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Poppers use and risky sexual behaviors among men who have sex with men in Beijing, China



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ABSTRACT

Background: Although poppers are increasingly popular among MSM in China, little is known about the patterns of poppers use. The objectives of this study were to describe the patterns of poppers use and examine its association with sexual behaviors and HIV infection among MSM in Beijing, China.

Methods: As part of a multi-component HIV intervention trial, 3588 MSM were surveyed between March 2013 and March 2014 in Beijing, China. Blood samples were collected and tested for HIV and syphilis. The questionnaire collected information about socio-demographic and behavioral characteristics. Univariate and multivariable logistic regression analyses were performed to evaluate the correlates of poppers use. **Results:** Over a quarter of men (27.5%) reported having used at least one type of drugs in the past three months. Poppers were the most popular one (26.8%). Poppers use was correlated with a higher HIV prevalence [odds ratio (OR): 1.38, 95% confidence interval (CI): 1.11–1.70]. Demographic and sexual behavioral factors associated with poppers use included: younger age [adjusted OR (AOR): 1.56, 95% CI: 1.25–1.94], higher education (AOR: 1.61, 95% CI: 1.33–1.96), alcohol use (AOR: 1.32, 95% CI: 1.10–1.60), seeking male partners mainly via the internet (AOR: 1.60, 95% CI: 1.28–2.00), multiple male sex partnership (AOR: 2.22, 95% CI: 1.90–2.60), and unprotected receptive anal intercourse (AOR: 1.52, 95% CI: 1.28–1.81).

Conclusions: In this study, poppers use was positively associated with HIV infection and unprotected anal intercourse. Intervention efforts should be devoted to promote safer sex and HIV testing and counseling among MSM who use poppers.

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1. Introduction

Since 2007, sexual contact has surpassed injection drug use (IDU) as the primary risk factor for HIV infection in China. For example, in 2011, 81.6% of new HIV infections were caused by sexual transmission including heterosexual and homosexual contacts, while IDU only accounted for 18%. At the national level, the average HIV prevalence among Chinese men who have sex with men

(MSM) steadily increased from less than 1% in 2003–4.9% in 2009 (Ministry of Health et al., 2011; Wu et al., 2013).

IDU is rare among Chinese MSM (Nehl et al., 2015); however, use of alcohol and recreational drugs is common (Lu et al., 2013; Xu et al., 2014a,b). Alcohol and recreational drug use may lead to sexual risk-taking behaviors (Jia et al., 2010; Li et al., 2012; Santos et al., 2013). There are two types of illicit drugs in Chinese market, which are associated with HIV infection in different mechanisms: (1) use of the traditional drugs of heroin and opium is associated with HIV risk mainly among injection drug users; and (2) use of recreational drugs or club drugs, which are commonly used for the purpose of increasing euphoria at social venues such as clubs, “raves”, and dance parties (Mansergh et al., 2001; Mattison et al., 2001), may increase HIV risk through increasing unprotected sex

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and/or number of sexual partners (Bao et al., 2015; Jerome et al., 2009; Yu et al., 2015).

Recent studies have highlighted a higher prevalence of club drugs use among MSM, compared with their heterosexual counterparts (Cheng et al., 2010; Chow et al., 2012; Ford and Jasinski, 2006; Guo et al., 2011; McCabe et al., 2009; Reback et al., 2013; Talley et al., 2010; Tun et al., 2008). Moreover, certain club drugs such as methamphetamine, ecstasy, cocaine/crack, and poppers have been considered as the predictor of high-risk sexual behavior and HIV seroconversion among MSM (Colfax et al., 2005; Kelly et al., 2013; Rusch et al., 2004; Van Tieu and Koblin, 2009; Yu et al., 2015). Since MSM continue to bear the disproportionate disease burden of HIV due to a high probability of transmission for unprotected anal intercourse (UAI) per sexual act (Baggaley et al., 2010), the synergistic relationship between club drug use and risky sexual behavior may further fuel HIV epidemic among MSM (Macdonald et al., 2008). While the association between club drug use and risky sexual behavior has been established, the specific type of drugs and their link with risky sexual behavior are geographically different around the globe (Van Tieu and Koblin, 2009). Previous studies among Chinese MSM have shown that certain club drugs are more popular than others, especially inhalant nitrites (poppers) (Nehl et al., 2015; Xu et al., 2014a,b).

Poppers belong to amyl, alkyl, or butyl nitrites which used to be a prescription drug applied to relieve angina pectoris due to the vasodilatory effect following the inhalation of its vapor (Haverkos et al., 1994; Romanelli et al., 2004). Poppers are now commonly used primarily by MSM to facilitate sexual intercourse, due to their mechanism of relaxing the anal sphincter and dilating capillaries. Research has documented that poppers use may increase HIV transmission through their engagement in high-risk sex behaviors among MSM (Phillips et al., 2014; Yu et al., 2015). Poppers are not listed as an illicit drug in China, and can be easily purchased through the internet or at adult stores. Although poppers are increasingly popular in MSM community in China, little is known about the patterns of poppers use. The objectives of this study were to describe the patterns of poppers use and examine its association with sexual behaviors and HIV infection among MSM in Beijing, China.

2. Methods

2.1. Study population

The present study was part of the multi-component HIV prevention intervention trial (MP3) among MSM in Beijing, China. The MP3 study consisted of two phases. Data for this analysis are from the Phase I, which was an intervention program aiming at expanding HIV testing among MSM at the community level through short message service (SMS), community outreach, web advertisement and peer referral interventions. Phase I research was completed from March, 2013 to March, 2014. Participants were recruited by convenience sampling with four intervention measures mentioned above, and the inclusion criteria were: male, at least 18 years old, self-reported sex with men in the last 12 months, currently living in Beijing, and provision of written informed consent. The study protocol was reviewed and approved by the institutional review boards of Vanderbilt University, and National Center for AIDS/STD Control and Prevention (NCAIDS) of China Center for Disease Control and Prevention.

2.2. Questionnaire design

A total of 3588 eligible participants were enrolled into this study; each completed an interviewer-administered standard-structured questionnaire survey. The questionnaire collected the

information about socio-demographic characteristics (e.g., age, ethnicity, marital status, education, occupation, personal monthly income, registered Beijing residency and health insurance status), alcohol and drug use (e.g., frequency and amount of alcohol use in the past three months); type and frequency of drugs (e.g., methamphetamine, ecstasy (MDMA), 'rush' (poppers), 'magu' (a kind of processed tablets named in Thai which consist of amphetamine and caffeine), ketamine, cannabis or marijuana, cocaine, opium, heroin, morphine, others), sexual behaviors (e.g., age of sexual debut, venue for seeking male sex partner, lifetime number of sexual partners, number of receptive or insertive anal intercourse and condom use in the past three months), risk perception, and history of HIV testing (e.g., lifetime number of HIV testing, date of testing, testing result, and reasons for no testing). The question about drug use including poppers was asked as 'some people have tried or used a range of different types of drugs. Which of the following, if any, have you tried or used in the past 3 months and how often?', and interviewees read out each of the drugs mentioned above, and then participants were asked to choose one of the options of frequency for each drug use—(1) Never; (2) monthly or less; (3) 2–4 times a month; (4) 2–3 times a week; (5) 4 or more times a week. Those who self-reported having ever used two or more drugs in the past three months were classified as "1" (polydrug user), while others were "0" (non-users).

2.3. Laboratory test

Each participant was finger pricked for HIV and syphilis rapid tests using One STEP Anti-HIV1/2 Test (HIV ELISA testing kit 1, Zhuhai Livzon Diagnostics Inc., Zhuhai, China) and One Step Syphilis Anti-TP (Shanghai Kehua Bioengineering Co., Shanghai, China), respectively. For those with positive rapid test results, 5-mL blood specimens were collected and further screened using another enzyme-linked immunosorbent assay (ELISA) (Beijing Wantai Biological Pharmacy Enterprise Co., Ltd., Beijing, China). Specimens with a positive syphilis rapid test were further screened using toluidine red unheated serum test (TRUST) (Wantai Biological Pharmacy Enterprise Co., Ltd., Beijing, China) and confirmed by *Treponemapallidum* particle assay (TPPA) (Fujirebio, Inc., Tokyo, Japan). Specimens with both positive TRUST and TPPA results were defined as syphilis positive. Specimens with HIV positive ELISA results were shipped to the central lab for confirmatory test using HIV-1/2 Western blot immune assay (WB) (HIV blot 2.2 WB, MP Biomedicals Asia Pacific Pte., Ltd., Singapore).

2.4. Data analysis

Data were double entered and checked using Epi-data 3.1 (version 3.1; EpiData Association, Odense, Denmark) and analyzed using SAS software (version 9.2; SAS Institute Inc., Cary, NC, USA). We dichotomized the outcome variable, poppers use, to "1" (poppers user) if a participant self-reported having used it at least once in the past three months and "0" (non-user) if not. Chi-square tests were conducted to compare the difference in socio-demographics, alcohol use, sexual behaviors, HIV risk perception, HIV and syphilis infection by poppers use status. Factors associated with poppers use were evaluated using logistic regression analyses. Variables with *P* values less than 0.1 in the univariate analyses were entered in a multivariable stepwise logistic regression analysis model, and variables with *P* values less than 0.05 were retained in the final model. Adjusted odds ratios (AOR) were calculated along with 95% confidence intervals (CI). The relationship between poppers use and HIV infection was also evaluated using logistic regression.

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