

antibody test history in the previous year. The questionnaire also assessed depression using the Japanese version of the Self-rated Depression Scale [19] adapted from the original Zung measure [20]; scores above 50.0 have been shown to indicate high levels of depression in Japanese subjects [21] (Cronbach's  $\alpha=0.917$ ). Questions were also asked sexual behaviours in the previous 6 months including: unprotected anal intercourse (UAI), the number of male sexual partners, and the frequency of attending gay venues (gay bars) and sex clubs. HIV/STI knowledge was assessed using five true-or-false items: 'You can assess your HIV status 2 to 3 days after a high-risk event'; 'You are more likely to be infected with HIV if you have an STI'; 'You can contract an STI through oral sex'; 'You will not contract an STI through insertive anal sex'; and 'You will not contract HIV through insertive anal sex'. The participants were divided into two groups based on their responses: those who answered all five items correctly, and those who answered one or more question incorrectly.

Questions regarding substance use included lifetime use of the substances listed in Table 1. The reason for asking for lifetime substance use was based on the results of the study's pilot study in which many participants expressed hesitancy in reporting recent involvement in illegal substance use.

#### Statistical analysis

Bivariate and multiple logistic regression analyses were conducted to identify correlates of substance use. The subjects were divided into three groups according to their lifetime substance use history: those who never used any substance ("never-used" group), those who used only one type of substance ("lifetime reported single substance user" group), and those who used more than one type of

substance ("lifetime reported multiple substance user" group). The never-used group was compared to each substance user group using the chi-square test. Multiple logistic regression analysis was then used to evaluate the independent correlations of demographic, behavioural, and psychological variables with substance use in each substance user group, with the never-used group as the reference. Due to the cross-sectional design and the different time frames of questions regarding substance use and sexual behaviour, causal analysis cannot be made.

## Results

### Demographic characteristics

There were 2,195 respondents to the survey, and the data from 2,062 participants were used. Of the 133 respondents who were eliminated, 88 had incomplete questionnaires and 45 did not live in Japan. The average age of the participants was 29.0 years (range 14–76, SD = 8.0). Sixty percent had university degrees or higher. Regarding sexual orientation, 70.5% identified as gay, 20.8% as bisexual, and 8.7% as other. Of the participants, 73% resided in Tokyo, Osaka, or another urban area.

### Substance use

Of the participants, 65% had lifetime experience of substance use and 35% had never used (see Table 1). The most frequently used substances were amyl nitrite (63.2%), followed by 5-methoxy-N,N-diisopropyltryptamine (5MEO-DIPT) [22] (9.3%), known as "gomeo", marijuana (5.7%), and other substances (0.1–3.3%). Among lifetime reported single substance users, the vast majority (96.4%) reported using amyl nitrite. Most of the lifetime reported multiple substance users had used amyl nitrite (96.8%) and almost half had used 5MEO-DIPT. In addition, substance use involving marijuana (25.4%), magic mushrooms (16.8%), Viagra (15.1%), ecstasy

**Table 1: Substance use among Japanese MSM recruited through the Internet (N = 2,062).**

	Overall n = 2062	Lifetime reported single substance user n = 945	Lifetime reported multiple substance user n = 405
	%	%	%
Amyl nitrites (Poppers)	63.2	96.4	96.8
5-methoxy-N,N-diisopropyltryptamine (5MEO-DIPT)	9.3	0.2	46.9
Marijuana	5.7	1.6	25.4
Magic mushrooms	3.3	0.1	16.8
Viagra	3.1	0.3	15.1
Methylenedioxymethamphetamine (Ecstasy)	2.8	0.2	13.8
Methamphetamine	2.6	0	13.3
Psychotropic agents	2.6	0.6	11.9
Thinner	1.6	0.1	7.7
Crack or Cocaine	0.8	0	4.0
Lysergic acid diethylamide(LSD)	0.6	0	3.0
Heroin	0.2	0	1.5
Injectable steroids	0.1	0	0.7



(13.8%), and methamphetamine (13.3%) were reported. Of the lifetime reported multiple substance users, only 18 (4.4%) had ever injected substances and one of them was HIV-positive. Overall, 70% of both lifetime reported single and multiple substance users resided in Tokyo, Osaka, or other urban areas.

#### **Correlates of type of substance and sexual behaviour**

Bivariate analyses showed higher percentages of unprotected sexual activities among substance users, particularly among lifetime reported multiple substance users (See Table 2). Regarding sexual behaviour within the previous 6 months, 45% of lifetime reported multiple substance users reported a casual sex partner with another man (male sex friend), 49.6% had four or more sexual partners, 57.0% had unprotected anal intercourse (UAI), 64.2% visited a sex club, and 73.3% visited a gay venue. Lifetime reported multiple substance use was associated with a higher frequency of diagnosis with STIs: HIV 7.4%, syphilis 17.8%, hepatitis A 3.0%, and hepatitis B 10.9%. Older age, less education, HIV testing within the previous year, and higher HIV-related knowledge scores were also concentrated among lifetime reported single and multiple substance users, with a greater concentration among lifetime reported multiple substance users. Depression was associated with substance use only in lifetime reported multiple substance users.

Table 3 shows the results of the multivariate regression analysis conducted to identify independent correlates of substance use inputting all variables compulsorily, except for a history of diagnosis with syphilis or hepatitis which were closely correlated with HIV infection. The analysis revealed that UAI and visiting sex club/gay venues in the previous 6 months were significantly associated with the lifetime reported single and multiple substance user groups and the association was strongest with lifetime reported multiple substance use. The association of having six or more sex partners in the previous 6 months, educational background, and age group showed a consistent pattern across the substance user groups and peaked in the 30 to 39 year age group. Having had an HIV test within the previous year reached statistical significance in both lifetime reported single and multiple substance user groups. Lifetime reported multiple substance use was significantly correlated with having a casual male sex partner, depression, being HIV-positive, and HIV-related knowledge.

#### **Discussion**

As the first Internet survey conducted with a large sample of MSM in Japan, it is the first to reveal the profile of substance use and its relationship with sexual behavior among this population. Our results indicate that amyl nitrite was ever used by 63.2% of respondents, 5MEO-DIPT by 9.3% suggesting that amyl nitrite and 5MEO-

DIPT represent the substances most commonly used. Frequent use of 5MEO-DIPT has been also observed in other study conducted among Japanese MSM in 2003 where 18.8% of 576 gay night club clients reported lifetime use of 5MEO-DIPT [23]. Comparison with the results of a randomized nationwide general population survey on substance use, conducted in 2005 in Japan [24], suggests that substance use is relatively high among our respondents in that marijuana use is 4 times, Methylenedioxymethamphetamine use 28 times and methamphetamine use 8 times higher than the general population sample, though no comparable data has been available on amyl nitrite or 5MEO-DIPT. Regarding the substance use profile, it is important to note that the most common substances used were those that were not prohibited by law at the time of the survey, though both 5MEO-DIPT and amyl nitrite became prohibited substances in 2005 and 2006, respectively. Rates of use could be biased due to the underreporting of illegal substance use by respondents, though care was taken to ask lifetime use rather than current use. Thus, actual substance use rates among respondents could actually be higher than the situation revealed in our study. The results of the interviews conducted as a part of the pilot survey pointed to discourses by MSM that 5MEO-DIPT and amyl nitrite were as effective as other illegal substances in increasing sexual sensation and that these substances would be safe because the law would not allow the sale and use of unsafe substances. It is possible that the combination of a number of factors, including the efficacy of these substances, feeling of security in obeying the law and false perception of medical safety, lead to the use of 5MEO-DIPT and amyl nitrite in preference to illegal substances. If this is the case, it is possible that the substance use profile has changed substantially since the recent criminalisation of 5MEO-DIPT and amyl nitrite, and it is an imperative that follow up surveys be conducted to determine this.

#### **Type of substance use and sexual behaviour**

There is a body of research indicating the connection between amyl nitrite use and sexual behaviour, including high risk sexual behaviours such as UAI and multiple sexual partners [3,5,6,25]. Our results were consistent with previous studies, indicating that lifetime reported multiple substance users had a greater number of sex partners and engaged in unprotected sex more frequently, placing them at greater risk for HIV and STIs. In fact, among lifetime reported multiple substance users in this study, infection rates of 7.4% for HIV and 17.8% for syphilis were reported; this HIV prevalence is the highest among any MSM subpopulation ever surveyed to date in Japan. The sexual risks of lifetime reported single substance users were no less alarming, since nearly half had engaged in UAI during the previous 6 months and 2.3% reported infection with HIV and 8.0% with syphilis. Similar high

Table 2: Socio-demographics, risk characteristics, and sexually transmitted infections of Japanese MSM recruited through the Internet

	Overall n = 2062		Never users n = 712		Lifetime reported single substance user n = 945		Lifetime reported multiple substance user n = 405	
	%	n	%	n	%	n	%	n
Age group								
14-19	7.8	11.5	6.1	5.5	6.1	5.5	.000	
20-29	51.4	52.0	53.2	48.3	53.2	48.3		
30-39	30.6	24.3	32.8	37.8	32.8	37.8		
40+	9.5	12.2	8	8.5	8	8.5		
Education level								
No University degree	40.2	36.5	40.5	45.9	40.5	45.9	.002	
University degree	59.8	63.5	59.5	54.1	59.5	54.1		
Sexual orientation								
Gay	70.5	62.8	75.2	73.1	75.2	73.1	.002	
Bisexual	20.8	25.7	18.2	18	18.2	18		
Other	8.7	11.5	6.6	8.9	6.6	8.9		
Currently have a casual sex partner	70.0	78.7	69.9	54.8	69.9	54.8	.000	
No	30.0	21.3	30.1	45.2	30.1	45.2		
Yes	30.0	21.3	30.1	45.2	30.1	45.2		
Depression <sup>1</sup>	18.3	15.7	16.6	26.7	16.6	26.7	.000	
High	97.2	99.3	97.7	92.6	97.7	92.6		
Negative	2.8	0.7	2.3	7.4	2.3	7.4		
Positive	92.3	98.5	92.0	82.2	92.0	82.2	.000	
Syphilis	7.7	1.5	8.0	17.8	7.7	17.8	.011	
Hepatitis A	98.7	99.2	99.2	97.0	99.2	97.0	.000	
No	1.3	0.8	0.8	3.0	0.8	3.0		
Yes	95.1	98.6	95.0	89.1	95.0	89.1	.000	
Hepatitis B	4.9	1.4	5.0	10.9	4.9	10.9	.000	
Yes	56.6	18.8	7.1	4.7	56.6	4.7	.000	
UAI in the previous 6 month								
No anal intercourse	21.3	49.4	44.3	38.3	44.3	38.3		
Protected	22.1	31.7	48.6	57.0	48.6	57.0	.000	
Unprotected	18.9	26.7	15.7	12.6	18.9	12.6		
Number of sexual partners in the previous 6 months								
0	23.0	30.1	20.1	17.3	20.1	17.3	.000	
1	23.7	24.0	24.9	20.5	24.9	20.5		
2-3	14.7	9.8	17.6	16.5	14.7	16.5		
4-5	19.7	9.4	21.8	33.1	19.7	33.1		
6+	52.0	69.0	46.2	35.8	46.2	35.8	.000	
Sex club in the previous 6 months	48.0	31.0	53.8	64.2	48.0	64.2	.000	
Yes	39.6	54.1	34.2	26.7	34.2	26.7		
Gay venue in the previous 6 months	60.4	45.9	65.8	73.3	60.4	73.3	.000	
Yes	76.3	85.5	74.1	65.4	74.1	65.4	.000	
Tested for HIV within the past year	23.7	14.5	25.9	34.6	23.7	34.6	.000	
Yes	53.7	61.8	51.6	44.2	53.7	44.2	.000	
HIV/STI knowledge score	46.3	38.2	48.4	55.8	46.3	55.8		
Full score								

1 Dichotomous categories based on Kawano, Suematsu &amp; Shirazato (1990)

Table 3: Multivariate analysis of substance use of Japanese MSM recruited through the Internet.

	Lifetime reported single substance user (n = 945)			Lifetime reported multiple substance user (n = 405)		
	AOR	95% C.I.	P-value	AOR	95% C.I.	P-value
Age group						
14-19	1			1		
20-29	1.60	1.07-2.40	.023	1.53	0.85-2.77	.160
30-39	2.12	1.38-3.25	.001	2.62	1.41-4.86	.002
40+	1.02	0.62-1.67	.944	1.16	0.57-2.38	.679
Education level						
No University degree	1			1		
University degree	0.74	0.56-0.94	.012	0.66	0.48-0.89	.007
Sexual orientation						
Gay	1			1		
Bisexual	0.81	0.62-1.06	.120	1.00	0.68-1.46	.985
Other	0.62	0.42-0.92	.016	1.19	0.72-1.98	.502
Currently have a casual sex partner						
No	1			1		
Yes	1.24	0.96-1.60	.104	2.57	1.84-3.59	.000
Depression						
No	1			1		
Yes	1.12	0.84-1.50	.447	2.27	1.58-3.27	.000
HIV status						
Negative	1			1		
Positive	2.91	0.92-9.21	.070	7.78	2.33-25.93	.001
UAI in the previous 6 months						
No anal intercourse	1			1		
Protected	1.57	0.95-2.58	.078	1.20	0.56-2.56	.634
Unprotected	2.53	1.53-4.17	.000	2.42	1.14-5.16	.022
Number of sex partners in the previous 6 months						
0	1			1		
1	0.82	0.54-1.25	.360	1.08	0.59-1.98	.804
2-3	1.04	0.68-1.58	.864	1.06	0.59-1.92	.838
4-5	1.44	0.90-2.29	.127	1.22	0.65-2.30	.543
6+	1.67	1.05-2.67	.031	2.13	1.15-3.95	.016
Sex club in the previous 6 months						
No	1			1		
Yes	1.64	1.29-2.09	.000	2.00	1.44-2.80	.000
Gay venue in the previous 6 months						
No	1			1		
Yes	1.65	1.32-2.01	.000	2.56	1.78-3.39	.000
Tasted for HIV within the past year						
No	1			1		
Yes	1.42	1.08-1.88	.013	1.78	1.25-2.54	.001
HIV/STI knowledge score						
0-4	1			1		
5 (full score)	1.22	0.98-1.52	.081	1.59	1.18-2.16	.003

OR, odds ratio; CI, confidence interval



rates of syphilis prevalence have also been reported in recent data of Japanese MSM who attended HIV/STIs-testing programmes for gay men in the Osaka area, where syphilis prevalence was found to be 14.7% in 2000, 15.9% in 2001 and 19.6% in 2002 [26], suggesting the possible emergence of a syphilis epidemic among these groups. Since syphilis increases susceptibility to HIV infection, syphilis prevention and treatment programmes for Japanese MSM should be prioritised. Furthermore, substance use needs to be factored into the development of HIV prevention education programmes for MSM in Japan.

In this study, there was a strong association between lifetime reported multiple substance use and depression, which may imply that participants with depressive symptoms might use substances to cope. However, the explanatory pathways remain unclear due to the cross-sectional survey design. Interventions for Japanese MSM could include the use of Internet technologies to provide referrals to specialists, such as clinical psychologists, psychiatrists, and substance treatment and mental health organizations, to address substance use and depression. There is also a need for education to increase knowledge about the needs and concerns of MSM among Japanese medical doctors, nurses, and other public health professionals because homosexuality and same-sex behaviour are poorly understood within Japan's health sector.

Our results suggest that the Internet is a potentially useful tool for promoting intervention measures for Japanese MSM, as reflected in the successful recruitment of large number of participants our Web site achieved within a short period. In addition to disseminating information to the public at large, the Internet could be used to provide personalized intervention or support for vulnerable and more marginalized populations at risk for HIV, and it is particularly relevant in cultures and settings in which MSM remain highly stigmatized and less visible, such as Japan.

#### Limitations

There are several limitations to our study. First, it is impossible to determine whether study participants represent the MSM population as a whole or only MSM using the Internet. We also recognize that there was a sampling bias in terms of the respondents' age and educational background. Second, no causal inference was possible because of the cross-sectional design of the study. Third, substance history referred to lifetime behaviour, whereas the time frame for sexual behaviour related questions was the previous six months. Caution should therefore be exercised in interpreting the observed association between substance use and sexual behaviour as the data does not suggest causal relationships, and it may well be that other, as yet unexamined, variable influence sexual risk behaviour

and multiple substance use. It is possible that some of the lifetime reported single or multiple substance users were no longer using during the preceding 6 months, which could have weakened the association between lifetime substance use and sexual behaviour. Finally, although the study was conducted through the Internet, there could still be underreporting of sensitive questions, such as HIV status or illicit-substance use.

Future research should specify the time frames for substance use, why and how substances are used by Japanese MSM. Indeed, it is a necessity to clarify the motivation, situational context, and psychological problems associated with substance use among Japanese MSM in order to develop effective education and prevention programmes.

#### Conclusion

This is the first academic study to use the Internet to examine the sexual and substance use behaviours of MSM in Asia. Our findings clearly indicate that substance use was widespread among respondents, as was unsafe sexual behaviours and HIV/STIs infection, especially among lifetime reported multiple substance users. These results indicate an urgent need to introduce effective community-based prevention measures for HIV and STIs among MSM in Japan. The present study also suggests that it may be possible to offer prevention programmes via the Internet.

#### Competing interests

The author(s) declare that they have no competing interests.

#### Authors' contributions

YH conceived this study and developed the overall procedure used in this project, including the questionnaire, sampling, and statistical analysis, and drafted the manuscript. JK, MU, TY and M O-K were responsible for the study design and creating the questionnaire.

SI, HK and MK were responsible for the data analysis and involved in writing and revising the manuscript. All of the authors participated in the study design, and read and approved the final manuscript.

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#### References

1. AIDS surveillance committee MHLW: **Annual surveillance report of HIV/AIDS in Japan, 2004**. Ministry of Health, Labour and Welfare 2004.
2. Thiede H, Valleroy LA, MacKellar DA, Celentano DD, Ford WL, Hagan H, Koblin BA, LaLora M, McFarland W, Shehan DA, Torian LV: **Regional patterns and correlates of substance use among young men who have sex with men in 7 US urban areas**. *Am J Public Health* 2003, **93**(11):1915-1921.

3. Mattison AM, Ross MW, Wolfson T, Franklin D, San Diego HIV Neurobehavioral Research Center Group: **Circuit party attendance, club drug use, and unsafe sex in gay men.** *J Subst Abuse* 2001, **13**(1-2):119-126.
4. Klitzman RL, Pope HGJ, Hudson JI: **MDMA ("Ecstasy") abuse and high-risk sexual behaviors among 169 gay and bisexual men.** *Am J Psychiatry* 2000, **157**(7):1162-1164.
5. Fernandez MI, Perrino T, Collazo JB, Varga LM, Marsh D, Hernandez N, Rehbein A, Bowen GS: **Surfing new territory: club-drug use and risky sex among Hispanic men who have sex with men recruited on the Internet.** *J Urban Health* 2005, **82**(1 Suppl 1):79-88.
6. Choi KH, Operario D, Gregorich SE, McFarland W, MacKellar D, Valeroy L: **Substance use, substance choice, and unprotected anal intercourse among young Asian American and Pacific Islander men who have sex with men.** *AIDS Educ Prev* 2005, **17**(5):418-429.
7. Hirshfield S, Remien RH, Humberstone M, Walavalkar I, Chiasson MA: **Substance use and high-risk sex among men who have sex with men: a national online study in the USA.** *AIDS Care* 2004, **16**(8):1036-1047.
8. Prestage G, Van de Ven P, Mao L, Grulich A, Kippax S, Kaldor J: **Contexts for last occasions of unprotected anal intercourse among HIV-negative gay men in Sydney: the health in men cohort.** *AIDS Care* 2005, **17**(1):23-32.
9. Tamang A, Acharya LB, Pant SB, Basnyat A, Guruvacharya VL, Smalls S, Neilsen G, Girault P: **Integrated bio-behavioural survey (IBBS) among men who have sex with men in Kathmandu valley.** In *CREPHA, FHI, BDS and SACTS report Nepal*; 2005.
10. CEMSHAD-DoH-USAIDS/FHI-Philippines: **Presentation on HIV/AIDS risks and vulnerabilities in 4 cities in the Philippines. Pap, Men at "Pamin". Dissemination forum and consultative workshop, May 27, Manila, Philippines** 2005.
11. Mansergh G, Colfax GN, Marks G, Rader M, Guzman R, Buchbinder S: **The Circuit Party Men's Health Survey: findings and implications for gay and bisexual men.** *Am J Public Health* 2001, **91**(6):953-958.
12. Darrow WW, Biersteker S, Geiss T, Chevalier K, Clark J, Marrero Y, Mills V, Obaja K: **Risky sexual behaviors associated with recreational drug use among men who have sex with men in an international resort area: challenges and opportunities.** *J Urban Health* 2005, **82**(4):601-609.
13. Ministry of Internal Affairs and Communications: **Information and Communications in Japan, 2006.** Ministry of Internal Affairs and Communications 2006.
14. Ministry of Internal Affairs and Communications: **Information and Communications in Japan, 2004.** Ministry of Internal Affairs and Communications 2004.
15. Rhodes SD, Bowie DA, Hergenrather KC: **Collecting behavioural data using the world wide web: considerations for researchers.** *J Epidemiol Community Health* 2003, **57**(1):68-73.
16. Bull SS, McFarlane M: **Soliciting sex on the Internet: what are the risks for sexually transmitted diseases and HIV?** *Sex Transm Dis* 2000, **27**(9):545-550.
17. Hospers HJ, Kok G, Harterink P, de Zwart O: **A new meeting place: chatting on the Internet, e-dating and sexual risk behaviour among Dutch men who have sex with men.** *AIDS* 2005, **19**(10):1097-1101.
18. Hidaka Y, Ichikawa S, Koyano J, Urao M, Yasuo T, Kihara M: **Online qualitative research investigating sexual behaviors among Japanese Men who have Sex with Men.** Presented at 130th Annual meeting of American Public Health Association 2002.
19. Fukuda K, Kobayashi S: **The Japanese Version of SDS.** In *Sankyoubou Kyoto, Japan*, Sankyoubou; 1983.
20. Zung WW: **A Self-Rating Depression Scale.** *Arch Gen Psychiatry* 1965, **12**:63-70.
21. Kawano T, Suematsu H, Shinzato R: **Shinsin Igaku no tameno Shinri tesuto. Asakura-shoten. [in Japanese]** 1990.
22. **Schedules of controlled substances: placement of alpha-methyltryptamine and 5-methoxy-N,N-diisopropyltryptamine into schedule I of the Controlled Substances Act. Final rule.** *Fed Regist* 2004, **69**(188):58050-58053.
23. Kimura H, Onitsuka T, Tsuji H, Okamoto G, Ichikawa S: **HIV prevention intervention in Osaka (in Japanese).** Annual report of HIV prevention program for men who have sex with men in Japan 2005:57-78.
24. Wada K: **Yakubutsu shiyounikansuru zenkoku jumin chousa. Yakubutsu ranyou izon no jitaihaaku to ranyou izosanyonitaisuru taiousakani kansurukenyu** 2006:17-91.
25. Buchbinder SP, Vittinghoff E, Heagerty PJ, Celum CL, Seage GR, Judson FN, McKirnan D, Mayer KH, Koblin BA: **Sexual risk, nitrite inhalant use, and lack of circumcision associated with HIV seroconversion in men who have sex with men in the United States.** *J Acquir Immune Defic Syndr* 2005, **39**(1):82-89.
26. Ichikawa S: **Prevention Intervention of HIV Infection among Men who have sex with men (MSM)- Project MASH Osaka.** In *The Journal of AIDS Research Volume 5.* Tokyo, The Japanese Society for AIDS Research; 2003:174-181.

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# High Prevalence of HIV Infection Associated With Incarceration Among Community-Based Injecting Drug Users in Tehran, Iran

Saman Zamani, MD, PhD,\* Masahiro Kihara, MD, PhD,\* Mohammad M. Gouya, MD, MPH,†  
 Mohsen Vazirian, MD,‡§ Bijan Nassirimanesh, MD,¶ Masako Ono-Kihara, PhD,\*  
 Shahrzad Mortazavi Ravari, DDS,\* Afshin Safaie, DMSc,† and Seichi Ichikawa, PhD||

**Objectives:** To determine the prevalence and correlates of HIV-1 infection among community-based injecting drug users (IDUs) in Tehran, Iran.

**Methods:** In October 2004, 213 IDUs were recruited from a drop-in center and its neighboring parks and streets in Tehran. Participants were interviewed using a structured questionnaire regarding their sociodemographics and HIV risk characteristics, and specimens of oral mucosal transudate were collected and tested for HIV-1 antibodies. Data were analyzed using  $\chi^2$  and multiple logistic regression to estimate odds ratios (OR) and 95% confidence intervals (CI).

**Results:** The prevalence of HIV-1 infection was 23.2% (48 of 207) among male injecting drug users. In the multivariable analysis, a history of shared drug injection inside prison (OR, 2.45; 95% CI, 1.01–5.97) and that of multiple incarcerations (OR, 3.13; 95% CI, 1.08–9.09) were associated with significantly higher prevalence of HIV-1 infection.

**Conclusions:** The prevalence of HIV-1 infection has reached an alarming level among IDUs in Tehran, with incarceration-related exposures revealed to be the main correlates of HIV-1 infection. Urgent and comprehensive harm reduction programs for drug users in prison and those in the community in Tehran are of prime importance to prevent further transmission of HIV infection.

**Key Words:** HIV, injecting drug user, prison, MSM, Iran

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The intertwined epidemics of HIV/AIDS and injecting drug use are among the most vexing public health problems in Iran. To date, about 12,000 people have been identified as

having HIV or AIDS in Iran, with more than half of this figure being detected within the past 2 years.<sup>1</sup> The dominant mode of HIV transmission is still through injection drug use,<sup>2</sup> and this accounts for about 86% of reported cases with known transmission routes.<sup>1</sup> While the population of injecting drug users (IDUs) has been growing in Iran,<sup>3</sup> recent figures indicate that the prevalence of HIV-1 infection has reached 15% among IDUs visiting treatment centers in the capital, Tehran.<sup>4</sup> The epidemic of HIV/AIDS among IDUs in Iran should also be considered in a broader and regional context in central Asia, where many countries such as neighboring Armenia reportedly have a high prevalence of HIV among its IDUs.<sup>5</sup>

In response to the growing epidemic of HIV/AIDS among IDUs, Iranian authorities have taken several positive steps. Upon adoption of a harm reduction policy for drug use in 2002, programs to provide substitute therapies and needle/syringe exchanges have been established in many provinces.<sup>6,7</sup> Although the level of coverage of these programs for drug users has not yet been evaluated, there is evidence showing that a rapid scale up in the availability of preventive programs inside prisons and in the outside community has occurred.<sup>6–8</sup> The number of centers providing substitute therapies and/or sterile needles/syringes in Iran has now increased to more than 30 centers since the establishment of the first one in 2002 (unpublished data from the Ministry of Health in Iran).

Despite the rapid increase in community-based programs for IDUs in Iran, there is little research-based evidence on the prevalence of HIV infection and risk behaviors among this population. This study was conducted as a part of the HIV/AIDS Prevention Study among Drug Users in Iran (HADI project—phase 2) aiming to determine the prevalence of HIV-1 infection and its correlates among a group of community-based IDUs in Tehran.

## METHODS

The survey was conducted in the Shoosh area in south-central Tehran, a relatively poor area where there is a high concentration of migrants and drug users.<sup>9</sup> Because of the increasing number of drug users, authorities were urged to set up the first outreach program for drug users in this area of Tehran. The outreach program that was designed by the Ministry of Health and initially funded by the United Nations Office on Drug and Crime has been run by a nongovernmental organization (NGO) called the Persepolis Society since October 2003. The NGO has been providing drug users

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From the \*Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto, Japan; †Center for Disease Management and ‡Bureau for Psychosocial and School Health, Ministry of Health and Medical Education, Tehran, Iran; §Iranian National Center for Addiction Studies (INCAS), Tehran, Iran; ¶Persepolis Society, Tehran, Iran; ||Laboratory for Infection Control and Prevention, School of Nursing, Nagoya City University, Nagoya, Japan.

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Reprints: Dr Saman Zamani, Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Yoshida-Konocho, Sakyo-ku, Kyoto 606-8501, Japan (e-mail: szamani@pbh.med.kyoto-u.ac.jp).

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with a range of services including a needle/syringe program through its drop-in center and mobile services in the area.<sup>7,10</sup>

In October 2004, a consecutive sample of drug users was recruited at the drop-in center and at parks and streets in the area. Active drug users were approached by an ex-user NGO staff member for recruitment and were then interviewed by a male researcher. After obtaining informed consent, each respondent was interviewed using a structured questionnaire that included 60 questions about sociodemographic characteristics, drug use characteristics, history of incarceration, and sexual behavior. The questionnaire was developed based on the findings of our previous qualitative and quantitative studies; and participants were accordingly asked if they ever used a shared needle or syringe for drug injection (receptive sharing of needle or syringe), if they were ever incarcerated (being kept in prison) in their lifetime, and if they ever used a shared injection device (needle, syringe, or handmade injection device) while incarcerated. All interviews were conducted in the Persian language.

On completion of the interview, the trained interviewer took an oral mucosal transudate sample from consenting participants. Oral samples were obtained using the OraSure oral fluid specimen collection device (OraSure Technologies, Inc, Beaverton, Ore) and were shipped in batches to Japan for testing. All samples were tested twice for HIV-1 with enzyme-linked immunosorbent assay (Oral Fluid Vironostika HIV-1 Microelisa System; BioMérieux Inc, Durham, NC), and repeatedly reactive enzyme-linked immunosorbent assay samples were confirmed using a Western blot test (OraSure HIV-1 Western Blot Kit; OraSure Technologies, Inc, Bethlehem, Pa).<sup>11</sup>

The research protocol was approved by the Ethical Committee of the Iranian National Center for Addiction Studies at Tehran University of Medical Sciences in Iran and by the Committee for Research on Human Subjects at Kyoto University in Japan. Informed consent was obtained separately for the interview and HIV testing, and no personal identifiers were recorded on the questionnaires. After being interviewed, participants were recommended to undertake free serum HIV testing, available at the drop-in center, to obtain a confirmative clinical diagnosis.

Statistical analysis was performed using SPSS for Windows (version 12.01; SPSS Inc, Chicago, Ill).  $\chi^2$  or Fisher exact tests were performed to determine bivariate associations between HIV-1 status and categorical variables. Variables were entered into a multivariable model if their association with HIV-1 infection by bivariate analyses had a  $P$  value  $\leq 0.10$  or if they were considered epidemiologically important. Multivariable logistic regression analysis was used to examine the associations of independent variables with the outcome, simultaneously adjusting for potential confounders, and to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI).

## RESULTS

Of the 302 drug users who were invited to participate in the study, 2 men refused to be interviewed (response rate 99.3%) and 2 incomplete questionnaires were later excluded. All participants gave specimens for oral HIV testing.

Of the respondents, 213 (207 male and 6 female) reported ever injecting illicit drugs in their lifetime and were thus defined in this study as IDU. Among 207 male IDUs, 48 were confirmed to be positive for HIV-1 antibodies using the Western blot test, giving an HIV-1 prevalence of 23.2%. Among 6 female IDUs, 2 were found to be HIV-positive; both had experienced multiple incarcerations and had used drugs inside prison. Having recruited too few female IDUs for adequate statistical analysis, only the data relating to male IDUs are presented in this article.

### Sociodemographic Characteristics

The median age of male IDUs was 32.0 and 74% were recruited from the drop-in center, with others recruited from the center's neighboring parks and streets. IDUs had diverse ethnicities composed of 60% Fars, 27% Azerbaijani, and 13% other ethnicities including Kurd, Lur, Arab, and Afghan. Whereas 14% had never attended school, 25% of IDUs had reached high school or college level. About 57% of male IDUs had ever been married, of which only 37% were living with their spouse. At the time of interview, 66% were jobless and one third had no place other than parks, streets, or abandoned buildings to live (Table 1). None of the

**TABLE 1.** Sociodemographic Characteristics of Male Injecting Drug Users Recruited From a Drop-in Center and its Neighboring Area in Tehran in 2004 (n = 207)

Characteristics	n (%)
Recruitment site	
Drop-in center	153 (73.9)
Park/street	54 (26.1)
Age at interview (years)	
<30	75 (36.2)
30-39	82 (39.6)
$\geq 40$	50 (24.2)
Ethnicity	
Fars	124 (59.9)
Azerbaijani	56 (27.1)
Others	27 (13.0)
Education	
Primary school or less	77 (37.2)
Junior high school	78 (37.7)
High school or more	52 (25.1)
Marital status	
Never married	90 (43.5)
Married (not living with spouse)	74 (35.7)
Married (living with spouse)	43 (20.8)
Place of residence	
Residential place	139 (67.5)
Park/street/abandoned building	67 (32.5)
Migrated to Tehran	
No (originally from Tehran)	135 (65.9)
Yes (<5 years ago)	21 (10.2)
Yes ( $\geq 5$ years ago)	49 (23.9)
Job situation	
Have a job	71 (34.3)
Jobless	136 (65.7)



**TABLE 2.** Risk Characteristics of Male Injecting Drug Users Recruited From a Drop-in Center and its Neighboring Area in Tehran in 2004, by HIV-1 Test Results (n = 207)

Characteristics	No.	HIV-1 positive n (%)	Crude OR (95% CI)	P*
Overall	207	48 (23.2)	—	—
Time from last drug injection (months)				
<6	186	45 (24.2)	1.0	—
≥6	21	3 (14.3)	0.5 (0.1–1.9)	0.418†
Length of continual injecting (years)				
<6	100	21 (21.0)	1.0	—
≥6	105	27 (25.7)	1.3 (0.7–2.5)	0.426
Frequency of daily injecting				
Once a day or less	58	14 (24.1)	1.0	—
Twice a day or more	144	33 (22.9)	0.9 (0.5–1.9)	0.853
No. of incarcerations				
0–1	49	5 (10.2)	1.0	—
2–5	112	28 (25.0)	2.9 (1.1–8.1)	0.038
>5	45	15 (33.3)	4.4 (1.4–13.4)	0.009
Total length of incarceration (years)				
No incarceration/<2	112	19 (17.0)	1.0	—
2–5	58	13 (22.4)	1.4 (0.6–3.1)	0.390
>5	35	16 (45.7)	4.1 (1.8–9.4)	0.001
Ever injected a drug inside prison				
No	152	30 (19.7)	1.0	—
Yes	55	18 (32.7)	2.0 (1.0–3.9)	0.050
Ever injected a drug using a shared utensil inside prison				
No	162	32 (19.8)	1.0	—
Yes	45	16 (35.6)	2.2 (1.1–4.6)	0.026
Ever tattooed				
No	71	12 (16.9)	1.0	—
Yes (never inside prison)	52	12 (23.1)	1.5 (0.6–3.6)	0.395
Yes (ever inside prison)	84	24 (28.6)	2.0 (0.9–4.3)	0.089
Ever had an IDU sex partner				
No/never had sex	177	40 (22.6)	1.0	—
Yes	23	6 (26.1)	1.2 (0.4–3.3)	0.708
Ever had sex with another man				
No/never had sex	191	45 (23.6)	1.0	—
Yes	16	3 (18.8)	0.7 (0.2–2.7)	1.000†

\*P values based on  $\chi^2$  test of proportions unless otherwise specified.

†Two-tailed Fisher exact test.

sociodemographic characteristics of IDUs was associated with HIV-1 infection.

### Drug Use Characteristics

The median age for commencing illicit drug use and drug injecting were 18.0 and 25.0 years old, respectively. Opium, hashish, or heroin was the first drug reported to be used by 42%, 37.5%, and 20.5% of the IDU participants, respectively. About 10% of IDUs started drug use via injecting.

Based on the reported age at interview and that of first drug injection, the median length of injecting drugs was estimated to be 6 years. About half of male IDUs reported having ever injected a drug using a shared needle or syringe (receptive sharing of needle or syringe), but this proportion was 11% for the last drug injected. In the month before the interview, 60% of IDUs reported they have been using drugs mainly in public places such as parks or streets. Up to 91% of IDUs reported using heroin in the past month. About 63%

reported having ever received sterile needle/syringe from the NGO needle and syringe program previously. None of these characteristics relating to drug use was significantly associated with higher prevalence of HIV-1 infection.

### History of Incarceration

As high as 94% of male IDUs had a history of incarceration in their lifetime, with most (81%) having experienced 2 or more prior incarcerations (multiple incarcerations). Of those who were ever incarcerated, the median number and length of lifetime incarcerations were 3 and 18 months, respectively. Among those with a history of incarceration, 28% (55 of 194) reported having ever injected a drug inside prison; of them, 82% (45 of 55) used shared injection device (needle, syringe, or handmade injection device) for drug injecting at some time during their incarceration. Up to 43% of ever-incarcerated IDUs reported being tattooed inside prison.



**TABLE 3.** Multivariable Analysis on the Association Between HIV-1 Infection and Risk Characteristics of Injecting Drug Users Recruited From a Drop-in Center and its Neighboring Area in Tehran in 2004

Characteristics	Adjusted OR	95% CI	P
Ever injected using a shared device in prison	2.45	1.01–5.97	0.049
History of multiple incarcerations ( $\geq 2$ times)	3.13	1.08–9.09	0.036
Ever had sex with another man	0.53	0.12–2.34	0.400
Ever tattooed inside prison	1.34	0.63–2.85	0.442

Variables shown in this table are controlled for age, levels of education, marital status, job situation, recruitment site, homelessness, and years of drug injection.

The prevalence of HIV-1 infection was associated with the number of lifetime incarcerations and with the total length of incarcerations in a dose-dependent manner (Table 2). Those who reported having injected a drug inside prison using a shared injection device (needle, syringe, or handmade device) had a significantly higher prevalence of HIV-1 compared with those who did not (36% vs. 20%,  $P < 0.05$ ). The prevalence of HIV-1 infection among those who reported a history of tattooing inside prison was marginally higher than those without a history of tattooing (29% vs. 17%,  $P = 0.089$ ).

### Sexual Behavior

Among 167 IDUs who reported ever being sexually active, 54% reported having had 2 or more sexual partners in their lifetime, and only 53% (88 of 167) had ever used a condom during sex. Of all IDUs, about 8% (16 of 207) reported ever having sex with another man in their lifetime and 11% reported having had an IDU sexual partner. Neither of these risk behaviors relating to sexual behavior of male IDUs were associated with HIV-1 infection.

### Multivariable Analysis

The variable related to the history of shared drug injection inside prison and that of multiple incarcerations ( $\geq 2$  times) were selected as the main incarceration-related exposures to be included in the multivariable model. In the multivariable analysis controlling for basic sociodemographic characteristics, it was shown that HIV-1 infection remained associated with a history of shared drug injection inside prison (adjusted OR, 2.45; 95% CI, 1.01–5.97) and of having had multiple incarcerations (adjusted OR, 3.13; 95% CI, 1.08–9.09) (Table 3). No interaction was found between the number of lifetime incarcerations and shared drug injecting inside prison in association with HIV infection.

## DISCUSSION

This study for the first time investigated the prevalence of HIV-1 infection and its correlates among community-based IDUs in Tehran. Our findings show that the HIV prevalence detected in Tehran was at a record high and that it was potentially correlated with a history of shared drug injection inside prison and that of multiple incarcerations.

The association between HIV-1 infection and a history of shared drug injection inside prison has been reported in

other countries<sup>12–14</sup> and was found in our earlier study among IDUs who visited treatment centers in Tehran.<sup>4</sup> This association is also supported by our qualitative data<sup>15</sup> that showed that although drugs are available in some prisons, they are much more expensive than those purchased outside of prison in Iran. Having obtained an expensive drug inside prison where drug use is apparently prohibited, the most cost-effective and concealing way for drug users to consume their drugs is by injecting. Meanwhile, an extreme shortage of needles and syringes inside prisons may lead incarcerated IDUs to share needle/syringe or handmade injection device with a large number of partners, which, as shown in this study, puts them at great risk of HIV infection.

In the multivariable analysis including variables related to a history of shared drug injecting and tattooing inside prison, a history of multiple incarcerations remained significantly associated with HIV infection. This finding could be due to underreporting of shared drug injection or same-gender sexual practices inside prison, or other confounding factors inside prison, such as violence, which have not been investigated in this study.

Although health authorities in the Iran Prisons Organization have been scaling up preventive interventions to control the transmission of HIV infection inside prisons,<sup>8</sup> our data, which have been mainly obtained from ex-prisoner IDUs in a community-based setting, highlight the necessity for comprehensive and integrated interventions for currently incarcerated IDUs and ex-prisoner drug users in the community to efficiently prevent HIV transmission among the IDU population.

The high level of HIV-1 among IDUs is also of great concern because of the possibility that the infection could be transmitted from those infected IDUs to their sexual partners.<sup>16–20</sup> This concern is deepened because many IDUs in our sample have had multiple sex partners in their lifetime and condom use has not been well adopted, as about half of sexually active male IDUs reported never having used a condom in their lifetime.

The present study provided first evidence of same-gender sexual practice among drug users in Iran, with 8% of IDUs having reported a history of having sex with another man in their lifetime. Although this practice did not show any additional risk for HIV infection in our small sample, evidence from other countries has shown that male IDUs who have sex with other men are at great risk of acquiring HIV and transmitting the virus sexually to broader populations.<sup>21–24</sup> Thereby, health authorities in Iran are encouraged that it is timely to address same-gender sexual practices of IDUs and to start identifying appropriate sexual risk reduction strategies, while avoiding further stigmatization due to their same-gender sexual activity.

Our study had several limitations. The design of our study was cross-sectional, which precludes us from determining the exact temporal relationship between risk behaviors and HIV infection. We also recruited drug users from one single drop-in center and through outreach activities in Tehran; therefore, our findings may not be representative of wider IDU communities. Many sociodemographic characteristics of the IDU participants in this study, such as age, gender composition, ethnicity, and employment rate were comparable with



those of IDUs who participated in our previous study in treatment settings in Tehran; however, the proportion of homeless IDUs was significantly higher among the IDUs in the present study (32.5%) compared with our previous study (2.4%). The high proportions of homeless IDUs in this study might be related to the recruitment neighborhood that is known to be a place for migrants from other provinces to gather.<sup>9</sup> We mainly relied on self-reported risk behaviors that could be biased as a result of recall ability or social desirability,<sup>25,26</sup> given the social context where many of the HIV risk behaviors are highly stigmatized.

In conclusion, our findings show that HIV prevalence has reached high proportions among community-based IDUs in Tehran, with incarceration-related exposures revealed to be the main correlates of infection. Urgent and comprehensive harm reduction programs for drug users in prison and those in the community are needed if the epidemic among IDUs in Tehran is to be controlled. At the same time, sexual risk reduction programs are crucial in preventing sexual transmission of HIV infection from sexually active IDUs to a broader population in Iran.

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#### REFERENCES

- Center for Disease Management, Ministry of Health and Medical Education. *AIDS/HIV Surveillance Report* (September 2005). Tehran, Iran; 2005.
- UNAIDS/UNICEF/WHO. *Epidemiological Fact Sheets on HIV/AIDS and Sexually Transmitted Infections-Islamic Republic of Iran* (2004 update). Geneva; 2004.
- MAP Network. *AIDS in Asia: Face the Facts—A Comprehensive Analysis of the AIDS Epidemic in Asia*. Washington, DC: Monitoring the AIDS Pandemic (MAP) Network; 2004.
- Zamani S, Kihara M, Gouya MM, et al. Prevalence of and factors associated with HIV-1 infection among drug users visiting treatment centers in Tehran, Iran. *AIDS*. 2005;19:709–716.
- Aceijas C, Stimson GV, Hickman M, et al. Global overview of injecting drug use and HIV infection among injecting drug users. *AIDS*. 2004;18:2295–2303.
- Vazirian M. Review of drug demand reduction programs in Iran: advice for development and strategic planning. *Social Welfare Quarterly*. 2003;9:145–201.
- Substance Abuse Prevention and Treatment Office. *A Report on the Performance of Substance Abuse Prevention and Treatment Office (SAPTO Report)*. Tehran: Ministry of Health and Medical Education; 2005.
- Afshar P, Kasraee F. HIV prevention experiences and programs in Iranian prisons [MoPC0057]. Presented at: the Seventh International Congress on AIDS in Asia and the Pacific; 2005; Kobe.
- Razzaghi EM, Rahimi Movaghgar A. *Rapid assessment and response: multi-center project on injection drug use*. Tehran: WHO; 2003.
- Vazirian M, Nassirimanesh B, Zamani S, et al. Needle and syringe sharing practices of injecting drug users participating in an outreach HIV prevention program in Tehran, Iran: a cross-sectional study. *Harm Reduct J [serial online]*. 2005, October 7;2(1):19.
- Gallo D, George JR, Fitchen JH, et al. Evaluation of a system using oral mucosal transudate for HIV-1 antibody screening and confirmatory testing. *JAMA*. 1997;277:254–258.
- Vanichseni S, Kitayaporn D, Mastro TD, et al. Continued high HIV-1 incidence in a vaccine trial preparatory cohort of injection drug users in Bangkok, Thailand. *AIDS*. 2001;15:397–405.
- Kang SY, Deren S, Andia J, et al. HIV transmission behaviors in jail/prison among Puerto Rican drug injectors in New York and Puerto Rico. *AIDS Behav*. 2005;9:377–386.
- Taylor A, Goldberg D, Emslie J, et al. Outbreak of HIV infection in a Scottish prison. *BMJ*. 1995;310:289–292.
- Zamani S, Kihara M, Ono-Kihara M, et al. A qualitative study on drug abusers' risk behaviors and attitudes toward HIV/AIDS in Iran [72]. Presented at: the 15th International Conference on the Reduction of Drug Related Harm; 2004; Melbourne.
- Panda S, Kumar MS, Lokabiraman S, et al. Risk factors for HIV infection in injection drug users and evidence for onward transmission of HIV to their sexual partners in Chennai, India. *J Acquir Immune Defic Syndr*. 2005;39:9–15.
- Gyarmathy VA, Neaigus A. Marginalized and socially integrated groups of IDUs in Hungary: potential bridges of HIV infection. *J Urban Health*. 2005;82(3 (suppl 4)):iv101–iv112.
- Pisani E, Sucahya PK, et al. Sexual behavior among injection drug users in 3 Indonesian cities carries a high potential for HIV spread to noninjectors. *J Acquir Immune Defic Syndr*. 2003;34:403–406.
- Perngmark P, Celentano DD, Kawichai S. Risk factors for HIV infection among drug injectors in southern Thailand. *Drug Alcohol Depend*. 2003;71:229–238.
- Strathdee SA. Sexual HIV transmission in the context of injection drug use: implications for interventions. *Int J Drug Policy*. 2003;14:79–81.
- Bluthenthal RN, Kral AH, Gee L, et al. Trends in HIV seroprevalence and risk among gay and bisexual men who inject drugs in San Francisco, 1988 to 2000. *J Acquir Immune Defic Syndr*. 2001;28:264–269.
- Bull SS, Piper P, Rietmeijer C. Men who have sex with men and also inject drugs—profiles of risk related to the synergy of sex and drug injection behaviors. *J Homosex*. 2002;42:31–51.
- Beyrer C, Sripaipan T, et al. High HIV, hepatitis C and sexual risks among drug-using men who have sex with men in northern Thailand. *AIDS*. 2005;19:1535–1540.
- O'Connell JM, Lampinen TM, Weber AE, et al. Sexual risk profile of young men in Vancouver, British Columbia, who have sex with men and inject drugs. *AIDS Behav*. 2004;8:17–23.
- Latkin CA, Vlahov D, Anthony JC. Socially desirable responding and self-reported HIV infection risk behaviors among intravenous drug users. *Addiction*. 1993;88:517–526.
- Latkin CA, Vlahov D. Socially desirable response tendency as a correlate of accuracy of self-reported HIV serostatus for HIV seropositive injection drug users. *Addiction*. 1998;93:1191–1197.

## The Intent and Practice of Condom Use Among HIV-Positive Men Who Have Sex with Men in Japan

YOJI INOUE, R.N., PH.N., Ph.D.,<sup>1</sup> YOSHIHIKO YAMAZAKI, Ph.D.,<sup>2</sup>  
MASAHIRO KIHARA, M.D., Ph.D.,<sup>3</sup> CHIHIRO WAKABAYASHI, M.H.E.,<sup>4</sup>  
YUKIKO SEKI, R.N., PH.N., Ph.D.,<sup>5</sup> and SEIICHI ICHIKAWA, Ph.D.<sup>6</sup>

### ABSTRACT

To evaluate the intent and practice of condom use among Japanese HIV-positive men who have sex with men (MSM), a survey using anonymous questionnaires was carried out and 117 respondents were investigated. For anal sex and oral sex, respectively, 58.1% and 15.2% intended to use condoms and 47.2% and 12.4% used condoms all of the time. The intent of condom use decisively affected the practice of condom use and was closely related to the perceived risk level of HIV/sexually transmitted (STI) transmission. In anal sex, willingness to protect sexual partners from HIV infection was strongly related not only to the intent but also to the practice. Enhancement of willingness to protect oneself from STI was suggested to enhance willingness to protect his/her sexual partners from HIV infection with secondary enhancement of the intent or the practice of condom use. Specific support of MSM with HIV for improving the intent and practice of condom use is urgently needed.

### INTRODUCTION

RECENTLY, as the availability of highly active antiretroviral therapy (HAART) has improved the health outlook for people with HIV (PWH), HIV infection has come to resemble a chronic disease and the continuation of sexual life has been suggested to be important for the enhancement of (QOL) of PWH.<sup>1</sup> While the necessity for attention to the sexual life of PWH has been gradually recognized, several studies have revealed that certain percentages of PWH engage in unprotected intercourse.<sup>2-4</sup> This sit-

uation demands study of the sexual life of PWH not only to improve their QOL but also to prevent HIV from spreading. Because there have been reports that multidrug resistant HIV is gradually spreading,<sup>5,6</sup> the need for evaluation of preventive behavior is increasing. Moreover, safer sex among PWH is important for the management of their own health because multiple infections with different types of HIV may accelerate the progression of the disease.<sup>7</sup> Contracting other sexually transmitted infections (STI) while living with a compromised immune system may delay the cure.<sup>8</sup> Therefore, clarifi-

<sup>1</sup>School of Nursing, Mie Prefectural College of Nursing, Mie, Japan.

<sup>2</sup>Department of Health Sociology, School of Health Sciences and Nursing, University of Tokyo, Tokyo, Japan.

<sup>3</sup>Department of Global Health and Socio-epidemiology, School of Public Health, University of Kyoto, Kyoto, Japan.

<sup>4</sup>Department of Social Work, School of Health and Social Services, Saitama Prefectural University, Saitama, Japan.

<sup>5</sup>Department of Nursing Administration, School of Health Sciences, Gunma University of Prefecture, Gunma, <sup>6</sup>Department of Infection Control and Prevention Nursing, School of Nursing, Nagoya City University, Aichi, Japan.



cation of the state of practice of safer sex by PWH and factors that affect it should have implications as to how PWH should be supported and what type of support programs should be developed. However, as far as we know, there have been few detailed investigations of these issues in Japan. Also, according to the HIV/AIDS Surveillance Committee, 70.6% of HIV-positive Japanese men newly reported in 2004 were those who have sex with men (MSM),<sup>9</sup> which shows high vulnerability of MSM to HIV infection in Japan.

Thus, this study sought to evaluate the intent and practice of condom use, which is considered to be extremely effective for the prevention of HIV infection,<sup>10</sup> among Japanese HIV-positive MSM, to analyze the complex factors, and to develop methods of support and intervention.

## MATERIALS AND METHODS

### *Participants and procedures*

Prior to the survey, a research group named the STI and HIV Survey Group consisting of medical staff from HIV care units, researchers, and PWH was established in July 1999 in Tokyo. A questionnaire for the preliminary survey was prepared in collaboration, following the style of participatory research.<sup>11</sup> The preliminary survey was carried out in September to November 2000, and the questionnaire used in this study was prepared on the basis of the results.<sup>12</sup>

Participants in the study were recruited from November 2002 to April 2003 at four major hospitals in Japan (two in Tokyo, one in Osaka, and one in a northern area of Japan), relatively experienced in HIV treatment. Criteria for the participants were as follows: (1) Japanese, with sexually transmitted HIV and (2) those who visited the hospitals regularly. Patients who received notification of HIV infection within 1 month were excluded for ethical reasons.

A total of 299 patients were recruited and approached by physicians or nurses directly involved in their medical care. Anonymous self-completion questionnaire was handed out to each patient and collected by mail in a sealed

envelope, addressed directly to the authors, who were not involved in their direct medical care. Valid replies came from 170 and the effective response rate was 56.9%.

Of the 170 respondents, 161 were male (including 134 MSM), 7 were female, and 2 did not specify their gender. Since the intent and practice of condom use were expected to differ markedly by gender and sexuality, the respondents analyzed in this study were limited to 117 MSM who had sexual contact at least once during the past 1 year.

Although little information was available for those who failed to reply the survey, it is possible to speculate that those who had negative attitude toward their sexuality or keeping up with their sexual activity, those who lost interest in sexual activities because of their age, psychological issues such as depression or anxiety, or medical treatments, and those who hesitate to share their sexual issues with their medical staff, were included in nonrespondents.

### *Variables and scales*

When explaining condom use practice for the prevention of HIV infection, the health belief model,<sup>13</sup> the theory of reasoned action,<sup>14</sup> and the social cognitive theory<sup>15</sup> are frequently used. Wulfert and Wan<sup>16</sup> and Wulfert et al.<sup>17</sup> carried out studies using structural equation modeling to examine which of these three models was the most appropriate for studying condom use as a preventive action against HIV infection. They showed that all three models were statistically fit but that some of the paths were not as significant as the models suggested. They concluded that all three models were useful to an extent but that they should be modified and developed further. A small number of new models, including the information-motivation-behavioral skills model<sup>18</sup> and the AIDS risk reduction model,<sup>19</sup> have been developed for the specific objective of understanding preventive behavior against HIV infection, but these are also considered to require further evaluation. Thus, the behavioral theory models that is best for understanding the behavior of the general population remains controversial.<sup>3,20</sup>

Moreover, since there seem to be large differences with regards to the motivation of con-



dom use between PWH and people unaffected by HIV, new variables and scales should be developed on the basis of the existing behavioral theory models to better understand the behavior. For example, the absence of "protecting oneself from HIV infection," which is considered to be an intrinsic motivation, and the voluntary initiative to protect sexual partners from HIV infection with the practice of safer sex have been suggested as characteristics of the motivation for condom use by PWH.<sup>21</sup> Such initiatives may originate from the atmosphere and pressure of people around PWH, demanding that they must not transmit HIV to their partners.<sup>22</sup>

In consideration of the above, we prepared variables and scales to be used for the analysis, taking the following into account: that a gap is considered to exist between the intent and practice, that this gap may be caused by factors in the social environment as well as individual factors, which in turn affects the processes of actually practicing or maintaining particular behavior, that various complex factors are involved in the motivations that lead to the intent.

## MEASURES

### *Characteristics of the respondents*

The variables measured included age, educational background, self-rated health (single item with a 5-point scale, scored 1-5), Hospital Anxiety and Depression Scale (HADS, 14 items, each of which was scored 0-3),<sup>23,24</sup> casualness of sexual partners (0 = having sex only with "steady partners" in the past year, 1 = having sex with both "steady partners" and "casual partners," 2 = having sex only with "casual partners"), and frequency of alcohol or drug use during sex (summing up two 4-point scales, 0 = never to 3 = always).

### *Intent and practice of condom use*

Various instruments have been used in the literature to determine the frequency of condom use but three methods have been typically used: frequency counts, Likert-type scales, and proportional indicators.<sup>25</sup> The reliability and

validity of these methods have also been evaluated.<sup>26</sup> In this study, the frequency of intended condom use before the actual acts of sex during the past year for anal sex, i.e., intent (anal), and for oral sex, i.e. intent (oral), was evaluated using a 5-point Likert-scale from 0 = never to 4 = all of the time, without specification of sexual partner type. To assess practice of condom use, the frequency during the past year respondents actually used condoms for anal sex, i.e., practice (anal), and for oral sex, i.e., practice (oral), was evaluated using a 5-point scale from 0 = never to 4 = all of the time, without specification of sexual partner type. To obtain results as accurately as possible, we included the following statement, "You may find some questions very embarrassing to answer, but we do appreciate your frankness in answering," since it has been suggested that respondents tend to answer in consideration of social preferences in self-reports of condom use frequency.<sup>27</sup>

### *Perception of HIV/STI/use of condoms*

Because we expected that the perception of various aspects concerning HIV/STI and condom use would be either directly or indirectly related to the intent and practice of condom use, 20 items shown in Table 1 were prepared regarding states during the past year using a 4-point scale from "false" to "true." The percentages shown in Table 1 are those of the respondents who answered "true" or "relatively true" among all respondents. Responses to each item were scored from 0 to 3, except for the risk items (anal and oral) which were reversed. Based on the results of exploratory factor analysis (principal factor method, promax rotation), these items were categorized into eight groups: protecting oneself as willingness to protect oneself from STI (1 item), protecting partners as willingness to protect sexual partners from HIV (1 item), subjective norm as social pressure requiring prevention of transmission of HIV to sexual partners (1 item), risk (anal) as perceived risk level of HIV/STI transmission by anal sex without using condoms (2 items), risk (oral) as perceived risk level of HIV/STI transmission by oral sex without using condoms (2 items), severity as perceived



TABLE 1. PERCEPTION OF HIV/STI/USE OF CONDOMS (n = 117)

Items	% <sup>a</sup>
Protecting oneself	
I don't want to contract STI other than HIV.	96.6
Protecting partners	
I want to protect my sexual partners from HIV infection.	96.6
Subjective norm	
I feel the atmosphere of people around me and society pressuring me not to transmit HIV to my sexual partners.	77.8
Risk (anal)	
The possibility of contracting HIV in anal sex is extremely small.	3.4
The possibility of contracting STI other than HIV in anal sex is extremely small.	1.7
Risk (oral)	
The possibility of contracting HIV in oral sex is extremely small.	37.6
The possibility of contracting STI other than HIV in oral sex is extremely small.	16.2
Severity	
HIV infection forces you to fight diseases over a long period of time.	94.0
HIV infection may result in death.	77.8
HIV infection makes daily life difficult.	73.5
HIV infection makes it difficult to stay healthy.	77.8
HIV infection troubles you by causing changes in your appearance due to treatments.	47.0
Barriers	
I don't want the trouble of obtaining condoms.	29.1
I don't want the trouble of using condoms.	32.5
Using condoms ruins the mood of sex.	34.2
I don't feel good when I use condoms.	56.4
It is difficult to propose the use of condoms to my sexual partners.	29.1
It is difficult to talk about the use of condoms with my sexual partners.	28.2
Condom efficacy	
Condoms are effective for the prevention of transmission of HIV or STI.	87.2
There is no means for the prevention of HIV infection other than condoms.	62.4

<sup>a</sup>The percentages shown are those of the respondents who answered "true" or "relatively true." STI, sexually transmitted infection.

severity of HIV infection (5 items), barriers as perceived barriers against condom use (6 items) and condom efficacy as perceived effectiveness of condoms for HIV/STI prevention (2 items).

As for the severity, HIV optimism regarding the impact of HAART on survival and degree of infectivity have been reported to be an important issue in terms of its influence on intent to use condoms since the late 1990s, and significant relationships between optimistic views of HIV infection and the practice of unprotected sex were shown in some studies.<sup>28-31</sup> We, therefore, decided to include severity defined as perceived difficulties that people may experience after contracting HIV. Five items shown in Table 1 including, "HIV infection forces you to fight diseases over a long period of time," "HIV infection may result in death," "HIV infection makes daily life difficult" were included in the severity scale.

For each scale, standard scoring procedures were used in which item responses were summed. As shown in Table 2, Cronbach  $\alpha$  ranged from 0.65 to 0.86.

## STATISTIC ANALYSIS

Partial correlation analysis and hierarchical multiple regression analysis using the intent and the practice of condom use in anal sex and oral sex as dependent variables. Based on the literature,<sup>3,32-34</sup> control variables were selected as follows: age, educational background, self-rated health, HADS, and the frequency of alcohol or drug use during sex (and the intent of condom use when the practice of condom use was used as a dependent variable). SPSS 12.0J software (SPSS, Chicago, IL) was used for the analysis.

TABLE 2. VARIABLES AND SCALES

Variables and scales	Items	$\alpha$	Range	Average
Protecting oneself	1	—	0-3	2.83 $\pm$ 0.53
Protecting partners	1	—	0-3	2.76 $\pm$ 0.49
Subjective norm	1	—	0-3	2.28 $\pm$ 0.92
Risk (anal)	2	0.92	0-6	5.67 $\pm$ 0.98
Risk (oral)	2	0.84	0-6	4.21 $\pm$ 1.65
Severity	5	0.78	0-15	10.68 $\pm$ 2.97
Barriers	6	0.88	0-18	6.71 $\pm$ 4.62
Condom efficacy	2	0.65	0-6	4.44 $\pm$ 1.59
Casualness of sexual partners	1	—	0-2	1.34 $\pm$ 0.71
Frequency of alcohol/drug use during sex	2	—	0-6	1.58 $\pm$ 1.20

## RESULTS

### Characteristics of the respondents

Age ranged from 22 to 61, with a mean of  $35.1 \pm 7.5$ . Self-rated health was either "very bad" or "bad" in 19.7%. The mean HADS score was  $12.4 \pm 8.3$ . As for casualness of sexual partners in the past year, 13.7% had sex only with "steady partners," 47.9% had sex only with "casual partners," and 37.6% had sex with both "steady partners" and "casual partners." In the past year, 47.9% had experiences of drinking alcohol during sex, and 62.4% had experiences of using drugs including legal drugs during sex.

### Intent and practice of condom use

Concerning the intent of condom use (Table 3), 58.1% and 15.2% intended to use condoms all of the time for anal sex and oral sex, respectively. The correlations between the intent (anal) and the intent (oral) were significant, with  $r = 0.46$  ( $p < 0.001$ ). Concerning the practice of condom use, 47.2% and 12.4% used condoms all of the time for anal sex and oral sex, respectively. The correlations between the practice (anal) and the practice (oral) were significant, with  $r = 0.51$  ( $p < 0.001$ ).

### Partial correlation analysis and multiple regression analysis using the intent (anal) as the dependent variable

On partial correlation analysis, the variables that showed significant partial correlations were protecting oneself, protecting partners, risk (anal), and barriers. As a result of hierar-

chical multiple regression analysis, risk (anal) consistently showed a strong positive association with the intent (anal). The positive trends between protecting oneself and the intent (anal) ( $p < 0.1$ ) disappeared with the advance from model 2 to model 3. When additional variables were applied to model 4, it was found that barriers had significant negative relationship with the intent (anal) ( $p < 0.001$ ) (Table 4).

### Partial correlation analysis and multiple regression analysis using the practice (anal) as the dependent variable

On partial correlation analysis, the variables that showed significant partial correlations

TABLE 3. INTENT AND PRACTICE OF CONDOM USE ( $n = 117$ )

	Anal		Oral	
	n	% <sup>a</sup>	n	% <sup>a</sup>
Intent				
All of the time	61	58.1	17	15.2
More than half of the time	21	20.0	24	21.4
Almost half of the time	11	10.5	19	17.0
Less than half of the time	6	5.7	32	28.6
Never	6	5.7	20	17.9
Never had this type of sex	10	—	3	—
NA	2	—	2	—
Practice				
All of the time	50	47.2	14	12.4
More than half of the time	23	21.7	9	8.0
Almost half of the time	14	13.2	18	15.9
Less than half of the time	13	12.3	31	27.4
Never	6	5.7	41	36.3
Never had this type of sex	10	—	3	—
NA	1	—	1	—

<sup>a</sup>Percentages were calculated after excluding NA and "Never had this type of sex."  
NA, not available.



TABLE 4. PARTIAL CORRELATION ANALYSIS AND MULTIPLE REGRESSION ANALYSIS USING INTENT (ANAL) AS THE DEPENDENT VARIABLE

Independent variable	Partial correlation <sup>a</sup> <i>r</i>	Multiple regression <sup>a</sup>			
		Model 1 <i>b</i>	Model 2 <i>b</i>	Model 3 <i>b</i>	Model 4 <i>b</i>
Protecting oneself	0.240*		0.174 <sup>+</sup>	0.073	0.000
Protecting partners	0.350***			0.234*	0.192 <sup>+</sup>
Subjective norm	0.077				
Risk (anal)	0.399***	0.406***	0.375***	0.320**	0.328**
Severity	-0.062				
Barriers	-0.410***				-0.379***
Condom efficacy	0.060				
Casualness of sexual partners	-0.057				
R <sup>2</sup>		0.191**	0.220**	0.249**	0.379***

<sup>a</sup>Control variables: age, educational background, self-rated health, HADS, and frequency of alcohol/drug use during sex.

<sup>b</sup>+:  $p < 0.1$ ; \*:  $p < 0.05$ ; \*\*:  $p < 0.01$ ; \*\*\*:  $p < 0.001$ .

HADS, Hospital Depression and Anxiety Scale.

were protecting partners, barriers. Casualness of sexual partners also showed correlating trends ( $p < 0.1$ ). On multiple regression analysis, a very strong positive association was observed between the practice (anal) and the intent (anal). When protecting partners, barriers and casualness of sexual partners were applied to the multiple regression equation, the practice (anal) was significantly associated with the first two variables and was also associated at  $p < 0.1$  level with casualness of sexual partners (Table 5).

*Partial correlation analysis and multiple regression analysis using the intent (oral) as the dependent variable*

On partial correlation analysis, the intent (oral) was significantly correlated positively with risk (oral), and was also correlated ( $p < 0.1$  level) negatively with casualness of sexual partners. Similar associations were observed among these variables also on multiple regression analysis (Table 6).

*Partial correlation analysis and multiple regression analysis using the practice (oral) as the dependent variable*

On partial correlation analysis, the practice (oral) was significantly correlated with casualness of sexual partners, and was also correlated with risk (oral) and barriers at  $p < 0.1$  level. Hi-

erarchical multiple regression analysis showed a very strong positive association between the practice (oral) and the intent (oral). Also, as shown in model 2, an increase in the casualness of sexual partners was significantly associated with deterioration of the practice (oral). When additional variables were applied to model 3, the trends of negative association between barriers and the practice (oral) were found ( $p < 0.1$ ) (Table 7).

TABLE 5. PARTIAL CORRELATION ANALYSIS AND MULTIPLE REGRESSION ANALYSIS USING PRACTICE (ANAL) AS THE DEPENDENT VARIABLE

Independent variable	Partial correlation <sup>a</sup> <i>r</i>	Multiple regression <sup>a</sup>	
		Model 1 <i>b</i>	Model 2 <i>b</i>
Intent (anal)		0.730***	0.587***
Protecting oneself	0.060		
Protecting partners	0.286**		0.197**
Subjective norm	-0.019		
Risk (anal)	0.108		
Severity	-0.098		
Barriers	-0.257*		-0.187*
Condom efficacy	0.003		
Casualness of sexual partners	-0.188 <sup>+</sup>		-0.114 <sup>+</sup>
R <sup>2</sup>		0.567***	0.638***

<sup>a</sup>Control variables: age, educational background, self-rated health, HADS, and frequency of alcohol/drug use during sex. Intent (vaginal/anal) was added in partial correlation analysis.

<sup>b</sup>+:  $p < 0.1$ ; \*:  $p < 0.05$ ; \*\*:  $p < 0.01$ ; \*\*\*:  $p < 0.001$ .

HADS, Hospital Anxiety and Depression Scale.

TABLE 6. PARTIAL CORRELATION ANALYSIS AND MULTIPLE REGRESSION ANALYSIS USING INTENT (ORAL) AS THE DEPENDENT VARIABLE

Independent variable	Partial correlation <sup>a</sup>	Multiple regression <sup>a</sup>
	r	b
Protecting oneself	0.019	
Protecting partners	0.098	
Subjective norm	-0.174 <sup>+</sup>	-0.165 <sup>+</sup>
Risk (oral)	0.295**	0.294**
Severity	0.078	
Barriers	-0.113	
Condom efficacy	-0.012	
Casualness of sexual partners	-0.148	
R <sup>2</sup>		0.142*

<sup>a</sup>Control variables: age, educational background, self-rated health, HADS, and frequency of alcohol/drug use during sex.

<sup>b</sup>+:  $p < 0.1$ ; \*:  $p < 0.05$ ; \*\*:  $p < 0.01$ .

HADS, Hospital Anxiety and Depression Scale.

## DISCUSSION

### Condom use practice by HIV-positive MSM in Japan

Results revealed that for anal sex, 58.1% of the respondents intended to use condoms all of the time and 47.2% actually used condoms all of the time. Also, for oral sex, 15.2% intended to use condoms all of the time and 12.4% actually used condoms all of the time. These results

suggest that there is generally a possibility of HIV infection from HIV-positive MSM to their sexual partners and that many HIV-positive MSM are exposed to the risks of STI or repeated HIV infection, similar to the results of previous research. Concrete measures needed to support for improving practice of condom use from the viewpoint of prevention of damage to the health of HIV positive MSM due to STI or HIV as well as public spread of HIV infection.

### Factors related to the intent of condom use

The results revealed that the intent of condom use decisively affected the practice of condom use for both anal and oral sex. It is therefore considered to be more effective to first provide support for developing the intent for condom use.

The level of perceived risk of HIV/STI transmission was shown to be an important variable in determining the intent of condom use. Public dissemination of information, including HIV/STI infectivity, has been taken as an HIV prevention strategy,<sup>35,36</sup> and is also used in the guidelines of PWH intervention.<sup>37</sup> However, the results of our study suggest that if information is provided that a particular risk behavior is associated with a relatively low rate of HIV/STI infectivity, the "low infectivity rate" may make a strong impression on the informed, leading them to continue such risky

TABLE 7. PARTIAL CORRELATION ANALYSIS AND MULTIPLE REGRESSION ANALYSIS USING PRACTICE (ORAL) AS THE DEPENDENT VARIABLE

Independent variable	Partial correlation <sup>a</sup>	Multiple regression <sup>a</sup>		
	r	Model 1 b	Model 2 b	Model 3 b
Intent (oral)		0.679***	0.645***	0.606***
Protecting oneself	0.097			
Protecting partners	0.113			
Subjective norm	0.086			
Risk (oral)	0.163 <sup>+</sup>			0.110
Severity	-0.108			
Barriers	-0.191 <sup>+</sup>			-0.132 <sup>+</sup>
Condom efficacy	-0.044			
Casualness of sexual partners	-0.330**		-0.233**	-0.227**
R <sup>2</sup>		0.532***	0.583***	0.599***

<sup>a</sup>Control variables: age, educational background, self-rated health, HADS, and frequency of alcohol/drug use during sex. Intent (oral) was added in partial correlation analysis.

<sup>b</sup>+:  $p < 0.1$ ; \*\*:  $p < 0.01$ ; \*\*\*:  $p < 0.001$ .

HADS, Hospital Anxiety and Depression Scale.



behavior. It is therefore considered to be effective to first clearly state which behavior is risky before mentioning infectivity when disseminating information to the public.

Concerning anal sex, willingness to protect sexual partners from HIV infection was shown to be a very important factor. It was closely related to the intent as well as the practice of condom use, and was found to constitute the core of the motivation, supporting the results of previous studies.<sup>21</sup>

We assumed that willingness to protect oneself from STI and willingness to protect sexual partners from HIV are both directly related to the intent of condom use. However, since the  $p < 0.1$  level association of the variable of protecting oneself disappeared when the variable of protecting sexual partners was added to the results of hierarchical multiple regression analysis, it is suggested that enhancement of willingness to protect oneself from STI enhances willingness to protect sexual partners from HIV infection with secondary enhancement of the intent or the practice of condom use for anal sex. The need to mention clearly in messages to PWH has been recommended that safer sex is important not only for protecting their sexual partners but also for protecting their own health.<sup>38</sup> The results of this study support the measure in terms of enhancing the intent of condom use among HIV-positive MSM.

In contrast, for oral sex, the intent of condom use showed no association with willingness to protect oneself from STI or willingness to protect sexual partners from HIV. One possible explanation is that since the respondents perceived infectivity of HIV/STI by oral sex to be much lower than by anal sex (see Table 1), they did not closely associate protection of sexual partners from HIV/STI with condom use in oral sex, which in turn did not lead to an enhancement of the intent of condom use for oral sex.

#### *Factors related to the practice of condom use*

"Perceived barriers against condom use" was found to be a factor related to the practice of condom use both for anal sex and oral sex. It was also closely related to the intent of condom use in anal sex. Kelly<sup>39</sup> reported that when there are barriers against condom use, such as

negotiation difficulties with sexual partners regarding condom use, the barriers can be reduced by skill-improving interventions not only in PWH but also in the general population. The report also suggested that environmental improvements such as increasing accessibility to condoms may be effective in reducing these barriers. The results of this study suggest that intervention and education for reducing the barriers may be effective in HIV-positive MSM for improving the practice of condom use.

A high level of casualness of sexual partners was suggested to be directly related to the practice of condom use, rather than indirectly as initially expected. The results demonstrated the necessity for taking such situations into consideration when developing support programs to promote condom use in PWH, which were similar to those of previous studies in HIV-positive MSM.<sup>40</sup> As for causes of the relationship, the following three background factors were suggested to exist. First, if the respondents have steady partners, they may have become more aware of the possibility of transmitting HIV or STI to their sexual partners and their responsibility for the prevention of infection, resulting in better condom use practice. Second, the issue of disclosure to sexual partners may exist: if sexual partners are casual, HIV-positive MSM may feel it difficult to disclose that they are HIV positive or to talk about condom use, and they may consequently fail to use condoms. In fact, Marks et al.<sup>41</sup> and Perry et al.<sup>42</sup> reported that PWH tend not to disclose their serostatus to highly casual partners. On the other hand, there have been reports stating that disclosure of HIV status to sexual partners was not related to the state of safer sex practice,<sup>43</sup> and that the frequency of condom use was even lower when PWH disclosed their status to their casual sexual partners.<sup>44</sup> Some researchers have mentioned that prevention interventions designed to encourage people to disclose their serostatus have been misguided.<sup>45</sup> Finally, condom use for oral sex with casual partners is not suggested to become common practice among MSM not only in Japan but also in other countries. If people in general consider condom use in sex with casual sexual partners unnecessary, if condoms are



not actually used, or if condoms are not readily available, PWH may begin to think that "the sexual partners are also responsible for HIV infection."<sup>46</sup> Interpretations of the results obtained in this study need further discussion.

*Social environment affecting the intent and practice of condom use*

In this study, factors such as "perceived risk level of HIV/STI transmission" and "perceived barriers against the condom use" were shown to be directly or indirectly related to the intent or the practice of condom use by PWH even after controlled by HADS, use of alcohol/drugs during sex, age, educational background, and self-rated health status. These are not perceptions that individuals begin to have only after they have been diagnosed as HIV positive, but may have been formed under the effects of information, education, press reports concerning HIV/STI and sexual health,<sup>47,48</sup> and the trends of the society and community, that they were exposed to before they were diagnosed as HIV positive. Kihara et al.<sup>49</sup> reported that no regular behavior surveillance or national survey programs had yet been introduced in Japan, which can be pointed out as a serious situation compared to other developed countries. The study also strongly suggests that well-targeted and effective prevention programs should be established, because the vulnerability to HIV and STI in Japan is predicted to be greatly enhanced not only among MSM but also among heterosexual youth. In the view of this as well as the finding of this study, intervention and education at the individual level alone is not sufficient in the long term, and society-based measures are also necessary including: (1) more information dissemination regarding sexual health in school education, community education, and administrative publications, (2) to let it be widely known that the use of condoms is invaluable for the prevention of HIV/STI, and to create an environment in which condoms are used generally in sex by increasing the accessibility to condoms, (3) to increase sections that provide consultations for sexual health problems or condom use in administrative offices, nongovernmental organizations (NGOs), and medical institutes. It is strongly suggested that

measures to improve the social environment of HIV-positive MSM in Japan will eventually lead to improvement in their condom use practice.

*Limitation and future issues*

This study is subject to several limitations. First, because the participants were recruited from only four hospitals relatively experienced in HIV treatment, problems unique to these hospitals may be reflected in the results. It is important to conduct a survey including those in other areas or visiting other hospitals. Second, because this study was cross-sectional, judgment concerning the cause-effect relationship was limited. Surveys including longitudinal programs and qualitative evaluations by methods such as interviews should be carried out to confirm the results of this study. Third, in a study of screening for potentially transmitting sexual risk behavior, urethral sexually transmitted infection and sildenafil use among males, Cachay et al.<sup>50</sup> found that the use of medications for erectile dysfunction was an independent risk factor for failure to use condoms among MSM. In future research it would be advisable to include sildenafil use as a predictor of the intent and practice of condom use. Fourth, questions as to the other potential predictors, such as HAART use, perceived efficacy of HAART, HIV status of the partners, or knowledge of their partners' serostatus, remain open to research. To enhance understanding of the social determinants of condom use behavior, there is an urgent need to conduct studies that examine these psychosocial and interpersonal variables. Finally, development of support programs on the individual and societal levels based on the results of this study is needed. In addition, following several examples,<sup>51-54</sup> executing tentative interventions using developed support programs and evaluating their effects for scientific assessment is indispensable.

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