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Factors Associated with Recent Risky Drug Use and Sexual Behaviors among Drug Users in Southwestern China

Yifei Hu[1], Shu Liang[2], Junling Zhu[1], Guangming Qin[2], Qianping Liu[3], Benli Song[3], Qixing Wang[4], Daying Wei[4], Linglin Zhang[2], Han-Zhu Qian[5]*, Yuhua Ruan[1]* and Yiming Shao[1]

[1]*National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, P. R. China*
[2]*Sichuan Provincial Center for Disease Control and Prevention, Chengdu, Sichuan Province, P. R. China*
[3]*Xichang Center for STD and Leprosy Control, Xichang City, Sichuan Province, P. R. China*
[4]*Liangshan Prefecture Center for Disease Control and Prevention, Sichuan Province, P. R. China*
[5]*Vanderbilt Institute for Global Health, and Division of Epidemiology, Vanderbilt University School of Medicine, Nashville, Tennessee, USA*

Abstract

A cross-sectional survey was conducted in 2007 among 504 drug users who were recruited mainly from detoxification centers in southwest China. About one-third (34.3%) of participants reported recent risky drug use behavior, which was defined as injecting drugs in the past 3 months, and more than one-fifth (21.6%) reported recent risky sexual behavior, or had multiple sexual partners in the past 30 days. Male sex (odds ratio [OR], 1.9; 95% confidence interval [CI], 1.2-3.2) and more episodes of detoxification (OR, 3.7; 95% CI, 2.3-6.0) were associated with higher odds of risky drug use behavior, while unmarried status (OR, 1.7; 95% CI, 1.0-2.9), higher personal annual income (OR, 1.8; 95% CI, 1.1-2.8) and history of sexually transmitted infections (OR, 3.7; 95% CI, 2.1-6.6) were associated with higher odds of having risky sexual behavior. Subgroup analyses showed 15% participants who used drugs in the past 3 months also shared needles, and 77% participants who had multiple sexual partners in the past 30 days did not use condoms during sex with non-primary sexual partners. The study findings are useful for developing HIV risk reduction intervention programs among drug users.

Keywords: HIV; Drug use; Sexual behavior; China

Background

Drug abuse has become increasingly common in China over the last 2 to 3 decades, particularly in the southwest areas that border the well-known heroin production region, the "Golden Triangle" [1]. The number of drug users registered by Chinese public security departments rose from 70,000 in 1990 to 1.22 million in 2009 at an average rate increase of 122% per year [2]. Injection drug use (IDU) was the initial driving force for HIV spread in China [1,3] and had contributed to over half of the total infections as of 2005 [4,5]. Risky drug use behaviors such as injection, as well as risky sexual behaviors such as having multiple sexual partners, can put drug users at risk of both acquiring and transmitting HIV and other blood-borne diseases. While there is plenty of literature on HIV prevalence among drug-using populations in China and around the world [6-14], few studies have investigated drug users' recent risky drug use and sexual behaviors [8,15-17], which are indicators for new HIV infection. National and local harm reduction programs, such as methadone maintenance and needle exchange, have been targeting drug use populations, but little data are available about the impacts of these programs [12,18-22]. Understanding the predictors for recent risk behaviors will help inform the development and refinement of HIV intervention programs.

Methods

Study design: A cross-sectional study was conducted in 2007 in Xichang City, Sichuan Province in southwestern China. The participants (n=504) were mainly recruited from detoxification centers (93.1%), and the rest were from a methadone maintenance therapy (MMT) clinic (6.9%). The participation rate was about 50%. More than 80% of participants were enrolled in the study within one week after entry to detoxification or MMT programs, and 2.8% were enrolled after 1 month. Eligibility criteria were self-reported drug users, 18 years or older, and willing to give consent to participate in an interview and give a blood specimen for HIV testing. The study protocol was approved by the institutional review board of the National Center for HIV/AIDS Control and Prevention, China Center for Disease Control and Prevention (China CDC) and Vanderbilt University.

Data collection: Participants were interviewed by trained local CDC staff based on a structured questionnaire. The following information was collected: demographics including sex, age, ethnicity, education, employment status, and marital status; drug use behaviors including history and current use of heroin and other drugs, duration and frequency of drug use, and injection and needle sharing experience in the last 3 months; sexual behaviors such as number of sexual partners, type of sexual partners, and condom use; and experiences of receiving drug addiction treatment and participation in other HIV risk reduction intervention programs.

Laboratory test: A blood sample was collected from each participant. The blood sample was screened for HIV antibodies using an enzyme-linked immunosorbent assay (ELISA; Beijing Wantai Biologic Medicine Company, China), and was confirmed with HIV-1/2 Western blot immunoassay (HIV Blot 2.2 WB; Genelabs Diagnostics, Singapore). A sample with positive results by both tests was considered HIV-positive. Antibodies of syphilis, hepatitis B and C were also tested but are not reported in this paper.

***Corresponding author:** Han-Zhu Qian, Vanderbilt Institute for Global Health, and Division of Epidemiology, Vanderbilt University School of Medicine, Nashville, Tennessee, USA, Tel: +1-615-343-3159; E-mail: han-zhu.qian@vanderbilt.edu

Yuhua Ruan, National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, P. R. China; E-mail: ruanyuhua92@gmail.com

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Statistical analysis: Both questionnaire and lab testing data were double-entered and the consistency of both databases was compared using Epi Data software (EPI Data for Windows; EPI Data Association, Odense, Denmark). Data were analyzed using the Statistical Analysis System version 9.2 (SAS Institute Inc., Cary, North Carolina, USA).

Two primary outcome variables were recent risky drug use behavior and recent risky sexual behavior. Recent risky drug use behavior was defined as having injected drugs in the last 3 months, and recent risky sexual behavior was defined as having more than one sexual partner in the last 30 days. In addition, needle sharing was considered as a secondary outcome variable, as those without recent drug use behavior had missing data on this variable. Similarly, unprotected sex with extramarital or casual partners was also considered as a secondary outcome variable, as not all participants had multiple sexual partners. Our reports focus on the results of primary outcome variables.

Demographic, drug use and sexual behavioral variables were compared between male and female participants, using either chi-square tests for categorical variables or t-tests for continuous variables. To explore the predictors for recent risky drug use and sexual behaviors, univariate logistic regression analyses were performed to assess the effect of demographic variables (e.g. sex, ethnicity, marital status, education level, employment status, and economic situation), behavioral variables (e.g. frequency of drug use a nd sexual activities), and exposure to intervention programs (e.g., MMT). Variables that were significant at a level of P<0.10 in univariate analyses were included in multivariate logistic regression models. As male and female participants might have different risk behaviors, we forced the sex variable into the final multivariate models for predicting recent risky drug use and sexual behaviors, regardless of significance at a level of P<0.05. We were also interested in the impact of MMT programs; therefore, we forced the variable of participation in MMT into the model for predicting recent risky drug use.

Results

Demographic characteristics: Among 504 participants, the median age was 30 years with a range of 18 to 65; 61.3% were male; 46.2% were of Han majority ethnicity, and 53.5% were Yi or other ethnic minorities; 33.2% had no formal education, 20.5% attended primary school (up to 6 years of schooling), and 29.5% and 9.0% attended junior (up to 9 years) and senior (up to 12 years) high school, respectively; 26.8% were jobless; 31.8% were single. The median annual personal income was US$1,429 (range, $0-$28,571; interquartile range [IQR], $714-$2,143). The median duration of drug use was 4.5 years (range, 1 month-24 years; IQR, 1.3-9.9 years). The main drug abused was heroin, and only 15.1% of participants reported using other drugs in the last 3 months. About one-third (34.3%) of participants reported injecting drugs in the last 3 months; 16.5% reported paying money for sex or exchanging sex for money in the last 6 months.

Table 1 presents univariate analysis outcomes. Compared with females, male participants were 2 years older, had a longer duration of drug use (6.3 years in males versus 5.0 in females), were more likely to inject drugs (38.8% vs. 27.2%) and share needles (7.8% vs. 1.0%) in the last 3 months, were more likely to have more than one sexual partner (24.3% vs.17.4%), were more likely to have a sexually transmitted

Demographics or behaviors	Male, N=309(%)	Female, N=195(%)	Total, N=504(%)	χ^2	P-value
Age* (mean ± SD, year)	31±8	29±7	30±8	3.64	<0.01
Ethnicity				2.86	0.09
Han majority	140 (45.3)	93(47.7)	221 (46.2)		
Yi or other minorities	169 (54.7)	102 (52.3)	112 (53.8)		
Year of schooling				2.57	0.11
≤6 years	162 (52.4)	108 (55.4)	270 (53.6)		
>6 years	147 (47.6)	87 (44.6)	234(46.4)		
Currently employed	231 (75.8)	138 (70.8)	369 (73.2)	1.0	0.32
Personal annual income* (mean ± SD, U.S. dollars**)	2098±2765	2214±2925	2143±2825	0.45	0.65
Marital status				4.41	0.04
Currently married	105 (34.0)	49(25.1)	154(30.6)		
Other	204 (66.0)	146 (74.9)	350 (69.4)		
Ever used other drugs besides heroin in last 3 months	52(12.3)	24(16.8)	76(15.1)	1.9	0.17
Ever injected drugs in last 3 months	120(38.8)	53(27.2)	173(34.3)	7.2	<0.01
Frequency of using heroin in last 3 months				1.0	0.31
<7 times/week	67 (21.7)	35 (17.9)	102 (20.2)		
≥7 times/week	242 (78.3)	160 (82.1)	402(79.8)		
Shared needles and syringes in last 3 months	24 (7.8)	2 (1.0)	26 (5.2)	11.1	<0.01
Duration of drug use*(mean ± SD, year)	6.3±5.3	5.0±4.3	5.8±5.0	2.9	<0.01
Ever had STI diagnosis	57(18.4)	9(4.6)	66(13.1)	20.1	<0.01
Had more than one sexual partner in last 30 days	75(24.3)	34(17.4)	109(21.6)		0.07
Had unprotected sex with a primary sex partner in last 30 days	124 (40.1)	89(45.6)	213(42.3)	1.5	0.22
Paid money for sex or exchanged sex for money in last 6 months	53(19.1)	30(15.4)	83(16.5)	0.3	0.6
Currently participating in MMT program	16(5.2)	10(5.1)	26(5.2)	0.1	0.82
Ever had HIV test	155(50.2)	122(62.6)	277(55.0)	7.4	<0.01
Ever participated in HIV prevention program	124(40.1)	102(52.3)	226(44.8)	7.2	<0.01
HIV infection	34(11.0)	24(12.3)	58(11.5)	0.2	0.65

SD: standard deviation; STI: sexually transmitted infection; MMT: methadone maintenance therapy;
* t test
** 1US $≈7 RMB in June 2010

Table 1: Demographics and HIV-related behaviors among male and female drug users in Sichuan Province, China.

Factors	Participants who injected drugs in last 3 months N (%)	Unadjusted OR (95% CI)	P- value	Adjusted OR (95% CI)	P- value
Age	10 (20.8)		0.04		
≤20 years old		1			
>20 years old	163 (35.8)	2.1 (1.0, 4.4)			
Sex	53 (27.2)		<0.01		<0.01
Female		1		1	
Male	120 (38.8)	1.7 (1.2, 2.5)		1.9 (1.2, 3.2)	
Ethnicity			<0.01		
Han majority	104 (44.6)	1			
Yi orother minorities	69 (25.5)	0.4 (0.3, 0.6)			
Year of schooling			<0.01		
≤6 years	72 (26.7)	1			
>6 years	101(43.2)	2.0 (1.4, 3.0)			
Currently employed				0.11	
No	119 (32.3)	1			
Yes	54 (40.0)	1.4 (0.9, 2.1)			
Marital status			0.03		
Currently married	42 (27.3)	1			
Other	131 (37.4)	1.6 (1.1, 2.4)			
Personal annual income (US $)			<0.01		
≤1400	66 (26.9)	1			
>1400	107 (41.3)	1.9 (1.3, 2.8)			
Duration of drug use			<0.01		
< 6.0 years	74 (25.4)	1			
≥6.0 years	99 (46.5)	2.5 (1.7, 3.7)			
Primary partner ever used drugs			<0.01		<0.01
No	138 (31.2)	1		1	
Yes	35 (57.4)	3.0 (1.7, 5.1)		3.3 (1.7, 6.5)	
Frequency of orally using heroin in last 3 months			<0.01		<0.01
<7 times/week	91 (51.4)	1		1	
≥7 times/week	82 (25.1)	0.3 (0.2, 0.5)		0.3 (0.2, 0.5)	
Currently participating in MMT			0.97		
No	164 (34.3)	1			
Yes	9 (34.6)	1.0 (0.4, 2.3)			
Ever had HIV test			<0.01		
No	58 (25.6)	1			
Yes	115 (41.5)	2.1 (1.4, 3.0)			
Had unprotected sex with a primary sex partner in last 30 days			<0.01		
No	84 (28.9)	1			
Yes	89 (41.8)	1.8 (1.2, 2.6)			
Had unprotected sex with non-primary sex partners in last 30 days			<0.01		<0.01
No		1		1	
Yes	55 (57.3)	3.3 (2.1, 5.2)		2.7 (1.6, 4.6)	
Paid money for sex or exchanged sex for money in last 6 months			<0.01		
No	127 (30.2)	1			
Yes	46 (55.4)	2.9 (1.8, 4.7)			
Ever had more than one episode of detoxification			<0.01		<0.01
No	50 (20.1)	1		1	
Yes	123 (48.2)	3.7 (2.5, 5.5)		3.7 (2.3, 6.0)	
Ever participated in HIV prevention program			<0.01		0.06
No	68 (24.5)	1		1	
Yes	105 (46.5)	2.7 (1.8, 3.9)		1.6 (1.0, 2.5)	

OR: Odds ratio; CI: confidence interval.

Table 2: Factors associated with recent risky drug use behavior among drug users in Sichuan Province, China.

infection (STI) diagnosis (18.4% vs.4.6%), were less likely to ever have had an HIV test (50.2% vs. 62.6%) or to have participated in HIV prevention programs (40.1% vs. 52.3%) . Only about 5% of participants were currently receiving MMT. HIV prevalence in the study population was 11.5%, with no difference between male and female participants (P=0.65) .

Predicting factors for recent risky drug use behavior: We defined recent risky drug use behavior as having injected drugs in the 3 months prior to the survey; 34.3% (173/504) of participants met the criterion. Univariate logistic regression analyses showed that 16 factors were significantly associated with recent risky drug use behavior (Table 2). Those variables were included in the multivariate logistic regression model using a stepwise selection procedure at a significant level of 0.05. Four predictor variables remained in the final model: male sex (odds ratio [OR], 1.9; 95% CI, 1.2-3.2; P<0.01), having a drug-using primary sex partner (OR, 3.3; 95% CI, 1.7-6.5; P<0.01), lower frequency of orally using heroin in the last 3 months (≥7 vs. <7 times/week: OR, 0.3; 95% CI, 0.2-0.5; P<0.01), having unprotected sex with a non-primary sex partner in the last 30 days (OR, 2.7; 95%CI, 1.6-4.6; P<0.01), and having more than one episode of detoxification (OR, 3.7; 95% CI, 2.3-6.0; P<0.01). In addition, we forced another variable into the final model: ever participated in an HIV prevention program (OR, 1.6; 95% CI, 1.0-2.5; P=0.06) (Table 2).

Among 173 participants who used drugs in the past 3 months, 26 (15%) reported sharing needles. Males were 13 times more likely to share needles than females were (P<0.001); Participation in methadone maintenance therapy was not significantly associated with needle sharing (not shown in tables).

Factors	Participants who had multiple sex partners in the last 30 days	Unadjusted OR (95% CI)	P- value	Adjusted OR (95% CI)	P- value
	N (%)				
Sex			0.07		0.38
Female	34 (17.4)	1		1	
Male	75 (24.3)	1.5 (1.0, 2.4)		1.2 (0.8 , 2.0)	
Age			<0.01		
≤35 years old	96(24.9)	1			
>35 years old	13(10.9)	0.4 (0.2, 0.7)			
Ethnicity			0.15		
Han majority	57 (24.5)				
Yi or other minorities	52 (19.2)	0.7 (0.5, 1.1)			
Year of schooling			0.04		
≤6 years	49 (18.2)	1			
> 6 years	60 (25.6)	1.6 (1.0, 2.4)			
Currently employed			0.96		
No	29 (21.5)	1			
Yes	80 (21.7)	1.0 (0.6, 1.6)			
Marital status			0.03		0.05
Currently married	24 (15.6)	1		1	
Other	85 (24.3)	1.7 (1.1, 2.9)		1.7(1.0, 2.9)	
Personal annual income (US $)			<0.01		0.02
≤1400	39 (15.9)	1		1	
>1400	70 (27.0)	2.0 (1.3, 3.0)		1.8 (1.1, 2.8)	
Duration of drug use			0.03		
< 6 years	53 (18.2)	1			
≥6 years	56 (26.3)	1.6 (1.0, 2.5)			
Frequency of orally using heroin in last 3 months			<0.01		0.01
<7 times/week	52 (29.4)	1		1	
≥7 times/week	57 (17.4)	0.5 (0.3, 0.8)		0.6 (0.4, 0.9)	
Ever had STI diagnosis			<0.01		<0.01
No	76(17.3)	1		1	
Yes	33 (50.0)	4.8 (2.8, 8.2)		3.7 (2.1, 6.6)	
Ever had HIV test			0.05		
No	40 (17.6)	1			
Yes	69 (24.9)	1.6 (1.0, 2.4)			
Ever participated in HIV prevention program			0.02		
No	49 (17.6)	1			
Yes	60 (26.6)	1.7 (1.1, 2.6)			

OR: Odds ratio; CI: confidence interval; STI: sexually transmitted infections.

Table 3: Factor associated with recently having multiple sex partners among drug users in Sichuan Province, China.

Predicting factors for recent risky sexual behavior: We defined recent risky sexual behavior as having more than one sexual partner in the 30 days prior to the survey; 21.6% (109/504) of participants met the criterion. Univariate logistic regression analyses showed 10 factors were significantly associated with recent risky drug use behavior (Table 3). Those variables were included in the multivariate logistic regression model using a stepwise selection procedure at a significant level of 0.1. Four predictor variables remained in the final model: not currently married [OR, 1.7; 95% CI, 1.0–2.9; P=0.05], higher personal yearly income (OR, 1.8; 95% CI, 1.1-2.8; P=0.02), lower frequency of orally using heroin in the last 3 months (≥7 vs. <7 times/week: OR, 0.6; 95% CI, 0.4-0.9; P=0.01), and ever had an STI diagnosis (OR, 3.7; 95% CI, 2.1-6.6; P<0.01). In addition, we forced another variable into the final model: sex (OR, 1.2; 95% CI, 0.8-2.0; P=0.38) (Table 3).

Among 109 participants who had multiple sexual partners in the past 30 days, 84 (77%) did not use condoms during sex with non-primary sexual partners. Male participant s were 14 times more likely to have had unprotected sex than females were (P<0.001) (not shown in tables).

Discussion

Our study shows that recent risky drug use and sexual behaviors are common among drug users: 34.3% injected drugs in the past 3 months and 21.6% had multiple sexual partners in the last 30 days. These behaviors might have occurred before drug users entered detoxification or other treatment programs where the participants were recruited. Without treatment, these drug users would continue to have high risks of acquiring or/and transmitting HIV due to their risky behaviors. The majority of Chinese national and local treatment and prevention programs targeting drug abuse populations focus on reducing drug use. However, our study findings suggest that sex education and intervention programs are also needed to reduce the number of sexual partners and promote safer sex.

Male drug users were more likely than females to have injected drugs in the last 3 months, probably because male drug users were showed to have a longer history of drug use than females. Our study confirms the findings from other studies that those with a drug-using primary sex partner [23,24] are more likely to inject drugs. Our study found that those who have multiple episodes of detoxification or have ever participated in HIV prevention programs are more likely to inject drugs. This finding does not mean that detoxification or other prevention programs enhance risky drug use behavior; instead, it suggests that drug users might participate in these programs because they still used and injected drugs.

Married drug users are less likely than unmarried users to have multiple sexual partners in the last 30 days, and being currently married is a protector for involving in risky sex. Those with higher incomes may have more disposable money, and therefore are more likely to have multiple sexual partners. Commercial sex is ubiquitous in China, and those with disposable money are easily accessible to commercial sex service [25,26]. This may explain the positive relationship between high income and the number of sexual partners. In addition, a history of STI diagnosis seems to be a predicting factor of recent risky sexual behavior in this study population. However, there was no statistically significant gender difference in having multiple sexual partners, though male drug users have 20% higher odds than females.

Our study participants are recruited from detoxification and MMT programs, and therefore the study findings may not necessarily extrapolate to all drug users. However, to our knowledge, this is the first study to evaluate the predictors for recent risky drug use and sexual behaviors among drug users. The findings from this study will help tailor HIV risk reduction intervention programs in specific subgroups of drug users and will address their special needs to achieve better program outcomes.

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