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Recreational drug use and risk of HIV infection among men who have sex with men: A cross-sectional study in Shenzhen, China



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ABSTRACT

Background: Recreational drug use has increased in recent years, especially among MSM, and has been found to be associated with higher risk of HIV infection. However, there is limited information about current recreational drug use among MSM in Shenzhen which is an international gateway city to China with a rapidly expanding MSM population.

Methods: A cross-sectional survey among MSM in Shenzhen was conducted and was used to collect information on demographics, sexual behavior and drug use via questionnaires. Serologic results on HIV and syphilis were obtained from laboratory assays. We performed logistic regression analysis to evaluate correlates with drug use.

Results: Among the 1935 MSM surveyed, 12.7% reported use of recreational drugs in the past six months. Rush poppers had become the most frequently used drug (10.6%). Risk factors associated with the use of recreational drugs included being unmarried, non-Han ethnicity, having high education level, seeking male sex partners via the internet, having multiple male sex partners, performing receptive role during anal sex, and having unprotected anal intercourse. Recreational drug use was significantly associated with higher risk of both HIV and syphilis infections (aOR:1.89, 95% CI:1.28–2.79; aOR:1.79, 95% CI:1.25–2.60, respectively).

Conclusions: Recreational drug use is associated with increased risk of HIV and syphilis infections among MSM in Shenzhen. Rush poppers were the most popular recreational drug. This finding suggests the need for targeted prevention and behavioral intervention programs to control the recreational drug use, and to reduce HIV and other sexually transmitted diseases among MSM in Shenzhen and internationally.

1. Introduction

Due to successful global cooperation and efforts, the HIV epidemic has been decreasing for many countries in the past decades (Coates et al., 2008; van Griensven and van Wijngaarden, 2010). In China, however, HIV prevalence among men who have sex with men (MSM) had increased rapidly from 1.5% in 2005 to 8.0% in 2015 (UNAIDS, 2017).

Abuse of recreational drugs (also known as club drugs, soft drugs, new-type drugs) among MSM has been a worldwide public health concern (Bracchi et al., 2015; Daskalopoulou et al., 2014). Along with rapid economic development in China, recreational drugs such as rush poppers, ketamine and many other synthetic amphetamine-type stimulant drugs (including methamphetamine, ecstasy, ‘Magu’ pills, etc.)

has emerged and become popular, especially among MSM (Ding et al., 2013). The reported rate of drug abuse among MSM ranged from 21.4% to 28.3% (Chen et al., 2015; Wang et al., 2015; Xu et al., 2014b; Zhang et al., 2016). Aside from the harmful effects of recreational drug use, studies have shown that its use increased the likelihood of risky sexual behaviors which facilitated infection with HIV and other sexually transmitted diseases (Daskalopoulou et al., 2014; Friedman et al., 2014; Plankey et al., 2007).

Shenzhen, a gateway city to China (bordering Hong Kong to the south), has been a particularly attractive destination for MSM from other areas of the country and overseas. Its influx of young immigrants accounts for about 87% of the total population (Cai et al., 2010), and its MSM population reached over 100,000 in 2011 (Zhao et al., 2011). A previous study reported that 14.9% of the MSM in Shenzhen had used

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recreational drugs (top three: ketamine 10.1%, methamphetamine 4.4%, ecstasy 2.9%) and 7.6% had HIV (Liu et al., 2010). In recent years, the government has increased control of use of illegal soft drugs. Since then, there have been limited reports on recreational drug use, risky sexual behavior and risk for HIV/syphilis infection among MSM in Shenzhen. However, different from most other cities in China, MSMs in Shenzhen are young, heterogeneous and mobile, including international visitors. Consequently, updated and in-depth investigations on drug use and practice of risky sexual behaviors among MSM in Shenzhen are greatly needed. Therefore, we have investigated recreational drug use among MSM in Shenzhen, including the drugs of choice, and their potential impact on HIV and syphilis infections.

2. Methods

2.1. Definition of recreational drug use

Recreational drug use was defined as use of any of the following drugs in the past six months: rush poppers (alkyl nitrites), crystal meth (methamphetamine), hallucinogens (ketamine, LSD, PCP, etc.), marijuana, triazolam tablets, cocaine, ecstasy (3,4-methylenedioxymethamphetamine, MDMA), cough syrup (codeine phosphate), heroin or other opioids, magu (a mixture of methamphetamine and caffeine), and others.

2.2. Sampling methods and recruitment

MSM were recruited from March to December 2015 as voluntary participants by using the time-location-sampling (TLS), the respondent-driven sampling (RDS), and the “snowball” sampling methods. Informed consent was obtained from each participant. The criteria for eligible participants were: (1) being biologically male and (2) having had sexual contact (oral or anal sex) with other males in Shenzhen during the past 6 months before the survey. Each individual received 50 RMB (about 7.2 USD) for participation and an additional 10 RMB (about 1.5 USD) for recruitment of a new participant to our study. Our protocol for recruitment of MSMs was approved by the Human Subject Committee of the Shenzhen Center for Disease Control and Prevention (CDC).

2.3. Data collection

Each eligible participant was asked to sign a consent form at the start of the survey, to complete a self-administered computer-based questionnaire, and to donate a 5 mL blood sample for HIV and syphilis tests. The questionnaire was designed to collect data on socio-demographic characteristics (including age, ethnicity, home town, education, marital status, income, employment, and occupation), drug use, risky sexual behaviors (including sexual role in anal intercourse with men, main venue for seeking male sex partners, number of sexual partners, unprotected anal intercourse (UAI) in the past six months, and history of selling sex for money), history of HIV test, HIV-related knowledge, and HIV-education program participation. Confidentiality and anonymity were implemented throughout the study.

2.4. Laboratory testing

Laboratory testing of HIV and syphilis were performed according to standard procedures established by the laboratory of Shenzhen CDC. For HIV evaluation, screening was performed by using a rapid test (Determine HIV-1/2/O, Abbott Laboratories, IL) and enzyme-linked immunosorbent assay (Wantai Biotech Inc., Beijing); and positive test was confirmed using western blot analysis (Genlabs Diagnostics, Singapore). For syphilis evaluation, the rapid plasma regain qualitative method (Rongsheng Biotech Inc., Shanghai) and the Treponema pallidum particle agglutination assay (Fujirebio Inc, Japan) were used for

screening and confirmation, respectively.

Participants with negative testing results were informed via the internet, and those with syphilis-positive results were referred to a designated hospital for free diagnosis and treatments. The HIV-positive participants would go to the CDC clinic for a second HIV confirmation test. Confirmed HIV-positive participants were provided with free post-test counseling and were referred to the governmental HIV care and treatment program.

2.5. Data analysis

Descriptive analyses were conducted to assess the rate of any drug use within the past six months. Pearson's chi-squared test was used to test statistical differences between drug users and nonusers for the categorical variables, and Student's *t*-test was used for the continuous variables. Univariate logistic regressions were performed to evaluate the associations between recreational drug use and each risk factor. Based on the univariate logistic regression results, those variables with *P*-value < 0.1 level were then selected for a multivariate logistic regression analysis.

Multivariate logistic regression analysis was employed to examine the association between use of recreational drugs (use of each type of drug, polydrug use, any drug use) and HIV and syphilis infections, as well as risky sexual behaviors. Sampling approaches were adjusted in each regression model for estimation of the adjusted odds ratios (aOR) and 95% confidence intervals (CI) for each significant (*P* value < 0.05 level) variable. All analyses were performed in SPSS (version 17.0).

3. Results

3.1. Characteristics of participants

A total of 1935 (90.3%) out of 2143 MSM met the eligibility criteria and were included in the study. Participants were recruited by using the Time Location Sampling (TLS) (Money boys (MBs): *n* = 464; non-commercial MSM (ncMSM): *n* = 396), Respondent Driven Sampling (RDS) (*n* = 414), and “snowball” (*n* = 661) methods (Table 1). Among the participants, the mean age was 29.3 ± 8.4 years, ranging from 16 to 76 years; 97.8% were ethnically Han; 82.0% were immigrants (unregistered residents of Shenzhen), 67.9% came from urban areas; 85.8% had education at the senior high school level or higher; 83.0% were unmarried; 91.2% had full-time jobs and 45.3% were employed in commercial service work (Table 1).

Overall, 12.7% (245/1935) of the recruited MSM had used at least one of the recreational drugs within the past six months, and 0.8% (16/1935) had used multiple drugs. When compared with non-drug users, there were more drug users in participants over 25 years of age (71.0% vs 58.3%), of non-Han ethnicity (5.3% vs 1.7%), who were residents of Shenzhen (25.3% vs 16.9%), unmarried (88.6% vs 82.2%), and with education at senior high school level or above (93.9% vs 84.6%) and with monthly income above 5000 RMB (55.1% vs 41.6%). In addition, drug users preferred the receptive sexual intercourse (43.7% vs 31.0%) and sought male partners through the internet (82.4% vs 60.2%). They also had multiple sex partners (73.5% vs 47.7%), practised unprotected anal intercourse (48.6% vs 29.8%) and had HIV testing experience (79.6% vs 61.6%). On the other hand, fewer of them were employed in commercial service work (41.6% vs 45.9%) and in selling sex to men than non-drug users (6.1% vs 29.2%) (Table 1).

3.2. Drug use of different types

Of the 1935 participants, 12.7% (245/1935) reported use of drugs in the past six months, 10.6% used rush poppers, 0.7% used crystal meth, 0.5% used hallucinogens (ketamine, LSD, PCP, etc.), 0.4% used marijuana, 0.4% used triazolam tablets, 0.3% used cocaine, 0.3% used ecstasy, 0.2% used plenty of cough syrup, 0.2% used heroin and opium,

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