



HHS Public Access

Author manuscript

AIDS Behav. Author manuscript; available in PMC 2017 December 01.

Published in final edited form as:

AIDS Behav. 2016 December ; 20(12): 2976–2982. doi:10.1007/s10461-016-1356-3.

Investigating HIV among Chinese men who have sex with men with recent sexual debut, Chongqing, China, 2011

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Abstract

HIV among men who have sex with men (MSM) with recent male-male sexual debut, such as within the past five years, may be a proxy for recent HIV infection. Using this definition, we explored factors associated with HIV infection in this group to understand the evolving HIV epidemic among MSM in Chongqing. We conducted a cross-sectional respondent-driven sampling (RDS) survey among Chongqing MSM in 2011. Computer-assisted, self-administered questionnaires were used and blood specimens were collected for HIV and syphilis testing. Three hundred and ninety-one unique MSM were recruited of which 65.7% (257) had their sexual debut with another man in the past five years. HIV prevalence among men with recent sexual debut was 18.7% suggesting a possible HIV incidence of 3.7%. Multivariable analysis among men with recent sexual debut suggests that lower education, having more than one male partner, and currently being infected with syphilis are associated with HIV among men with recent sexual debut. HIV prevalence is high among MSM with recent sexual debut in Chongqing, which may be

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Conflict of Interest: none declared.

Compliance with ethical standards:

Ethical Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

a proxy a high incidence rate. HIV prevention efforts should focus on STD reduction among those MSM with lower educational attainment.

Keywords

men who have sex with men; sexual debut; recent HIV infection; China; HIV; incidence

Introduction

An estimated 35.3 million people were living with HIV worldwide in 2012[1]. Although they tend to make up a small portion of the general population, MSM are important components of nearly all HIV epidemics [1–4]. In China, a meta-analysis found pooled HIV prevalence among MSM increased from 0.6% (95% CI: 0.0–2.1%) in 2003 to 7.4% (95% CI: 5.7–9.2%) in 2009[5].

The increase in HIV prevalence in China from 2003 to 2009 suggests a modest rate of new infection, or HIV incidence. More recent data suggest this rate may be consistently high. BED-CEIA incidence among samples of MSM in Beijing was 6.8/100 person-years (PY) (95% CI: 3.4–10.2) in 2009, 11.2/100 PY (95% CI: 6.2–16.3) in 2010, and 5.8/100 PY (95% CI: 2.4–9.3) in 2011[6]. A longitudinal study in Beijing observed overall HIV incidence in 449 MSM at 8.6 (95% CI: 6.7–11.0) per 100 PY [7]. Men who reported exclusively sex with men were more likely to be at higher risk of HIV than men who reported sex with men and women [8]. However, interpretation of these rates must be cautious as such assays have previously found to over-estimate HIV incidence due to persons falsely testing as recently infected [9].

Many MSM in China become infected when they are relatively young, with median HIV prevalence of 5.4% for those younger than 25 years old[1]. Association between young age and a higher risk of HIV infection was suggested by several incidence studies [10–12]. This may be because of a lower ratio of condom use per sexual act in the young population[12,13], and the way they choose sexual partners[14] or their attitudes towards homosexuality[15]. The prevalence of HIV among young persons (e.g., 15 to 24 years old) has been suggested as a proxy for HIV incidence in this age group because HIV infection would have occurred within a limited and defined period of risk, likely during recent sexual debut; therefore, recent sexual debut may also serve as a proxy for HIV incidence in young persons. This proxy has been shown to hold true when independently testing this age group using laboratory based incidence assays [16]. The same rationale may be true for MSM whose sexual debut with other men is more recent, whether younger or older.

Chongqing has one of the highest HIV prevalence among MSM in China. In 2006 and 2007 HIV prevalence was reported at 10.4% and 12.5%, respectively. [17]. Taken on its face this suggests high HIV incidence in a short period of time. Moreover, cohort studies of Chinese MSM suggest high levels of HIV incidence as well. [18] Again, there are potential biases in these methods for estimating HIV incidence. Alternative methods of estimating HIV incidence may be useful in corroborating or refuting other methods. [19]

We therefore conducted this study among MSM in Chongqing to describe the differences between men who have recent sexual debut compared to those without recent sexual debut, to provide an alternate estimate of HIV incidence by examining HIV prevalence among men with recent sexual debut and to examine characteristics of men with recent sexual debut and HIV infection to guide possible points of intervention for HIV in this population.

Methods

We conducted a cross-sectional respondent-driven sampling (RDS) survey investigating HIV infection and risk behavior among Chongqing MSM in 2011. The study site was located at the Chongqing Center for Disease Control and Prevention (CDC). Participants were eligible if they had a valid recruitment coupon or were selected as a seed, were 18 years of age or older, had engaged in male-male sex in the past 12 months, and provided informed consent. The details of samples and sampling method have been reported previously [21,22]

Measures

We used a computerized self-administered questionnaire to collect information on demographic characteristics, HIV risk behaviors, testing history, drug use, access to HIV-related prevention services, and positive attitudes and perceptions towards safe sex. The scale used to measure attitudes towards safer sex has been described previously [20]. An increasing scale score means greater positive attitudes and perceptions towards safe sex. Men who scored higher than the mean score were considered to have high positive attitudes and perceptions towards safe sex. We classified men who reported initiating sexual behaviors with other men within the past 5 years as having recent sexual debut. Five years was chosen to be as close to the age group used in analyses of sexual debut in the literature but also accounting for overall age of men in our sample [16]. After the interview, a blood sample was collected for HIV and syphilis testing. Those who tested positive for HIV or syphilis were linked to care.

Laboratory Methods

Serological specimens collected from participants were tested for HIV and syphilis antibodies. Initial HIV screening used an enzyme immunoassay (Vironostika HIV Uni-Form plus O, bioMérieux, Holland). Preliminary HIV positive results were with a Western blot (HIV Blot 2.2 WBTM, Genelabs Diagnostics, Singapore). A rapid plasma reagent (RPR) test (Shanghai Rongsheng, China) was used for syphilis screening and a *Treponema pallidum* particle assay (TPPA) (Fujirebioinc, Japan) for confirmation.

Statistical Analyses

SAS version 9.1 was used for statistical analysis. The chi-square test was used to examine differences between men with recent sexual debut and those that had sexual debut longer than 5 years ago. We set our alpha for significance at $p < 0.05$. Variables significant in bivariate analyses of HIV infection among men with recent sexual debut were considered candidates for multivariate models. Multivariate logistic regression using backwards stepwise elimination were used to detect independent factors associated with HIV, while

controlling for all other variables. All analyses were not weighted for the sampling approach as we were not striving to make inference to the overall population of MSM in Chongqing.

Institutional Review Boards of the National Center for AIDS/STD Control and Prevention (NCAIDS) in China and Vanderbilt University reviewed and approved the study protocol.

Results

The study recruited 391 men in 2011. Of these men, 257 (65.7%) had sexual debut with a man in the past 5 years and 134 (34.3%) had their sexual debut greater than 5 years in the past. A greater proportion of men with recent sexual debut were 18–20 years old compared to those without recent sexual debut (18.7% vs. 0.8%, $p < 0.001$). Men with recent sexual debut were; more likely to be single (92.2% vs. 7.2%, $p < 0.001$), less likely to have a full time job (6.3% vs. 87.3%, $p < 0.001$), more likely to live in Chongqing less than 10 years (51.0% vs. 35.1%, $p = 0.003$), make less than 3000 RMB per month (75.1% vs. 53.7%, $p < 0.001$), less likely to have health insurance (58.0% vs. 74.6%, $p = 0.001$), less likely to have had sex with a woman (69.7% vs. 56.0%, $p = 0.007$) and more likely to identify as homosexual (87.6% vs. 76.9%, $p = 0.006$) compared to men with sexual debut greater than 5 years ago (Table 1). There were no significant differences in terms of sexual activity, HIV testing, STDs and circumcision between the two groups of men (Table 1). HIV prevalence between the two groups was not statistically different (18.7% among those recent sexual debut vs. 20.1%, $p = 0.726$).

Approximation of HIV incidence

HIV prevalence among men with recent sexual debut was 18.7%. To reach this level of HIV prevalence we estimate that HIV incidence would need to be about 3.7% per year over five years.

Factors associated with HIV infection among men with recent sexual debut

Table 2 presents results of bivariate and multivariate logistic regression analyses of associations with HIV infection among MSM with recent sexual debut in Chongqing. In bivariate analyses, low education (Odds Ratio [OR] 4.3, 95% Confidence Interval [CI] 2.1 – 8.5), having more than one male sex partner (OR 2.3, CI 1.2–4.4), having any unprotected anal sex in the past six months (OR 2.0, CI 1.1–3.9), had an STD during the past 12 months (OR 3.2, CI 1.1–9.4) and having a positive syphilis test (OR 6.2, CI 1.3–28.9) were associated ($p < 0.05$) with HIV infection. In multivariable analysis, low education, having more than one male sex partner and testing positive for syphilis remained associated with HIV infection among men with recent sexual debut.

Discussion

Recent sexual debut was associated as expected with younger age, being single, never having sex with a woman, employed part-time and identifying as homosexual. These findings are congruent with our expectation that men with recent sexual debut would be younger. This also supports our approach to HIV incidence estimation. That is most

studies using recent sexual debut focus on youth ages 15–24 years old who likely have had recent sexual debut [23].

As for an approximation of incidence among MSM, one study from 2006 and 2007 HIV prevalence was reported at 10.4% and 12.5%, respectively. Translating to an HIV possible HIV incidence of 2.1% per year. [17] Another previous study in Chongqing from 2006 to 2009 indicated HIV prevalence rising from 11.6% to 19.2%. This translates to an almost 2.5% increase in prevalence per year for three years [24]. With HIV prevalence at 18.7% among men with recent sexual debut, our study suggests that among men with recent sexual debut incidence could be as high as 3.7% per year. While our estimate is not directly equivalent to HIV incidence, it does provide a potentially useful proxy for incidence and risk that is occurring closer to the present moment rather than potentially in the distant past.

Moreover, the current analysis points to the need for HIV prevention programming to focus efforts on MSM who are recently initiating sexual behaviors with other men as they may be more vulnerable and unaware of how to protect themselves from HIV and other STIs. Furthermore, our results suggest that HIV prevention activities need to occur in middle and high school settings as the window of opportunity for HIV prevention after sexual debut is short and HIV infection in our study group was twice as likely to be among those with only high school or less education. Multiple partners were also associated with HIV infection among our study group suggesting interventions should target partner reduction as an outcome. Finally, as in other studies of Chinese MSM, we found a strong correlation between syphilis infection and HIV infection [25] thus our data also support recommending frequent STD screening and treatment for MSM.

There are limitations to our study. First, all measures of private and sensitive HIV risk behaviors were self-report and although the participants completed the survey on their own, social desirability bias was probably present with likely underestimation of stigmatized behaviors[20]. Secondly, cross-sectional surveys cannot distinguish the sequence between infection and exposure, so our findings are correlations and not evidence of causality. This has a particular bearing on interpreting correlates of infection since recent sexual debut. Moreover, while we posit that infection among MSM with recent sexual debut is a proxy for HIV incidence, we recognize the great need for the development and validation of alternate practical means to measure HIV incidence. Lastly, we do not attempt to generalize from this sample to the entire population of MSM in Chongqing thus we have used un-weighted analyses.

Nonetheless, our study confirms the rapid rise of HIV infection among MSM in Chongqing particularly among MSM who have recently begun having sex with other men and provides suggestions on what factors (i.e. sexual health education among those with lower educational levels, reduction of multiple partners and frequent STD screening) to focus HIV prevention attention.

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Demographic and behavioral characteristics of men who have sex with men with male partners, Chongqing, China, 2011

Table 1

Variable	MSM Without recent sexual debut (n=134)		MSM With recent sexual debut (n=257)		χ^2	P
	N	%	N	%		
Age						
18-23	9	6.7	149	58.0	119.7	<0.001
24-29	67	50.0	87	33.8		
30-34	28	20.9	15	5.8		
35-39	16	11.9	3	1.2		
40	14	10.5	3	1.2		
Education						
Completed college or more	99	73.9	207	80.5	2.3	0.13
High school or below	35	26.1	50	19.5		
Current marital status with women						
Other (married, widowed, divorced)	40	29.9	20	7.8	33.0	<0.001
Single	94	7.2	237	92.2		
Living with male sex partner	12	9.0	26	1.1	0.1	0.71
Employment status						
Other (Part time, unemployed)	17	12.7	102	39.7	3.3	<0.001
Full time job	117	87.3	155	6.3		
Residence						
Other than city center	25	18.7	51	19.8	0.008	0.78
City center	109	81.3	206	8.2		
Years of living in Chongqing						
<10	47	35.1	131	51.0	8.9	0.003
10	87	64.9	126	49.0		
Mean monthly income (RMB), P12M						
<3000	72	53.7	193	75.1	18.4	<0.001
3000	62	46.3	64	24.9		
Has health insurance	100	74.6	149	58.0	1.6	0.001
Ever sex with women						

Variable	MSM Without recent sexual debut (n=134)		MSM With recent sexual debut (n=257)		χ^2	P
	N	%	N	%		
No	75	56.0	179	69.7	7.2	0.007
Yes	59	44.0	78	3.4		
At what age did you first have sex with a man						
<18	17	12.7	20	7.8	2.5	0.1
18	117	87.3	237	92.2		
Self-reported sexual orientation						
Others (bisexual, heterosexual, unsure)	31	23.1	32	12.5	7.4	0.006
Homosexual	103	76.9	225	87.6		
Self-reported preferred role in anal sex with men						
Versatile/Bottom	42	31.3	55	21.4	4.7	0.031
Top	92	68.7	202	78.6		
More than one male sex partners past 6 months						
No	73	54.5	150	58.4	0.5	0.46
Yes	61	45.5	107	41.6		
Any unprotected anal sex, past 6 months						
No	101	75.4	187	72.8	0.3	0.58
Yes	33	24.6	70	27.2		
Any unprotected sex with women						
No	132	98.5	256	99.6	1.4	0.24
Yes	2	1.5	1	0.4		
Score of attitudes and Perceptions on Safe Sex *						
45	121	9.3	232	9.3	0.0001	0.99
>45	13	9.7	25	9.7		
HIV testing history						
Never tested	70	52.2	161	62.7	3.9	0.047
Ever tested	64	47.8	96	37.4		
Any drug use, past 12 months						
No	132	98.5	257	100.0	3.9	0.05
Yes	2	1.5	0	0.0		
Received free condoms/lubricant, past 12 months						

Variable	MSM Without recent sexual debut (n=134)		MSM With recent sexual debut (n=257)		χ^2	P
	N	%	N	%		
No	133	99.3	253	98.4	0.5	0.50
Yes	1	.8	4	1.6		
Had STD during the past 12 months						
No	127	94.8	242	94.2	0.06	0.80
Yes	7	5.2	15	5.8		
Circumcised						
No	117	87.3	218	84.8	0.4	0.51
Yes	17	12.7	39	15.2		
Tested syphilis positive						
No	125	93.3	250	97.3	3.6	0.059
Yes	9	6.7	7	2.7		
Tested HIV positive						
No	107	79.9	209	81.3	0.1	0.73
Yes	27	20.1	48	18.7		

* higher score suggests more positive attitudes towards safer sex

Risk factors associated with HIV infection of men who had sex with men who had recent sexual debut with male partners, Chongqing, China, 2011 (n = 257).

Table 2

Variable	HIV-infected N (%)	OR (95%CI)	P	AOR (95%CI)	P
Age					
18–23	26(17.5)	1.0			
24–29	17(19.5)	1.1 (1.6–2.3)	0.688		
30–34	2(13.3)	0.7 (2–3.4)	0.687		
35–39	2(66.7)	9.5 (8–108.3)	0.071		
40	1(33.3)	2.4 (2–27.1)	0.489		
Education					
Completed college or more	28 (13.5)	1.0		1.0	
High school or below	20 (40.0)	4.3 (2.1–8.5)	<.001	4.0(2.0–8.2)	<.001
Current marital status with women					
Other (married, widowed, divorced)	5 (25.0)	1.0			
Single	43 (18.1)	0.7 (0.2–1.9)	0.452		
Living with male sex partner	5 (19.2)	1.0 (0.4–2.9)	0.939		
Employment status					
Other (Part time, unemployed)	19 (18.6)	1.0			
Full time job	29 (18.7)	1.0 (0.5–1.9)	0.987		
Residence					
Other than city center	6 (11.8)	1.0			
City center	42 (2.4)	1.9 (0.8–4.8)	0.163		
Years of living in Chongqing					
<10	27 (2.6)	1.0			
10	21 (16.7)	0.8 (0.4–1.4)	0.418		
Mean monthly income(RMB), past 12 months					
<3000	38 (19.7)	1.0			
3000	10 (15.6)	1.8 (0.4–1.6)	0.471		
Have health insurance	22 (14.8)	0.5(0.3–1.0)	0.061		
Ever had sex with a woman	16 (2.5)	1.2 (0.6–2.3)	0.618		
At what age did you first have sex with a man					

Variable	HIV-infected N (%)	OR (95%CI)	P	AOR (95%CI)	P
<18	3 (15.0)	1.0			
18	45 (19.0)	1.3 (0.4-4.7)	0.662		
Self-reported sexual orientation					
Others (bisexual, heterosexual, unsure)	7 (21.9)	1.0			
Homosexual	41 (18.2)	0.8 (0.3-2.0)	0.620		
Self-reported preferred role in anal sex with men					
Top	7 (12.7)	1.0			
Versatile/Bottom	41 (2.3)	1.8 (0.7-4.1)	0.206		
More than one male sex partner, past 6 months	28 (26.2)	2.3(1.2-4.4)	0.010	2.2(1.1-4.5)	0.025
Any unprotected anal sex, past 6 months	19 (27.1)	2.0 (1.1-3.9)	0.035		
Score of attitudes and Perceptions on Safe Sex					
45	46 (19.8)	1.0			
>45	2 (8.0)	0.4 (0.1-1.5)	0.167		
HIV testing history					
Never tested	36 (22.4)	1.0			
Ever tested	12 (12.5)	0.5 (0.2-1.0)	0.053		
Received free condoms/lubricant, past 12 months	0 (0)	0.0 (0.0-999.9)	0.987		
Had STD during the past 12 months	6 (4.0)	3.2 (1.1-9.4)	0.037		
Circumcised	5 (12.8)	0.6 (0.2-1.6)	0.313		
Current test Syphilis positive	4 (57.1)	6.2 (1.3-28.9)	0.019	6.7(1.3-34.3)	0.022

* RMB: Renminbi, approximately US \$.15; OR: odds ratio; CI: confidence interval; AOR: adjusted odds ratio.