Attitudes Toward HIV Pre-Exposure Prophylaxis Among Men Who Have Sex with Men in Western China

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Abstract

Pre-exposure prophylaxis (PrEP), as demonstrated in recently published clinical trials, is one promising approach for controlling the emerging epidemic among men who have sex with men (MSM). We evaluated the attitudes towards use of PrEP among MSM in western China. A total of 1402 participants completed a self-administered questionnaire. Overall, 22% of the participants reported that they had heard of PrEP, <1% had ever used medicine to prevent HIV, and 64% reported that they were absolutely willing to use PrEP if it were proven to be safe and effective. The predictors of willingness to use PrEP included lower education, moderate income compared with the lowest income, never or rarely finding sexual partners through the Internet in the past 6 months, sexually transmitted infection (STI) history, more knowledge of AIDS, worrying about HIV as a threat to themselves and their family, having previously heard of PrEP, and believing that PrEP was effective in preventing HIV. This study demonstrates that Chinese MSM have moderate awareness of PrEP and a high interest in using it.

WHILE HIV PREVENTION INTERVENTION PROGRAMS have increased HIV knowledge and condom use, and improved attitudes toward people living with HIV/AIDS in China,¹ HIV epidemic continues to expand, particularly among men who have sex with men (MSM).² New approaches are urgently needed for controlling the emerging epidemic in MSM population, and one promising approach is pre-exposure prophylaxis (PrEP) as demonstrated in recently published clinical trials.^{3–5} Chinese disease prevention authorities consider promoting PrEP intervention among Chinese MSM, but the acceptability is unknown. In this Chinese “Eleven-Five” National Key Project funded by the National Ministry of Science and Technology, we evaluated the attitudes towards use of PrEP among MSM in western China.

A total of 1407 MSM who self reported a negative or unknown HIV serostatus were recruited using a snowball sampling method in Chongqing Municipality, Guangxi Province, and Sichuan Province in southwestern China between July 2009 and April 2010. A trained research assistant explained the study objective, obtained consent, and introduced PrEP. Then 1402 participants completed a self-administered questionnaire to collect the following data: (1) Demographics,

sexual behaviors, experience of sexually transmitted infections (STIs), and alcohol and drug use; (2) HIV/AIDS knowledge; (3) perception of HIV risk; (4) awareness, perception, and history of using PrEP; and (5) willingness to use PrEP. Willingness to use PrEP was surveyed with the following question: “If PrEP was safe and effective, how likely would you be willing to use it?” Answers to the question could be: absolutely willing, somewhat willing, neither willing nor unwilling, somewhat unwilling, and absolutely unwilling. Willingness to use PrEP was the outcome of interest in this analysis. We define the answer of “absolutely willing” as “yes or 1”, and all other answers as “no or 0” in logistic regression analysis, and this coding was used to provide a conservative estimate of the willingness to use PrEP.

Participants were suggested to take HIV testing at the end of interview. The study was approved by the institutional review boards of the National Center for AIDS/STD Control and Prevention, Chinese CDC, and Chongqing Medical University.

Of 1402 participants, the median age was 26 years (range: 18–74); 75% were urban residents; 19% were minority ethnics; 54% had a college education; 14% were ever married; 70% considered themselves as homosexuals, 21% as bisexuals, and

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TABLE 1. DEMOGRAPHICS AND RISK BEHAVIORS BY PARTICIPANTS' WILLINGNESS TO USE PrEP AMONG 1402 CHINESE MSM

Variable	Total (%)	Willingness to use (%)		OR (95%CI)	p Value
		Yes	No		
Age (year) ^a					
18–24	581 (41.5)	362 (62.3)	219 (37.7)	1.00	–
25–34	603 (43.0)	386 (64.0)	217 (36.0)	1.08 (0.85–1.36)	0.963
≥ 35	217 (15.5)	142 (65.4)	75 (34.6)	1.15 (0.83–1.59)	0.523
Registered residence ^a					
Urban	1051 (75.1)	664 (63.2)	387 (36.8)	1.00	–
Rural	348 (24.9)	224 (64.4)	124 (35.6)	1.05 (0.82–1.36)	0.691
Ethnicity					
Han	1138 (81.2)	722 (63.4)	416 (36.6)	1.00	–
non-Han minority	264 (18.8)	169 (64.0)	95 (36.0)	1.03 (0.78–1.35)	0.863
Education ^a					
College or higher	753 (53.9)	448 (59.5)	305 (40.5)	1.00	–
Senior middle school or lower	645 (46.1)	441 (68.4)	204 (31.6)	1.47 (1.18–1.84)	<0.001
Marital status					
Never married	1174 (83.7)	732 (62.4)	442 (37.6)	1.00	–
Ever married	228 (16.3)	159 (69.7)	69 (30.3)	1.39 (1.02–1.89)	0.035
Monthly income (yuan) ^a					
< 1000	628 (44.8)	388 (61.8)	240 (38.2)	1.00	–
1000–3000	593 (42.3)	398 (67.1)	195 (32.9)	1.26 (1.00–1.60)	0.013
> 3000	180 (12.9)	105 (58.3)	75 (41.7)	0.87 (0.62–1.21)	0.109
Sexual identity					
Homosexual	971 (69.3)	612 (63.0)	359 (37.0)	1.00	–
Bisexual	300 (21.4)	195 (65.0)	105 (35.0)	1.09 (0.83–1.43)	0.816
Heterosexual	18 (1.3)	13 (72.2)	5 (27.8)	1.53 (0.54–4.31)	0.457
Undefined	113 (8.0)	71 (62.8)	42 (37.2)	0.99 (0.66–1.48)	0.504
Sex position ^a					
Insertive sex	330 (23.6)	218 (66.1)	112 (33.9)	1.00	–
Both	818 (58.5)	516 (63.1)	302 (36.9)	0.88 (0.67–1.15)	0.743
Receptive sex	220 (15.7)	138 (62.7)	82 (37.3)	0.87 (0.61–1.23)	0.873
Other	30 (2.2)	17 (56.7)	13 (43.3)	0.67 (0.32–1.43)	0.414
Number of sex partners in the past 6 months					
< 2	542 (38.8)	348 (64.2)	194 (35.8)	1.00	–
≥ 2	856 (61.2)	539 (63.0)	317 (37.0)	0.95(0.76–1.19)	0.640
Had regular male sex partner in the past 6 months ^a					
No	511 (36.5)	325 (63.6)	186 (36.4)	1.00	–
Yes	891 (63.5)	566 (63.5)	325 (36.5)	1.00 (0.80–1.25)	0.977
Had casual male sex partner in the past 6 months ^a					
No	646 (46.1)	416 (64.4)	230 (35.6)	1.00	–
Yes	756 (53.9)	475 (62.8)	281 (37.2)	0.94 (0.75–1.16)	0.544
Had female sex partner in the past 6 months					
No	1227 (87.5)	776 (63.2)	451 (36.8)	1.00	–
Yes	175 (12.5)	115 (65.7)	60 (34.3)	1.11 (0.80–1.55)	0.525
Purchased sexual services in the past 6 months					
No	1339 (95.5)	850 (63.5)	489 (36.5)	1.00	–
Yes	63 (4.5)	41 (65.1)	22 (34.9)	1.07 (0.63–1.82)	0.798
Provided sexual services in the past 6 months					
No	1341 (95.7)	855 (63.8)	486 (36.2)	1.00	–
Yes	61 (4.4)	36 (59.0)	25 (41.0)	0.82 (0.49–1.38)	0.452
Found sex partners on the Internet in the past 6 months ^a					
Often or sometimes	500 (35.8)	291 (58.2)	209 (41.8)	1.00	–
Never or rarely	897 (64.2)	597 (66.6)	300 (33.4)	1.43 (1.14–1.79)	0.002
Had a history of STIs ^a					
No	1256 (89.6)	786 (62.6)	470 (37.4)	1.00	–
Yes	146 (10.4)	105 (71.9)	41 (28.1)	1.53 (1.05–2.24)	0.027
Used alcohol in the past 6 months ^a					
< One time per week	1039 (74.2)	652 (62.8)	387 (37.2)	1.00	–
≥ One time per week	361 (25.8)	238 (65.9)	123 (34.1)	1.15 (0.89–1.48)	0.280

(continued)

TABLE 1. (CONTINUED)

Variable	Total (%)	Willingness to use (%)		OR (95%CI)	p Value
		Yes	No		
Used drugs in the past 6 months ^a					
No	1336 (95.4)	856 (64.1)	480 (36.0)	1.00	–
Yes	65 (4.6)	35 (53.9)	30 (46.2)	0.65 (0.40–1.08)	0.096
Had unprotected anal or vaginal sex in the past 6 months					
No	731 (52.1)	466 (63.7)	265 (36.3)	1.00	–
Yes	671 (47.9)	425 (63.3)	246 (36.7)	0.98 (0.79–1.22)	0.873

^aVariables may have missing data.

95%CI, 95% confidence interval; MSM, men who have sex with men; OR, odds ratio.

1% as heterosexuals, and 8% were not sure; 24% reported practicing completely insertive sex and 16% completely receptive sex; 61% had two or more sexual partners in the past 6 months; 64% reported sex with their regular male sex partners, 54% with casual male sex partners, 13% with female sex partners; 5% reported having purchased sex, and 4% selling

sex in the past 6 months; 36% reported finding sexual partners on the Internet. Seven percentage of participants reported using drugs, and 26% using alcohol $\geq$ once per week; 10% had a history of STIs (Table 1).

Overall, 310 (22%) of the participants reported that they had heard of PrEP; 12 (<1%) had ever used medicine to

TABLE 2. BIVARIATE AND MULTIVARIABLE ANALYSES ON PREDICTORS OF WILLINGNESS TO USE PREP ($n=1402$)

Variables	Total	Willingness to use (%)	OR (95%CI)	p Value	AOR (95%CI)	p Value
Education ^a						
College or higher	753	59.5	1.00	–	1.00	–
Senior middle school or lower	645	68.4	1.50 (1.18–1.84)	<0.001	1.50 (1.18–1.92)	0.001
Marital status						
Never married	1174	62.4	1.00	–	1.00	–
Married	228	69.7	1.39 (1.02–1.89)	0.035	1.20 (0.87–1.67)	0.264
Income per month ^a						
<1000 Yuan	628	61.8	1.00	–	1.00	–
1000–3000 Yuan	593	67.1	1.26 (1.00–1.60)	0.013	1.31 (1.02–1.67)	0.016
>3000 Yuan	180	58.3	0.87 (0.62–1.21)	0.109	0.93 (0.65–1.32)	0.217
Finding sex partners on the Internet in the past 6 months ^a						
Often or sometimes	500	58.2	1.00	–	1.00	–
Never or rarely	897	66.6	1.43 (1.14–1.79)	0.002	1.37 (1.08–1.73)	0.008
Drug use in the past 6 months ^a						
No	1336	64.1	1.00	–	1.00	–
Yes	65	53.9	0.65 (0.40–1.08)	0.096	0.59 (0.35–1.01)	0.054
STI history						
No	1256	62.6	1.00	–	1.00	–
Yes	146	71.9	1.53 (1.05–2.24)	0.027	1.61 (1.09–2.39)	0.017
Knowledge of AIDS						
<12 points	681	60.2	1.00	–	1.00	–
≥ 12 points	721	66.7	1.33 (1.07–1.65)	0.012	1.49 (1.18–1.88)	<0.001
Worrying about HIV's threat to self and family						
No	456	57.9	1.00	–	1.00	–
Yes	946	66.3	1.43 (1.14–1.80)	0.002	1.34 (1.05–1.70)	0.017
Having previously heard of PrEP ^a						
No	1090	62.2	1.00	–	1.00	–
Yes	310	68.7	1.33 (1.02–1.75)	0.036	1.33 (1.01–1.75)	0.046
Believing that PrEP was effective in preventing HIV						
No	749	59.4	1.00	–	1.00	–
Yes	653	68.3	1.47 (1.18–1.83)	<0.001	1.46 (1.16–1.83)	0.001

^aVariables with few missing data. 95%CI, 95% confidence interval; AOR, adjusted odds ratio; OR, odds ratio.

The following variables were not significant ($p>0.10$) in the univariate model for willingness to use PrEP and are not shown in the table: age, registered residence, ethnicity, sexual identity, role of sex, number of sex partners, unprotected anal or vaginal sex, having regular male sex partners in the past 6 months, having casual male sex partners in the past 6 months, having female sex partners in the past 6 months, purchased sexual services in the past 6 months, provided sexual services in the past 6 months, and alcohol use in the past 6 months.

prevent HIV; 891 (64%) reported that they were absolutely willing to use PrEP if it were proven to be safe and effective. Regarding the willingness to use PrEP under specific hypothetical scenarios, 71% would be willing to use PrEP if it were free, and 77% would be willing to use PrEP if it were free and had been used by people around them. Only 30% would be willing to use PrEP if it had to be taken once a day, and 37% would prefer to use PrEP once a week.

Univariate analyses assessed the association between willingness to use PrEP and lower education, marital status, income, venue for finding sexual partners, drug use, history of STI, AIDS knowledge, concern about HIV risk, and previous knowledge and perception about PrEP. These variables significant at $p < 0.10$ are presented in Table 2. These variables were included in a multivariate logistic regression model, and only those significant at $p < 0.05$ were retained in the final multivariate model. The analysis shows that eight variables were predictors for willingness to use PrEP: lower education (OR=1.50; 95% CI: 1.18–1.92), moderate income compared with the lowest income (OR=1.31; 95% CI: 1.02–1.67), never or rarely finding sexual partners through the Internet in the past 6 months (OR=1.37; CI: 1.08–1.73), STI history (OR=1.61; 95% CI: 1.09–2.39), more knowledge of AIDS (OR=1.49; CI: 1.18–1.88), worrying about HIV as a threat to themselves and their family (OR=1.34; 95% CI: 1.05–1.70), having previously heard of PrEP (OR=1.33; 95% CI: 1.01–1.75), and believing that PrEP was effective in preventing HIV (OR=1.46, 95% CI: 1.16–1.83) (Table 2).

Clinical trials testing whether PrEP can prevent HIV transmission are underway globally, but the awareness of PrEP among MSM in western China was modest. Less than one quarter of participants reported that they had previously heard of PrEP, and <1% participants reported that they had used medicines to prevent HIV, but they did not know or remember the names or types of drugs. Therefore, there was no evidence of current PrEP use. These findings are similar to other reports western countries.^{6–8}

Several predictors of willingness to use PrEP were found in our study. Corroborating the findings of two studies from California⁶ and Boston,⁷ our study found that MSM with a lower education were more likely to accept PrEP compared to those with a higher education. MSM with a moderate income were more likely to report the use of PrEP in the future, which is consistent with the report from Boston.⁷ MSM with a STI history were more likely to report the use of PrEP in the future. One possible reason is that they had stronger perceptions of risk behaviors because of their experience with STI. Our results were similar to those of a previous study in Seattle,⁹ which showed that MSM recruited from STD clinics were more willing to use PrEP.

Although the study in California observed that MSM who reported risky behaviors, such as unprotected anal sex and drug use, were more likely to anticipate PrEP use,⁶ we did not observe such an association in our western Chinese population. The current survey shows that multiple sexual partners, unprotected anal sex, purchased or provided sexual services, and drug use were not associated with willingness to use PrEP, which is consistent with the two studies from Boston⁷ and Seattle.⁹ On the contrary, participants who did not or rarely found sexual partners on the Internet were more likely to be willing to use PrEP compared with higher risk participants, who often or sometimes found sexual partners on the

Internet. These results indicate that high-risk behavior is not a predictor of the willingness to use PrEP. Meanwhile, our study found that a positive perception of the threat of HIV and more knowledge of AIDS were predictors of willingness to use PrEP.

This study demonstrates that Chinese MSM have moderate awareness of PrEP and a high interest in using it. The actual acceptance rate in PrEP programs might be lower than the rate of stated willingness to use. Several issues need to be addressed in the implementation of PrEP programs. The prophylactic benefits could be substantially reduced by nonadherence, so it is important to include behavioral intervention for improving adherence.¹⁰ PrEP may cause risk compensation among at-risk MSM, and therefore, it should be offered as part of a comprehensive HIV prevention strategy that includes ongoing risk reduction counseling in the delivery of PrEP.^{10,11} In addition, physicians may have good knowledge about PrEP but limited experience.¹² Educational programs aimed at incorporating antiretroviral chemoprophylaxis into physicians' HIV prevention practices are warranted.

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