 count, and the date of HIV diagnosis. New York State requires named reporting of all diagnoses of HIV and AIDS, all HIV-related illness, all positive Western blot tests for HIV antibody, all viral load and CD4 cell count values, and all HIV genotypes (State of New York Laws Chapter 308, 2010). Client-level demographic and behavioral data were collected through the Electronic System for HIV/AIDS Reporting and Evaluation (eSHARE), a secure, web-based data system for contractually required reporting by NYC DOHMH-funded HIV service providers. The collection of fully identified data (including client names) from NYC DOHMH-funded HIV care and treatment programs in eSHARE permits de-duplication and merging of programmatic data with the Registry. eSHARE data were merged with viral load, CD4, and HIV diagnosis date data that were reported to the Registry as of 3/31/2014. This project was classified as a program evaluation (not research) by legal counsel at the NYC DOHMH.

2.3. Measures

Crystal meth use: A question on the substance use assessment about crystal meth use in the past 3 months was used to categorize clients for 'recent' crystal meth use (yes/no).

HIV medical outcomes: For each participant, the CD4 cell count and/or viral load tests closest to the date of the most recent substance use assessment (and within the 3 month period prior to this assessment) were selected from the Registry. Low CD4 counts were defined as <350 cells/mm^3 which represents the CD4 count at which ART is recommended for all HIV-infected individuals to reduce the risk of disease progression (Department of Health and Human Services [DHHS], 2014). Unsuppressed viral load was defined as an HIV-1 RNA > 200 copies/mL), which is the threshold for virologic failure (CDC, 2011; DHHS, 2014).

Sociodemographic and clinical characteristics: Covariates for this analysis included age (age 50 or older vs. 18–29/30–49), race/ethnicity (white vs. black/Latino/other), primary language (English vs. other), education (> vs. ≤ high school diploma/GED), country of birth (U.S./U.S. territory vs. other country), housing situation (stable vs. temporary/unstable), cocaine or crack use in the last 3 months, antiretroviral treatment (ART) status (current prescription for ART), and number of years living with HIV.

2.4. Data analysis

Chi-square tests were used to examine the differences between HIV-infected MSM with and without recent crystal meth use. Bivariate analyses of the relationship between each of the variables and HIV medical outcomes (low CD4 counts; unsuppressed viral load) were conducted using logistic regression to estimate odds ratios. Multivariate logistic regression models were used to identify the variables independently associated with HIV medical outcomes when adjusting for all other variables in the model. Variables statistically significant ($p < 0.05$) in bivariate analyses were included in the multivariate models. These results are shown as adjusted odds ratios (aOR) with their corresponding 95% confidence intervals (CIs). Data were analyzed using SAS statistical software version 9.2 (SAS Institute Inc., Cary, NC, USA).

3. Results

Of 2896 HIV-infected MSM, 106 (4%) reported recent crystal meth use. HIV-infected crystal meth users were significantly more likely than non-users to be under the age of 30, white, educated at the high school level or above, unstably/temporarily housed, and recent cocaine/crack users. HIV-infected crystal meth users were also less likely to be on ART or to be virally suppressed, and had been living with HIV for fewer years on average compared to non-users (Table 1). In bivariate analyses, crystal meth users were significantly more likely than non-users to have unsuppressed viral load (62.5% vs. 44.2%, OR = 2.1, 95% CI = 1.4–3.1). In multivariate analyses controlling for sociodemographic and clinical characteristics, there was an independent association between recent crystal meth use and unsuppressed viral load (Table 2; aOR = 1.8, 95% CI = 1.1–2.9). Recent crystal meth use was not significantly associated with low CD4 counts (Table 3).

4. Discussion

To our knowledge, this is the first published analysis to date to examine how crystal meth use relates to HIV medical outcomes specifically among HIV-infected MSM. Our findings demonstrate a significant independent association between crystal meth use and unsuppressed viral load. These results are consistent with prior studies that found a significant relationship between unsuppressed viral load and the use of crystal meth (Fairbairn et al., 2011; King et al., 2009) and other hard drugs (e.g., crack, heroin; Arnsten et al., 2002; Baum et al., 2009; Carrico et al., 2007; Cook et al., 2008; Lucas et al., 2002).

The relationship between crystal meth use and unsuppressed viral load in this analysis remained statistically significant when controlling for ART status. Other studies have similarly found that effects of substance use on HIV medical outcomes persisted after controlling for ART utilization and/or adherence (Baum et al., 2009; Carrico et al., 2007; Cook et al., 2008). This finding might lend additional support to the hypothesis that the effects of substance use on HIV disease progression may not be exclusively due to non-use of (or non-adherence to) ART (Carrico, 2011). For example, biological studies have indicated that crystal meth may be a cofactor in enhancing HIV infection and replication by promoting direct HIV infection of macrophages (Liang et al., 2008). Further investigation is needed to clarify the role of biological and/or behavioral