populations living with HIV and AIDS. AIDS Behav doi:10.1007/s10461-013-0547-4.
34. Godin G, Gagne C, Naccache H (2003) Validation of a self-reported questionnaire assessing adherence to antiretroviral medication. AIDS Patient Care STDS 17: 325–332.
35. Coates J, Swindale A, Bilinsky P (2007) Household Food Insecurity Access scale (HFIAS) for Measurement of Food Access: Indicator guide. Washington, DC: Food and Nutrition Technical Assistance Project, Academy for Educational Development.
36. Kalichman SC, Simbayi LC, Cloete A, Mthembu PP, Mkhonta RN, et al. (2009) Measuring AIDS stigmas in people living with HIV/AIDS: the internalized AIDS-related stigma scale. AIDS Care 21: 87–93.
37. Kessler RC, Green JG, Gruber MJ, Sampson NA, Bromet E, et al. (2010) Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. Int J Methods Psychiatr Res (Suppl 19): 4–22.
38. Wouters E, Heunis C, van Rensburg D, Meulemans H (2008) Patient satisfaction with antiretroviral services at primary health-care facilities in the Free State, South Africa - a two-year study using four waves of cross-sectional data. BMC Health Serv Res 8: 210.
39. McMahon JH, Jordan MR, Kelley K, Bertagnolio S, Hong SY, et al. (2011) Pharmacy adherence measures to assess adherence to antiretroviral therapy: review of the literature and implications for treatment monitoring. Clin Infect Dis 52: 493–506.
40. Chi BH, Cantrell RA, Zulu I, Mulenga LB, Levy JW, et al. (2009) Adherence to first-line antiretroviral therapy affects non-virologic outcomes among patients on treatment for more than 12 months in Lusaka, Zambia. Int J Epidemiology 38: 746–756.
41. Bisson GP, Gross R, Bellamy S, Chittams J, Hislop M, et al. (2008) Pharmacy refill adherence compared with CD4 count changes for monitoring HIV-infected adults on antiretroviral therapy. PLoS Med 5(5): e109. doi:10.1371/journal.pmed.0050109.
42. Weidle PJ, Wamai N, Solberg P, Liechty C, Sendagala S, et al. (2006) Adherence to antiretroviral therapy in a home-based AIDS care programme in rural Uganda. Lancet 368: 1587–1594.
43. Nguyen H, Zyl GV, Geboers D, Gross R, Mills EJ, et al. (2011) Pharmacy refill data combined with self-report adherence questions improves prediction of boosted protease inhibitor regimen failure. Presented at: 6th International Conference on HIV Treatment and Prevention Adherence. Miami, USA.
44. Goldman JD, Cantrell RA, Mulenga LB, Tambatamba BC, Reid SE, et al. (2008) Simple adherence assessments to predict virologic failure among HIV-infected adults with discordant immunologic and clinical responses to antiretroviral therapy. AIDS Res Hum Retroviruses 24: 1031–1035.
45. Peltzer K, Ramlagan S (2011) Perceived stigma among patients receiving antiretroviral therapy: a prospective study in KwaZulu-Natal, South Africa. AIDS Care 23: 60–68.
46. Filmer D, Pritchett LH (2001) Estimating wealth effects without expenditure data–or tears: an application to educational enrollments in states of India. Demography 38(1): 115–132.
47. Heaney CA, Israel BA (2008) Social networks and social support. In: Glanz K, Rimer BK, Viswanath K. Health Behavior and Health Education. San Francisco, CA: John Wiley & Sons. 189–210.
48. Weiser SD, Tsai AC, Gupta R, Frongillo EA, Kawuma A, et al. (2012) Food insecurity is associated with morbidity and patterns of healthcare utilization among HIV-infected individuals in a resource-poor setting. AIDS 26: 67–75.
49. Cantrell RA, Sinkala M, Megazinni K, Lawson-Marriott S, Washington S, et al. (2008) A pilot study of food supplementation to improve adherence to antiretroviral therapy among food-insecure adults in Lusaka, Zambia. J Acquir immune Defic Syndr 49: 190–195.
50. Tirivayi N, Koethe JR, Groot W (2012) Clinic-based food assistance is associated with increased medication adherence among HIV-infected adults on long-term antiretroviral in Zambia. J AIDS Clin Res 3(7): 171.
51. Tsai AC, Bangsberg DR, Emenyonu N, Senkungu JK, Martin JN, et al. (2011) The social context of food insecurity among persons living with HIV/AIDS in rural Uganda. Soc Sci Med 73: 1717–1724.
52. Tiyou A, Belachew T, Alemseged F, Biadgilign S (2012) Food insecurity and associated factors among HIV-infected individuals receiving highly active antiretroviral therapy in Jimma zone Southwest Ethiopia. Nutrition Journal 11: 51.
53. Weiser SD, Hatcher A, Frongillo EA, Guzman D, Riley ED, et al. (2013) Food Insecurity Is Associated with Greater Acute Care Utilization among HIV-Infected Homeless and Marginally Housed Individuals in San Francisco. J Gen Intern Med 28: 91–98.
54. Anema A, Weiser SD, Fernandes KA, Ding E, Brandson EK, et al. (2011) High prevalence of food insecurity among HIV-infected individuals receiving HAART in a resource-rich setting. AIDS Care 23: 221–230.
55. World Food Programme (2003) Programming in the Era of AIDS: WFP's Response to HIV/AIDS. Available: http://www.wfp.org/sites/default/files/Programming%20in%20the%20Era%20of%20AIDS%20WFP's%20Response%20to%20HIV:AIDS.pdf. Accessed 2012 Nov 11.
56. United Nations. Nutrition and HIV/AIDS. Statement by the Administrative Committee on Coordination, Sub-Committee on Nutrition as its 28th Session. Nairobi, Kenya: United Nations Administrative Committee on Coordination, Sub-Committee on Nutrition; 2001. Available: http://www.unscn.org/files/Annual_Sessions/28th_SCN_Session/28th_session_REPORT.pdf. Accessed 2012 Dec 3.
57. Johnston BE, Ahmad K, Smith C, Rose DN (1998) Adherence to highly active antiretroviral therapy among-HIV-infected patients of the inner city. Presented at: 12th World AIDS Conference. Geneva, Switzerland.
58. Horne R, Weinman J (1999) Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. Journal of Psychosom Res 47(6): 555–567.
59. Wasti SP, Simkhada P, Randall J, Freeman JV, van Teijlingen E (2012) Factors Influencing Adherence to Antiretroviral Treatment in Nepal: A Mixed-Methods Study. PLoS One 7: e35547.
60. Jacquet A, Ekouevi DK, Bashi J, Aboubakrine M, Messou E, et al. (2009) Alcohol use and adherence to antiretroviral therapy in HIV-infected patients in West Africa. Presented at: 5th International AIDS Society (IAS) conference on HIV pathogenesis, treatment and prevention. Cape Town, South Africa. Available: http://www.iasociety.org/Default.aspx?pageId=11&abstractId=200721856. Accessed 2012 Jan 12.
61. Nemes MI, Carvalho HeB, Souza MF (2004) Antiretroviral therapy adherence in Brazil. AIDS 18: S15–S20.
62. Godin G, Cote J, Naccache H, Lambert LD, Trottier S (2005) Prediction of adherence to antiretroviral therapy: a one year longitudinal study. AIDS Care 17: 493–504.
63. Nel A, Kagee A (2013) The relationship between depression, anxiety and medication adherence among patients receiving antiretroviral treatment in South Africa. AIDS Care 8: 948–955.
64. Campos L, Guimaraes M, Remien R (2008) Anxiety and Depression Symptoms as risk factors for non-adherence to antiretroviral therapy in Brazil. AIDS Behav 14: 289–299.
65. Molassiotis A, Nahas-Lopez V, Chung WYR, Lam SWC, Li CKP, et al. (2002) Factors associated with adherence to antiretroviral medication in HIV-infected patients. Int J STD AIDS 13: 301–310.
66. Furukawa TA, Kessler RC, Slade T, Andrews G (2003) The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. Psychol Med 33: 357–362.
67. Andersen LS, Grimsrud A, Myer L, Williams DR, Stein DJ, et al. (2011) The psychometric properties of the K10 and K6 scales in screening for mood and anxiety disorders in the South African Stress and Health study. Int J Methods Res 20: 215–223.
68. Joint United Nations Programme on HIV/AIDS & World Health Organization (2009) AIDS Epidemic update. Available: http://data.unaids.org/pub/Report/2009/JC1700_Epi_Update_2009_en.pdf. Accessed 2012 Mar 23.

Hindawi Publishing Corporation
BioMed Research International
Volume 2013, Article ID 349174, 7 pages
http://dx.doi.org/10.1155/2013/349174

Research Article

Unintended Pregnancy and Its Correlates among Female Attendees of Sexually Transmitted Disease Clinics in Eastern China

Qiaoqin Ma,[1] Xiaohong Pan,[1] Gaofeng Cai,[1] Jiezhe Yan,[1] Yun Xu,[1] Masako Ono-Kihara,[2] and Masahiro Kihara[2]

[1] *Department of HIV/STD Control, Zhejiang Provincial Center for Disease Prevention and Control, Hangzhou 310051, China*
[2] *Department of Global Health and Socio-Epidemiology, Kyoto University School of Public Health, Kyoto 606-8501, Japan*

Correspondence should be addressed to Qiaoqin Ma; qiaoqinma@aliyun.com

Received 6 April 2013; Revised 29 May 2013; Accepted 1 June 2013

Academic Editor: Yuhua Ruan

This study is to determine the prevalence of unintended pregnancy and its risk factors among the female attendees of sexually transmitted disease (STD) clinics in Zhejiang Province, China. A self-administered questionnaire survey of a cross-sectional design was administered to attendees at four STD clinics in 2007. Of the 313 female STD clinic attendees, 42.5% reported that they had at least one unintended pregnancy; the induced abortion rate was 39.0%. Over their lifetime, 12.1% responded "use condoms always/often" and 5.4% "always/often used oral contraceptives." The risk factors for the unintended pregnancy identified by the multivariate analysis were as follows: being married, experience of nonconsensual sex, and a history of STD, having two and over two sexual partners. Unintended pregnancies and induced abortion by female STD clinic attendees have reached an alarming prevalence. Doctors at STD clinics should attach importance not only to the STD problem of the female attendees, but also to the unintended pregnancy and the associated factors. Targeted contraceptive counseling and intervention should be promoted at STD clinics as a strategy to improve the efficiency and effectiveness of the reproductive health services in China.

1. Introduction

Unintended pregnancy is one of the principal reproductive health problems in China; many Chinese females have unintended pregnancies and suffer the consequences. A recent study revealed that 9.1% of the Chinese married females of childbearing age had an unintended pregnancy during the previous year [1]. According to a Health Ministry report, 6–10 million Chinese females underwent induced abortions annually between 2000 and 2009 [2]. In China, reproductive health care is easily accessed through family planning programs that provide contraceptive counseling and education, various contraception services, and induced abortion when necessary. Oral contraceptives (OCs) and condoms are widely available at drug stores and supermarkets. Information on the risk factors for unintended pregnancy is critical for improving the reproductive health services, to address the gap between the wide availability of contraception and the high prevalence of unintended pregnancy and its consequences. However, little research has examined this in China; the few studies extant focused on university students [3, 4], and females of childbearing age [1] or seeking abortions [5].

The incidences of sexually transmitted diseases (STDs) have increased rapidly in China. The national reported incidence of syphilis increased from 0.09 per 100,000 in 1990 to 23.07 per 100,000 in 2009 [6]. Of the 28 notifiable infectious diseases in China, syphilis ranks the third and gonorrhea the sixth in terms of both incident cases and incidence rate [2]. With the increase in STD transmission in China, STDs might be more likely to occur in conjunction with unintended pregnancy, as both are due to the consequences of unprotected sex. A high prevalence of STDs has been

identified among pregnant females at antenatal, abortion, and family planning clinics in both China [7–9] and elsewhere [10–12].

Chinese studies have documented that STD clinic atten- dees rarely protect themselves with condoms during their sexual intercourse, and many are infected with STDs [13, 14]; however, there are no reports of the prevalence of contraception or unintended pregnancy in this population. Therefore, we examined the risks of unintended pregnancy among female attendees at four STD clinics in Zhejiang Province, where the reported incidences of syphilis and gonorrhea are among the highest in China [15].

2. Methods

2.1. Participants and Data Collection. The research method was introduced somewhere else [16]. The participants of this study came from a cross-sectional survey conducted at four STD clinics in Zhejiang Province, Eastern China, from October to December, 2007. In 2007, 12 human immunodeficiency virus (HIV) surveillance sentinels were established at STD clinics in Zhejiang Province, to survey the prevalence of HIV and core information on their behaviors related to HIV transmission in the 3 months from April to June. Of the 12, four STD clinics agreed to conduct this study after reviewing the research protocol. We compared the attendees' gender, age, marital status, and residence between the four participating STD clinics and the remaining eight clinics using the 2007 surveillance data; the demographic characteristics were similar in the two groups. In principle, the study enrolled all sexually active attendees visiting the STD clinics for the diagnosis and treatment of STD, older than 14 years. Those attendees who were not sexually active, unwilling to participate in the study, had a language barrier, or visited the clinics for general skin diseases were excluded.

This paper only includes female STD clinic attendees. In total, 466 females visited the clinics for STD problems during the study period, and 334 females agreed to participate in the study with a response rate of 71.7%. Of the 334 females, 322 gave valid responses. Of these, 6 females only ever had sex with the same sex partner. We omitted these 6 individuals from further analyses because their sexual intercourse evidently could not lead to pregnancy, resulting in a sample size of 316. Those attendees who completed the question on their history of unintended pregnancy over a lifetime were included in the analysis, giving a final sample size of 313 females.

The questionnaire used in this study was developed after a review of the domestic and international literature, and it was modified after repeated discussion among the research team and doctors/nurses at the clinics studied. The final questionnaire had five sections with 7, 10, 21, 8, and 5 questions, respectively. The questionnaires were self-administered and anonymous, and they were collected consecutively by doctors or nurses at the clinics from October to December 2007.

2.2. Ethical Considerations. All attendees of the four clinics who met the recruitment criteria were informed of the study purpose and method and that participant privacy and confidentiality would be strictly protected. This information was also printed at the beginning of the questionnaire. This research was ratified by the Zhejiang Provincial Health Ministry. Those responsible for institutional review at Zhejiang Province's Center for Disease Control and Prevention and the four STD clinics approved this research and the study protocol.

2.3. Statistical Analysis. The participants were divided into two groups: those who had experienced unintended pregnancy and those who had not.

Participants' experience of unintended pregnancy was used as the dependent variable in the analysis. The independent variables included sociodemographic parameters, variables related to sexual behavior during (i) the first sexual activity, (ii) the participant's lifetime and current time, and (iii) the previous 6 months.

Factors associated with unintended pregnancy were identified using univariate and multivariate logistic regression analyses. Variables significant (P value <0.05) in the univariate analyses, other than those for the previous 6 months, were included in the multivariate models with participant's age, income, education level, marital status, and current employment being fixed in the models. Multivariate analyses were performed using a backward stepwise logistic regression analysis with a P value >0.10 as the removal criterion. A P value <0.05 was regarded as statistically significant. The data were analyzed using SPSS for Windows (ver. 17.0; SPSS, Chicago, IL, USA).

3. Results

Of the 313 female attendees, 133 (42.5%) reported a history of unintended pregnancy and 122 (39.0%) reported a history of induced abortion. The mean ± standard deviation (SD) number of unintended pregnancies was 1.52 ± 0.86 (range: 1–6); the mean number of induced abortions was 1.49 ± 0.87 (range: 1–6).

Of the participants' variables, age was distributed roughly evenly (Table 1). A percentage of 66.1% of the participants earned less than 2000 renminbi (RMB) per month, 72.8% had not finished high school at most, and 66.5% were married. Regarding the employment status, 29% of the participants were unemployed, 7% were retired, and 8.9% worked in the sector of public service. According to the univariate analysis, participant's age, education level, and marital status were unrelated to unintended pregnancy. Earning a salary ≥ 2000 RMB and having worked in the public sector were associated with unintended pregnancy.

Various sexual behaviors at first sex, lifetime, the previous 6 months, and diagnosed STD at lifetime and current time are shown in Table 2. The rate of always/often condom use over the lifetime was 12.1%, while the percentage for OC use was 5.4%. Multiple sexual partners were prevalent, and only 53.4% of participants reported only one partner during their lifetimes.

With respect to risks associated with unintended pregnancy (Table 2), female STD clinic participants who initiated sex at a younger age (versus those who initiated later),

Table 1: Demographic characteristics for unintended pregnancy among female STD clinic attendees.

Variable	Total (%)[a]	Pregnancy (%)	Crude OR (95% CI)[b]	*P* value
Age				
<30	169 (54.0)	70 (41.4)	1	
≥30	144 (46.0)	63 (43.8)	1.10 (0.70–1.72)	0.678
Income per month				
<2000	207 (66.1)	85 (41.1)	1	
≥2000	50 (16.0)	31 (62.0)	2.34 (1.24–4.42)	0.009
Education				
Below high school	228 (72.8)	103 (45.2)	1	
High school and above	84 (26.8)	29 (34.5)	0.64 (0.38–1.08)	0.092
Marriage				
Single	44 (14.1)	15 (34.1)	1	
Cohabitation	55 (17.6)	25 (45.5)	1.61 (0.71–3.65)	0.254
Married	208 (66.5)	90 (43.3)	1.48 (0.75–2.91)	0.264
Employment status				
Unemployed	90 (28.8)	29 (32.2)	1	
Public	28 (8.9)	18 (64.3)	3.79 (1.55–9.23)	0.003
Retired	23 (7.3)	12 (52.2)	2.30 (0.91–5.82)	0.080
Others	169 (54.0)	73 (43.2)	1.60 (0.94–2.74)	0.086

[a]Percentages may not add up to 100 due to missing data; [b]OR: odds ratio; CI: confidence interval

had nonconsensual sex (versus those with no such history), reported having had been diagnosed with an STD (versus those with no such history), having had two or more sexual partners (versus those having only one), rarely/sometimes and always/often used condoms (versus those who never used them), rarely/sometimes used OC (versus those who never used OC), were more likely to report a history of unintended pregnancy during their lifetime. Participants who had more than two sexual partners (versus those having only one), participants who rarely/sometimes and always/often used condoms (versus those who never used them), and participants who rarely/sometimes used OC (versus those who never used them) during the previous 6 months were associated with unintended pregnancy. Condom use and OC use at first sex, current STD diagnosed, and type of sex during lifetime were not associated with unintended pregnancy.

Multivariate logistic regression analysis revealed that being married (odds ratio (OR) 2.99, 95% confidence interval (95% CI) 1.12–7.96), experience of nonconsensual sex (OR 5.83, 95% CI 1.74–19.69), a history of STD (OR 3.31, 95% CI 1.82–6.01), and having two (OR 2.09, 95% CI 1.08–4.05) or more sexual partners (OR 3.02, 95% CI 1.44–6.35) remained risk factors for a history of unintended pregnancy (Table 3). However, the association of age at first sex, condom use, and OC use with unintended pregnancy disappeared in the multivariate analysis.

4. Discussion

This study addressed the gap in knowledge regarding unintended pregnancy and examined the associated factors among women attending four STD clinics. To our knowledge, this is the first quantitative study of its kind conducted in China. We found that the rate of unintended pregnancy among female STD clinic attendees was 42.5%. The amazingly high rate of unintended pregnancy in this study implies that our participants make poor use of not only barrier methods (such as condoms) but also other effective contraception, putting them at risk of both STDs and unintended pregnancy.

Research has indicated that using condoms correctly and consistently reduces substantially the consequences of unprotected intercourse [17, 18]. We identified a very low rate of condom use; only 12% always or often used condoms during their lifetimes, and around 9% in the previous 6 months. The proportion of our subjects using condom is clearly too small to prevent STDs and pregnancy. Surprisingly, those who always/often or rarely/sometimes used condoms during their lifetimes were more likely to experience unintended pregnancy compared with those who never used condoms in the bivariate analysis; though this correlation did not remain after adjustment for possible confounding, it seems that condom use does not reduce the risk of unintended pregnancy in this study. Those who never used condoms may have adopted other effective contraception, such as an intrauterine device (IUD) or sterilization; consequently, their pregnancy rate was not higher than those who used condoms; furthermore, many international and domestic studies have revealed that condom use was not effective enough in terms of preventing pregnancy, and they, in addition, highlighted the importance of correct condom use every time partners have sexual intercourse [19–21].

The consequences of low condom use are not limited to unintended pregnancy, but they naturally include an increased risk of STDs. A percentage of 39% of the participants was diagnosed with a current STD. The reported history of diagnosed STD reached 28%. We found that those who

Table 2: Bivariate correlates of unintended pregnancy with sexual behaviors.

Variable	Total (%)[a]	Pregnancy (%)	Crude OR (95% CI)[b]	P value
Age of first sex				
≥20	190 (60.7)	70 (36.8)	1	
<20	117 (37.4)	61 (52.1)	1.87 (1.17–2.98)	0.009
Condom use for first sex				
Use	28 (8.9)	9 (32.1)	1	
Nonuse/forget	281 (89.8)	122 (43.4)	1.62 (0.71–3.71)	0.253
OC use first sex				
Use	24 (7.7)	11 (45.8)	1	
Nonuse/forget	285 (91.1)	120 (42.1)	0.86 (0.37–1.98)	0.723
Ever nonconsent sex				
No	282 (90.1)	107 (37.9)	1	
Yes	29 (9.3)	24 (82.8)	7.85 (2.91–21.19)	0.000
STD history				
No	218 (69.6)	74 (33.9)	1	
Yes	87 (27.8)	54 (62.1)	3.18 (1.90–5.33)	0.000
Current STD				
No	189 (60.4)	80 (42.3)	1	0.958
Yes	122 (39.0)	52 (42.6)	1.01 (0.64–1.60)	
Partner number over lifetime				
1	166 (53.4)	54 (32.5)	1	
2	67 (21.5)	31 (46.3)	1.79 (1.00–3.19)	0.050
≥3	69 (22.2)	44 (63.8)	3.65 (2.03–6.58)	0.000
Type of sex over lifetime				
Only vaginal	293 (93.6)	122 (41.6)	1	
Ever anal or oral	13 (4.2)	8 (61.5)	2.24 (0.72–7.02)	0.165
Condom use over lifetime				
Never	99 (31.6)	26 (26.3)	1	
Rarely/sometimes	171 (54.6)	86 (50.3)	2.84 (1.66–4.87)	0.000
Always/often	38 (12.1)	20 (52.6)	3.12 (1.43–6.79)	0.004
OC use over lifetime				
Never	144 (46.0)	51 (35.4)	1	
Rarely/sometimes	145 (46.3)	74 (51.0)	1.90 (1.19–3.05)	0.008
Always/often	17 (5.4)	7 (41.2)	1.28 (0.46–3.56)	0.641
Partner number half year[c]				
1	178 (76.1)	74 (41.6)	1	
2	30 (12.8)	11 (36.7)	0.81 (0.37–1.81)	0.613
≥3	18 (7.7)	13 (72.2)	3.65 (1.25–10.69)	0.018
Condom use half year[c]				
Never	101 (43.0)	32 (31.7)	1	
Rarely/sometimes	110 (46.8)	56 (50.9)	2.24 (1.28–3.92)	0.005
Always/often	22 (9.4)	12 (54.5)	2.59 (1.01–6.61)	0.047
OC use half year[c]				
Never	144 (61.3)	54 (37.5)	1	
Rarely/sometimes	74 (31.5)	38 (51.4)	1.76 (1.00–3.10)	0.050
Always/often	11 (4.7)	7 (63.6)	2.92 (0.82–10.43)	0.100

[a]Percentages may not add up to 100 due to missing data; [b]OR: odds ratio; CI: confidence interval.
[c]235 of females were sexually active in the previous half year.

Table 3: Multivariate analysis predicting unintended pregnancy.

Variable	Adjusted OR (95% CI)[a]	*P* value
Marriage		
Single	1	
Cohabitation	2.55 (0.93–6.96)	0.068
Married	2.99 (1.12–7.96)	0.028
Ever nonconsent sex		
No	1	
Yes	5.83 (1.74–19.69)	0.004
STD history		
No	1	
Yes	3.31 (1.82–6.01)	0.000
Partner number over lifetime		
1	1	
2	2.09 (1.08–4.05)	0.029
≥3	3.02 (1.44–6.35)	0.004

[a]OR: odds ratio; CI: confidence interval.

had a history of STD were more likely to report a history of unintended pregnancy, suggesting that female STD clinic attendees use little contraception other than condom use.

Male condoms are the leading contraceptive method for unmarried young Chinese, followed, in order, by withdrawal, rhythm methods, and OC [22–24]. The rate of contraception use is high for married people, who mainly use IUD, sterilization, condom, or OC [25]. However, these findings do not apply to our study. Of our subjects, around 5% reported using OC always or often during their lifetimes and in the previous 6 months, which is even a much lower rate than that of condom use. High prevalence of unintended pregnancy and STD in our participants implies that the majority of our participants use not only condom and OC but also any other contraception either never or rarely. Chinese studies revealed that 50%–60% of females who become pregnant unintentionally and seek an induced abortion at a hospital did not use contraception [26, 27]. Doctors at STD clinics therefore should relay the importance of contraception to STD clinic attendees, specifically to STD-infected attendees, because they are at elevated risk of unintended pregnancy.

The rate and mean number of induced abortions in this study were slightly lower than that of unintended pregnancy. We speculate that the majority of unintended pregnancies were aborted artificially. The reason our pregnant participants chose abortion was unclear. This might be because some pregnancies occur with nonstable sexual partners. We found a high prevalence of multiple sexual partners among the participants during their lifetimes and even during the previous 6 months. The rate of abortion might also be related to the one-child policy among those who already had one child [28]. The high rates of unintended pregnancy and induced abortion emphasize the need for doctors at STD clinics to play an expanded role in sexual behavior intervention related to STDs to minimize these risks. The receipt of contraceptive counseling was associated with greater self-efficacy and increased contraception use to prevent unintended pregnancy [29, 30]. Therefore, contraception counseling should be considered a component of behavioral intervention at STD clinics.

We also found that having multiple sexual partners was a risk factor for unintended pregnancy, consistent with the results in Chinese university students [3]. The trend that the more sexual partners our female participants had the more likely they experienced an unintended pregnancy indicates that an increased number of sexual partners of those female participants did not result in increased contraceptive use. The fact that multiple sexual partnerships are very prevalent heightens the concern of unintended pregnancy for this population.

A history of nonconsensual sex was strongly related to unintended pregnancy in female attendees of STD clinics; this had the highest odds ratios for our participants, corroborating reports in other domestic and foreign populations [3, 31, 32]. Nonconsensual sex has also been reported to be associated with other risks, such as more sex partners, reduced condom use, and an increased risk of contracting STD/HIV [33–35]. These findings indicate that a history of nonconsensual sex in attendees at STD clinics warrants special consideration, and those so identified should be referred for appropriate counseling and reproductive health services.

Our study had several limitations. Its cross-sectional nature precluded determination of causal associations with unintended pregnancy; thus, further studies to identify factors associated with unintended pregnancy are necessary to better understand the associations we report here. Bias might have been introduced by the refusal of some attendees to participate. Self-reported sexual behaviors and STD histories might have been under-reported due to their sensitive nature in the Chinese culture, but this might not be evident because requesting an STD diagnosis and treatment at an STD clinic implies the acknowledgement of risky sexual behaviors. Finally, findings from four STD clinics might not be representative of STD clinic attendees in either this one province or all of China. However, we compared the demographic data of our study population and those females from the sentinel surveillance at 12 STD clinics in 2007, and we found that the distributions of age, marital status, and residence were all similar.

5. Conclusion

This study provides valuable information on unintended pregnancy in STD clinics in China. Female attendees seen in STD clinics feebly protect themselves during sexual intercourse, and they are vulnerable to both STDs and unintended pregnancy. The factors leading our attendees to expose themselves to these dual risks should be considered as an integral part of the development of prevention strategies. Doctors at STD clinics should attach importance to not only the STD problem of the attendees but also the unintended pregnancy and the associated factors. Contraceptive counseling and intervention should be promoted at STD clinics as a strategy to improve the efficiency and effectiveness of reproductive health services in China.

Acknowledgments

This research is supported by a grant from Zhejiang Provincial CDC. The authors are grateful to the doctors, nurses, and attendees involved in the research at the 4 STD clinics.

References

[1] Y. L. Zou, S. L. Liao, H. Yang, R. C. Chen, D. Q. Huang, S. Y. Li et al., "Study on the unintended pregnancy among married women of child-bearing age living in Qingshan district, Wuhan," *Zhonghua Liu Xing Bing Xue Za Zhi*, vol. 33, pp. 291–295, 2012.

[2] Health Ministry of China, *Statistical Almanac on Health in China, 2009*, Health Ministry of China, Beijing, China, 2010.

[3] Q. Ma, M. Ono-Kihara, L. Cong et al., "Unintended pregnancy and its risk factors among university students in eastern China," *Contraception*, vol. 77, no. 2, pp. 108–113, 2008.

[4] Y. Zhou, J. Xiong, J. Li et al., "Urgent need for contraceptive education and services in Chinese unmarried undergraduates: a multi-campus survey," *Journal of Huazhong University of Science and Technology*, vol. 31, no. 4, pp. 426–432, 2011.

[5] Y. Feng, C. Lou, H. Niu, L. Cheng, D. Li, X. Zuo et al., "Unintended pregnancy status among unmarried women seeking an abortion in Shanghai," *Chinese Journal of Family Planning*, vol. 19, pp. 469–472, 2011.

[6] X. D. Gong, "STD epidemiology and control," *Bulletin For STI Prevention and Control*, vol. 25, pp. 9–13, 2011.

[7] S. M. Chen, A. van den Hoek, C. G. Shao, L. Wang, D. C. Liu et al., "Prevalence of and risk indicators for STIs among women seeking induced abortions in two urban family planning clinics in Shandong province, People's Republic of China," *Sexually Transmitted Infections*, vol. 78, no. 3, 2002.

[8] W. Ha and L. Y. Chun, "Analysis of the pregnancies syphilis infection," *National Medical Frontiers of China*, vol. 5, pp. 91–93, 2010.

[9] X.-S. Chen, Y.-P. Yin, L.-P. Chen et al., "Sexually transmitted infections among pregnant women attending an antenatal clinic in Fuzhou, China," *Sexually Transmitted Diseases*, vol. 33, no. 5, pp. 296–301, 2006.

[10] E. A. Sullivan, M. Abel, S. Tabrizi et al., "Prevalence of sexually transmitted infections among antenatal women in Vanuatu, 1999-2000," *Sexually Transmitted Diseases*, vol. 30, no. 4, pp. 362–366, 2003.

[11] O. M. Ortashi, I. El Khidir, and E. Herieka, "Prevalence of HIV, syphilis, *Chlamydia trachomatis, Neisseria gonorrhoea, Trichomonas vaginalis* and candidiasis among pregnant women attending an antenatal clinic in Khartoum, Sudan," *Journal of Obstetrics and Gynaecology*, vol. 24, no. 5, pp. 513–515, 2004.

[12] J. E. Norman, O. Wu, S. Twaddle et al., "An evaluation of economics and acceptability of screening for *Chlamydia trachomatis* infection, in women attending antenatal, abortion, colposcopy and family planning clinics in Scotland, UK," *BJOG*, vol. 111, no. 11, pp. 1261–1268, 2004.

[13] K.-H. Choi, Z. Xiwen, Q. Shuquan, K. Yiee, and J. Mandel, "HIV risk among patients attending sexually transmitted disease clinics in China," *AIDS and Behavior*, vol. 4, no. 1, pp. 111–119, 2000.

[14] S. P. Y. Wong, Y.-P. Yin, X. Gao et al., "Risk of syphilis in STI clinic patients: a cross-sectional study of 11 500 cases in Guangxi, China," *Sexually Transmitted Infections*, vol. 83, no. 5, pp. 351–356, 2007.

[15] X. D. Gong, X. L. Yue, F. Teng, and N. Jiang, "The epidemic report for syphilis and gonorrhea in China in 2011," *Bulletin For STI Prevention and Control*, vol. 26, pp. 9–14, 2012.

[16] Q. Ma, X. Pan, G. Cai, J. Yan, M. Ono-Kihara, and M. Kihara, "HIV antibody testing and its correlates among heterosexual attendees of sexually transmitted disease clinics in China," *BMC Public Health*, vol. 13, article 44, 2013.

[17] K. H. King, L. Ruth, and W. Marcia, "Effectiveness of condoms in preventing sexually transmitted infections," *Bulletin of the World Health Organization*, vol. 82, no. 6, pp. 454–461, 2004.

[18] L. H. Bearinger, R. E. Sieving, J. Ferguson, and V. Sharma, "Global perspectives on the sexual and reproductive health of adolescents: patterns, prevention, and potential," *The Lancet*, vol. 369, no. 9568, pp. 1220–1231, 2007.

[19] W.-Y. Ip, L. L. Sin, and D. S. Chan, "Contraceptive self-efficacy and contraceptive knowledge of Hong Kong Chinese women with unplanned pregnancy," *Journal of Clinical Nursing*, vol. 18, no. 17, pp. 2416–2425, 2009.

[20] P. S. Branden, "Contraceptive choice and patient compliance the health care provider's challenge," *Journal of Nurse-Midwifery*, vol. 43, no. 6, pp. 471–482, 1998.

[21] C. Yimin, Z. Wei, L. Zhimin, Z. Yang, and W. Aiying, "Contraceptive practices of women requesting termination of pregnancy: a study from China," *Contraception*, vol. 55, no. 1, pp. 15–17, 1997.

[22] C. Lou, X. Yin, X. Zuo, Y. Zhang, and A. Wang, "Contraceptive use and impact factors among unmarried women seeking abortions in three cities," *Chinese Journal of Family Planning*, vol. 20, pp. 383–386, 2012.

[23] Y.-Z. Zhou, M.-M. Zhang, S. Wei et al., "Survey on knowledge, attitude, practice related to contraception among college students in Beijing," *Zhonghua Liu Xing Bing Xue Za Zhi*, vol. 30, no. 7, pp. 710–712, 2009.

[24] P. Zhang, C. Lou, Laurie, and E. Gao, "Unmarried adolescents contraceptive practices and impact factors in three cities in Asia," *Chinese Journal of School Health*, vol. 32, pp. 811–813, 2011.

[25] C. Wang, "Trends in contraceptive use and determinants of choice in China: 1980–2010," *Contraception*, vol. 85, no. 6, pp. 570–579, 2012.

[26] Z. Qi, "The cause analysis and prevention of unintended pregnancy," *Clinics and Practices*, vol. 11, pp. 876–877, 2007.

[27] S. Wang, "How to avoid the unintended pregnancy based on the analysis of induced abortion," *Chinese and Foreign Medical Research*, vol. 9, article 143, 2011.

[28] C. C. Wang, E. Vittinghoff, L. S. Hua, W. H. Yun, and Z. M. Rong, "Reducing pregnancy and induced abortion rates in China: family planning with husband participation," *The American Journal of Public Health*, vol. 88, no. 4, pp. 646–648, 1998.

[29] C. S. Weisman, D. S. Maccannon, J. T. Henderson, E. Shortridge, and C. L. Orso, "Contraceptive counseling in managed care: preventing unintended pregnancy in adults," *Women's Health Issues*, vol. 12, no. 2, pp. 79–95, 2002.

[30] K. Upson, S. D. Reed, S. W. Prager, and M. A. Schiff, "Factors associated with contraceptive nonuse among US women ages 35-44 years at risk of unwanted pregnancy," *Contraception*, vol. 81, no. 5, pp. 427–434, 2010.

[31] J. L. Stock, M. A. Bell, D. K. Boyer, and F. A. Connell, "Adolescent pregnancy and sexual risk-taking among sexually abused girls," *Perspectives on Sexual and Reproductive Health*, vol. 29, no. 5, pp. 200–227, 1997.

[32] G. M. Wingood and R. J. DiClemente, "Child sexual abuse, HIV sexual risk, and gender relations of African-American women," *The American Journal of Preventive Medicine*, vol. 13, no. 5, pp. 380–384, 1997.

[33] J. D. Champion, R. N. Shain, J. Piper, and S. T. Perdue, "Sexual abuse and sexual risk behaviors of minority women with sexually transmitted diseases," *Western Journal of Nursing Research*, vol. 23, no. 3, pp. 241–254, 2001.

[34] J. W. Kenney, C. Reinholtz, and P. J. Angelini, "Sexual abuse, sex before age 16, and high-risk behaviors of young females with sexually transmitted diseases," *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, vol. 27, no. 1, pp. 54–63, 1998.

[35] G. M. Wingood, P. Seth, R. J. Diclemente, and L. S. Robin- son, "Association of sexual abuse with incident high-risk human papillomavirus infection among young African-Ameri- can women," *Sexually Transmitted Diseases*, vol. 36, no. 12, pp. 784–786, 200

OPEN ACCESS Freely available online

PLOS ONE

The Characteristics of Heterosexual STD Clinic Attendees Who Practice Oral Sex in Zhejiang Province, China

Qiaoqin Ma[1]*, Xiaohong Pan[1], Gaofeng Cai[1], Jiezhe Yan[1], Yun Xu[1], Masako Ono-Kihara[2], Masahiro Kihara[2]

1 Department of HIV/STD control, Center for Disease Control and Prevention of Zhejiang Province, Hangzhou, PR China, 2 Department of Global Health and Socio- epidemiology, Kyoto University School of Public Health, Kyoto, Japan

Abstract

Background: The characteristics of heterosexual attendees who visit sexually transmitted disease (STD) clinics and practice oral sex have not been revealed in China. This information is important for the development of targeted STD prevention programmes for this population.

Study Design: A self-administered questionnaire survey with a cross-sectional design was administered to consecutive attendees at four STD clinics in Zhejiang Province, China, between October and December in 2007. Demographic, psychosocial, and behavioural factors associated with oral sex over a lifetime were identified using univariate and multivariate analyses.

Results: Of the 872 attendees, 6.9% engaged in oral sex over their lifetimes. Of the oral-sex group, 96.6% also engaged in vaginal sex. The correlates for oral sex over a lifetime as determined by the multivariate analysis were high income (odds ratio [OR] = 2.53, 95% confidence interval [CI] 1.39–4.59), high human immunodeficiency virus (HIV)-related knowledge (OR = 2.71, 95% CI 1.26–5.81), early sex initiation (OR = 2.42, 95% CI 1.37–4.27), multiple sexual partners (OR = 3.09, 95% CI 1.58–6.06), and sexually active in the previous 6 months (OR = 7.73, 95% CI 1.04–57.39).

Conclusions: Though the prevalence of oral sex is low, the heterosexual STD clinic attendees practicing oral sex was found to have higher risks associated with STD/HIV transmission than those not. Behavioural and medical interventions conducted by clinicians in Chinese STD clinics should take into account the characteristics and related risks of those who practice oral sex.

Citation: Ma Q, Pan X, Cai G, Yan J, Xu Y, et al. (2013) The Characteristics of Heterosexual STD Clinic Attendees Who Practice Oral Sex in Zhejiang Province, China. PLoS ONE 8(6): e67092. doi:10.1371/journal.pone.0067092

Editor: Julian W. Tang, Alberta Provincial Laboratory for Public Health/University of Alberta, Canada

Received March 7, 2013; Accepted May 15, 2013; Published June 25, 2013

Funding: This research was supported by a grant from Zhejiang provincial center for disease prevention and control,China. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The authors have declared that no competing interests exist.

* E-mail: qiaoqinma@gamail.com

Introduction

Oral sex is more risky than people think. Oral sex can transmit sexually transmitted infections (STDs), including herpes simplex viruses, human papilloma viruses (HPV), syphilis, gonorrhoea, Neisseria meningitidis, Chlamydia, and chancroid [1–4]. STDs in the oral cavity can be asymptomatic or subclinical, and can be mistaken for ulcers or herpes, thus delaying curative treatment and allowing ongoing transmission. Oral STDs can also damage the mucosal surfaces of the oral cavity, and unprotected exposure, especially in the presence of lesions, can increase the risk of human immunodeficiency virus (HIV) transmission [1,2,4,5]. Although the oral transmission of HIV is infrequent and substantially lower than through vaginal and anal intercourse, oral exposure to HIV was identified as an independent risk factor for acquiring HIV [6–8].

Data from the United States and Great Britain indicate that the percentage of men and women who engage in heterosexual oral sex has increased [9–13]. Over 80% of 15–44-year-olds in the United States reported ever having oral sex [11], while over 75% of 16–44-year-olds reported having oral sex in the past year in Great Britain [12,13]. In Japan, the proportion of female STD clinic attendees practicing unprotected oral sex with regular and casual partners was 84% and 28%, respectively; the respective percentages were 55 and 2% for females in the general population [14]. A few studies have indicated that oral sex is associated with multiple sexual partnerships, having a non-monogamous sex partner [15,16], much lower condom use when having oral sex compared to vaginal sex [15,17,18], an oral STD diagnosis [15], and an increased likelihood of contracting multiple STDs [16].

In China, few studies have examined the characteristics of individuals who practice oral sex and the risks of oral sex, even for high-risk populations. This is excluding reports on homosexual men, which suggest that the prevalence of oral sex is over 70% [19–21]. Given the possible increasing prevalence of oral sex among heterosexual partners in China due to rapid socioeconomic development, and associated negative health outcomes of oral sex, it is important to examine this behaviour in high-risk populations. Therefore, this study determined the prevalence and correlates of

heterosexual oral sex in STD clinic attendees to understand the epidemiology and risks of this type of sexual behaviour.

Methods

Participants and Data Collection

In China, people who are concerned about current or possible STD problems will visit STD clinics for examination and treatment. The participants in this study were derived from a cross-sectional survey conducted at four STD clinics in Zhejiang Province, Eastern China, between October and December in 2007. Zhejiang Province is one of the most economically developed areas in China and is reported to have the highest incidence of syphilis and gonorrhoea in China [22,23]. In 2007, Zhejiang Province established 12 HIV surveillance sentinels at STD clinics to collect basic information including HIV prevalence, demographic data (four questions), sexual behaviours in the last 3 months (three questions), drug use (one question), and blood plasma donation (one question) from April to June. Of these 12 STD clinics, 4 clinics located in the east, west, north, and middle area of the province agreed to participate in this study, the remaining eight declined participation due to a lack of interest in this research after review of the study protocol. Analysis was performed to compare the HIV prevalence and the attendees' demographic characteristics in terms of gender, age, marital status, and residence among the four STD clinics and the remaining eight non-participating clinics. The analysis revealed that significant difference was not shown for HIV prevalence (0.40% versus 0.23%) and these demographic characteristics were generally evenly distributed between the two groups.

The research method has been introduced somewhere [24]. All sexually active attendees visiting these STD clinics for STD diagnosis and treatment who were ≥14 years of age were recruited to the study. Those attendees who were not sexually active, unwilling to participate in the study, had a language barrier, or who visited clinics for general skin diseases were excluded. During the study period, 1187 individuals (721 males, 466 females) visited the clinics for STD problems and 935 (601 males, 334 females) agreed to participate in the research. The response rate was 83.4% for males, 71.7% for females, and 78.8% overall. Of the 935 respondents, 908 responded validly. Of these, 16 of 586 males and 6 of 322 females had ever had sex with a same-sex partner. To avoid confounding heterosexual oral sex with same-sex oral sex, we excluded these 22 individuals from further analyses, resulting in a sample size of 886. Since the purpose of this study is to explore the characteristics of those attendees who practice oral sex, 14 attendees who did not answered the question regarding the types of sexual intercourse they performed over their lifetimes were not included in the analysis, therefore the final sample size is 872.

The questionnaire used in this study was developed after reviewing that used for HIV surveillance at the STD clinics at that time, the domestic and international literature, then modified after repeated discussion among the research team and doctors/nurses at the clinics. The final questionnaire had five sections consisting of 7, 10, 21, 8, 5 questions, respectively. The questionnaires were anonymous and self-administered by the STD clinic attendees. A nurse or doctor, who was trained by the research team prior to the study, explained the research and questionnaire to the participants. There was no incentive provided to the participants.

Ethical Considerations

All attendees of the four clinics who met the recruitment criteria and adolescent attendees' guardian were informed of the study purpose and method, and that participant privacy and confidentiality would be strictly protected, and whether participating in this study was at their discretion. They were also explained that filling in the questionnaire were regarded as that they understand and accept the survey. The above information was also printed at the beginning of the questionnaire. Since the research instrument was a questionnaire, those attendees including the guardian for adolescent attendees who gave verbal consent were given the survey after being documented in a register book.

Those responsible for institutional review at Zhejiang Province's Center for Disease Control and Prevention and the four STD clinics approved the study protocol and consent procedure. The four clinics are situated in Haining city of Jiaxing prefecture, Jiangshan city of Quzhou prefecture, Deqing county of Huzhou prefecture, Yongkang city of Jinhua prefecture.

Measures

Those attendees who engaged in any oral, anal, or vaginal sex were defined as sexually active. Oral sex was described as sexual activity involving contact between an attendee's mouth and his or her partner's genital. The participants were divided into two groups, i.e., those who did and did not practice oral sex. The oral-sex group included those who engaged only in oral sex, those who engaged in oral and vaginal sex, and those engaged in oral, vaginal, and anal sex; the no-oral-sex group included those who engaged only in vaginal sex and those who engaged in both vaginal and anal sex.

The HIV-related knowledge scale included four statements: 1) reported HIV cases had increased rapidly in recent years in Zhejiang, 2) HIV is spread from the high-risk population to the general population through sexual intercourse, 3) STDs makes a person more vulnerable to HIV, and 4) the correct use of condoms can reduce the transmission of HIV. There were three possible responses to the four statements: correct'', ''incorrect'', and ''unsure''. The scores for this scale ranged from 0–4, and participants were categorized into three groups based on the frequency distribution of this scale with 4 reflecting a high level of knowledge, 0–1 reflecting a low level of knowledge, and 2–3 an intermediate level of knowledge. Cronbach's alpha for the internal consistency of this scale was 0.826.

Statistical Analysis

The data were analysed using SPSS for Windows (ver. 17.0; SPSS, Chicago, IL). Initial analyses were conducted to describe the frequency and prevalence of various types of sex. The main study analyses compared participants who reported ever engaging in oral sex with participants who did not report oral sex activity over a lifetime in terms of demographic characteristics, history of sexual behaviour, reported STD history, and STD-related symptoms. We also compared the groups with respect to HIV-related knowledge, and STD and HIV risk perception.

The type of sexual intercourse over a lifetime was used as the dependent variable in the logistic regression analysis. Logistic regressions compared participants who did and did not engage in oral sex over a lifetime for different factors. Finally, variables that were significant in the univariate analyses, other than the number of sexual partners and condom use during the previous 6 months, were entered into a multivariate backward stepwise logistic regression model with a P-value ≥0.10 as the criterion for removing a variable, to examine independent factors associated with oral sex. All results were reported as odds ratios (OR) and 95% confidence intervals (95% CI), and were considered significant when $P<0.05$.

Results

Type of Sex Practiced by the Participants

Of the 872 attendees, 60 had engaged in oral sex at some time point (6.9% of total, 8.3% of males, and 4.2% of females), while 812 (93.1%) had not. Of the oral-sex group, 2(3.3%) performed only oral sex, 53(88.3%) engaged in both oral and vaginal sex, and 5(8.3%) engaged in oral, vaginal, and anal sex. Of the no-oral-sex group, 808(99.5%) engaged only in vaginal sex, while 4(0.5%) engaged in vaginal and anal sex.

Demographic Factors Associated with Practicing Heterosexual Oral Sex

In the oral-sex group, 78.3% were male; the rate was 63.7% in the no-oral-sex group (Table 1). For those who performed oral sex and those who not, respectively, 51.7% versus 39.4% were les than 30 years older, 55.0% versus 69.5% were married, 80% versus 71.4% were local resident, 53.3% versus 66.0% didn't get high school education, 36.7% versus 61.0% earned an income less than 2000 Yuan per month, 26.7% versus 54.6% were unemployed or a peasant.

Table 1 also showed that practitioners of heterosexual oral sex were more likely to be male (OR = 2.06, 95% CI 1.10–3.88), less likely to be married (OR = 0.54, 95% CI 0.31–0.92), more likely to have earned an income ≥2000 RMB per month (OR = 3.45, 95% CI 1.98–6.02), more likely to have been employed by the government (OR = 3.57, 95% CI 1.75–7.25), and more likely to have worked in sectors other than being unemployed/a peasant or employed by the government (OR = 3.26, 95% CI 1.72–6.18) as compared with those who did not practice oral sex. The practitioners of oral sex did not differ significantly from non-practitioners in terms of age, residence, and education.

Psychosocial and Behavioural Factors Associated with Engaging in Heterosexual Oral Sex

Table 2 indicates that the practitioners of heterosexual oral sex had significantly more knowledge about HIV (OR = 4.05, 95% CI 1.88–8.75 for intermediate score group, OR = 2.47, 95% CI 1.10–5.56 for high score group), and higher risk perception for HIV (OR = 2.54, 95% CI 1.02–6.31). In addition, they were more likely to have initiated sex before 20 years of age (OR = 2.86, 95% CI 1.68–4.86), experienced non-consensual sex (OR = 3.09, 95% CI 1.31–7.32), had a history of unwanted pregnancy (female or male's female partner; OR = 1.84, 95% CI 1.08–3.15), reported multiple sexual partners (OR = 5.96, 95% CI 2.49–14.29 for ≥2 partners over lifetimes; OR = 2.21, 95% CI 1.08–4.53, OR = 10.56, 95% CI 5.26–21.18 for 2 and ≥2 partners, respectively, during the previous 6 months), reported sometimes/frequent condom use (OR = 2.52, 95% CI 1.46–4.35 for lifetime; OR = 2.10, 95% CI 1.20–3.67 for previous 6 months), and had been sexually active in the previous 6 months as compared with those who did not engage in oral sex.

Performance of oral sex was not significantly associated with awareness that oral sex can transmit STDs, risk perception for contracting STDs, the length of sexual activity, reported history of a STD, or STD-related symptoms on the genitals in the previous 6 months as compared with participants who did not engage in this behaviour.

Multivariate Model of Oral Sex

A multivariate logistic regression analysis showed that high monthly income (OR = 2.53, 95% CI 1.39–4.59), high HIV-related knowledge (OR = 2.71, 95% CI 1.26–5.81), early sex initiation (OR = 2.42, 95% CI 1.37–4.27), multiple sexual partners (OR = 3.09, 95% CI 1.58–6.06), and being sexually active in the

Table 1. Demographic characteristics of STD clinics attendees who did and did not practice oral sex.

		Oral-sex group		No-oral-sex group			
Characteristics	**Subgroups**	**n**	**(%[a])**	**n**	**(%)**	**OR (95% CI)[b]**	***P*-value**
Gender	Female[c]	13	(21.7)	295	(36.3)	1	
	Male	47	(78.3)	517	(63.7)	2.06(1.10–3.88)	0.024
Age	<30[c]	31	(51.7)	320	(39.4)	1	
	30–39	17	(28.3)	258	(31.8)	0.68(0.37–1.26)	0.218
	≥40	12	(20.0)	234	(28.8)	0.53(0.27–1.06)	0.070
Marriage	Unmarried[c]	26	(43.3)	238	(29.3)	1	
	Married	33	(55.0)	564	(69.5)	0.54(0.31–0.92)	0.022
Residence	Locally[c]	48	(80.0)	580	(71.4)	1	
	Other area	12	(20.0)	200	(24.6)	0.73(0.38–1.39)	0.334
Education	Below high school[c]	32	(53.3)	536	(66.0)	1	
	High school and over	27	(45.0)	270	(33.3)	1.68(0.98–2.85)	0.058
Income	≤2000[c]	22	(36.7)	495	(61.0)	1	
	>2000	35	(58.3)	228	(28.1)	3.45(1.98–6.02)	0.000
Occupation	Unemployed/peasant[c]	16	(26.7)	443	(54.6)	1	
	Employed by government	17	(28.3)	132	(16.3)	3.57(1.75–7.25)	0.000
	Other	27	(45.0)	229	(28.2)	3.26(1.72–6.18)	0.000

[a]The percentage of attendees may not add up to 100% due to non-response for some items.
[b]OR: unadjusted odds ratio; CI: confidence interval.
[c]Reference category.
doi:10.1371/journal.pone.0067092.t001

Table 2. Psychosocial and sexual behaviours of STD clinics attendees who did and did not practice oral sex.

		Oral-sex group		No-oral-sex group			
Characteristics	**Subgroups**	**n**	**(%[a])**	**n**	**(%)**	**OR (95% CI)[b]**	***P*-value**
HIV knowledge scale	Low (0–1)[c]	9	(15.0)	302	(37.2)	1	
	Intermediate (2–3)	28	(46.7)	232	(28.6)	4.05(1.88–8.75)	0.000
	High (4)	19	(31.7)	258	(31.8)	2.47(1.10–5.56)	0.029
Oral sex transmits STDs	Unsure/no[c]	34	(56.7)	466	(57.4)	1	
	Possible	26	(43.3)	338	(41.6)	1.05(0.62–1.79)	0.845
STD risk awareness	Unsure/no[c]	31	(51.7)	526	(64.8)	1	
	Possible	25	(41.7)	276	(34.0)	1.54(0.89–2.66)	0.123
HIV risk awareness	Unsure/no[c]	54	(90.0)	777	(95.7)	1	
	Possible	6	(10.0)	34	(4.2)	2.54(1.02–6.31)	0.045
Age of first sex	≥20[c]	27	(45.0)	559	(68.8)	1	
	<20	33	(55.0)	239	(29.4)	2.86(1.68–4.86)	0.000
Length of sexual activity	1–6 years[c]	19	(1.7)	259	(31.9)	1	
	7–15 years	25	(41.7)	263	(32.4)	1.30(0.70–2.41)	0.413
	>15 years	16	(26.7)	276	(34.0)	0.79(0.40–1.57)	0.501
Experienced non-consensual	No[c]	53	(88.3)	772	(95.1)	1	
sex	Yes	7	(11.7)	33	(4.1)	3.09(1.31–7.32)	0.010
History of unwanted	No[c]	35	(58.3)	580	(71.4)	1	
pregnancy	Yes	25	(41.7)	225	(27.7)	1.84(1.08–3.15)	0.026
History of STDs[d]	No[c]	43	(71.7)	637	(78.4)	1	
	Yes	16	(26.7)	154	(19.0)	1.54(0.84–2.81)	0.159
Number of lifetime sex	1[c]	6	(10.0)	263	(32.5)	1	
partners	2	7	(11.7)	220	(27.2)	1.40(0.46–4.21)	0.555
	≥3	40	(66.7)	294	(36.4)	5.96(2.49–14.29)	0.000
Condom use lifetime	Never/rarely[c]	23	(38.3)	489	(60.2)	1	
	Sometimes/often	35	(58.3)	295	(36.3)	2.52(1.46–4.35)	0.001
	Always	2	(3.3)	23	(2.8)	1.85(0.41–8.32)	0.423
Sexually active in last 6	No[c]	1	(1.7)	125	(15.4)	1	
months	Yes	58	(96.7)	646	(79.6)	11.22(1.54–81.78)	0.017
STD-related symptoms[e] in	No[c]	28	(46.7)	404	(49.8)	1	
last 6 months	Yes	32	(53.3)	392	(48.3)	1.18 (0.70–1.99)	0.542
Number of sex partners in	1[c]	17	(29.3)	416	(64.6)	1	
last 6 months	2	15	(25.9)	166	(25.9)	2.21(1.08–4.53)	0.030
	≥3	22	(37.9)	51	(7.9)	10.56(5.26–21.18)	0.000
Condom use in last 6	Never/rarely[c]	29	(50.0)	429	(66.4)	1	
months	Sometimes/often	26	(44.8)	183	(28.3)	2.10(1.20–3.67)	0.009
	Always	3	(5.2)	31	(4.8)	1.43(0.41–4.96)	0.572

[a]The percentage of attendees may not add up to 100% due to non-response for some items.
[b]OR: unadjusted odds ratio; CI: confidence interval.
[c]Reference category.
[d]STD mainly refers to gonorrhea, syphilis, chancroid, condyloma acuminatum, chlamydia, genital herpes, non-gonococcal urethritis, etc. in this research.
[e]STD-related symptoms refers to such symptoms as feeling pain or burning during one's micturition, abnormal sexual organ secretion, anal ulcer or pain, skin damage or neoplasm on sexual organs, etc. in this research.
doi:10.1371/journal.pone.0067092.t002

previous 6 months (OR = 7.73, 95% CI 1.04–57.39) were significantly associated with oral sex (Table 3).

Discussion

This study is among the first to examine the practices of oral sex among heterosexual STD clinic attendees in China. We found that among heterosexual participants, 8.3% of males and 4.2% of females practiced oral sex; this prevalence is consistent with a data from married women in urban area of one city, southern China [25]. The practice of oral sex is quite low among STD clinic attendees, a population at higher risk of STDs as compared with female STD clinic attendees in Japan [14] and the general populations in other developed countries [11–14]. Of those practicing oral sex, less than 4% practiced oral sex only, and the remaining practiced at least vaginal sex, indicating that most of

Table 3. Multivariate analysis predicting the practice of oral sex.

Variable	Subgroups	AOR (95% CI)[a]	*P*-value
Income	<2000[b]	1	
	≥2000	2.53(1.39–4.59)	0.002
Knowledge scale	Lower (0–1)[b]	1	
	Intermediate-high (2–4)	2.71(1.26–5.81)	0.011
Age of first sex	≥20[b]	1	
	<20	2.42(1.37–4.27)	0.002
Number of lifetime	<3[b]	1	
sex partners	≥3	3.09 (1.58–6.06)	0.001
Sexually active in last	No[b]	1	
6 months	Yes	7.73(1.04–57.39)	0.046

[a]AOR: adjusted odds ratio; CI: confidence interval.
[b]Reference category.
doi:10.1371/journal.pone.0067092.t003

these participants engaged in the 2 types of sex and were consequently at possibility of acquiring an STD by either vaginal intercourse or oral sex.

In this study, we define sexual activity as any oral, vaginal, or anal sex. Condom use was evaluated over a lifetime and during the previous 6 months. Unfortunately, we did not ask how often the subjects used condoms with each type of sexual behaviour. Consequently, we do not know how often oral sex was protected, or how the rate of protection differed from vaginal and anal sex. In our subjects, condom use was extremely low; 40–50% of the participants in the oral-sex group never/rarely used condoms, while only 3% always used condoms throughout their lives and 5% always used condoms within the past 6 months. Other studies have shown that condom use is much lower during oral sex than during vaginal sex [15,17,18]. Therefore, it is reasonable to speculate that during oral sex, few of our participants were protected, leading to concern regarding the oral STD risk for this group.

Those who earn a high income are more likely to practice oral sex. Though data is not shown in the table, the further analysis revealed those who earned an average income ~2000 Yuan per month, compared with those who earned #2000 Yuan, were more likely to be employed by the government (40.3% vs. 7.0%), less likely to be a peasant or unemployed (27.8% vs. 65.4%), more likely to have a high school or higher education (48.9% vs. 27.4%), more likely to have had sex with more than two partners (53.4% vs. 34.2%), more likely to report STD-related symptoms in the last half year (54.9% vs. 45.0%). However, there was no significant increase in those who always used condoms (3.8% vs. 2.5%). These data imply that our STD clinic attendees from a high social level are more sexually active and at higher risk for STD/HIV infection.

Not surprisingly, those practicing oral sex had more knowledge, given their higher socioeconomic status. Nevertheless, this knowledge did not translate into protective behaviour. Our findings indicate that those who practiced heterosexual oral sex were more likely to have sex with multiple sexual partners, be sexually active in the last 6 months? Multiple sexual partnerships and frequent sex are undoubtedly risky behaviours for STD/HIV infection if they are not effectively protected. Oral sex practitioners were also found to initiate sex at a younger age. The age at first sexual intercourse is a strong indicator of later adult sexual activity, and early sex initiation has been confirmed to be related to having more sexual partners, having sex more frequently [26–28], which is consistent with our findings, and being more likely to ever have been diagnosed with an STD. These findings suggest that those STD clinic attendees who practiced oral sex were more vulnerable to STD/HIV, the intervention program targeting them for STD/HIV prevention should centre on behaviour rather than knowledge, though we all understand that knowledge is important for a person to identify risky and protective behaviours, and the basis for behaviour change.

Although this study revealed an association between oral sex and risk factors for STD/HIV infection, there was no significant difference in the reported STD history over a lifetime or STD-related symptoms on the genitals in the last 6 months between the oral-sex and no-oral-sex groups. It appears that those STD clinic attendees who practise oral sex have no increased report of STD occurrence. Considering that there were no differences in condom use between the two groups in the multivariate analysis, and Chinese studies have revealed that those who practice oral sex are more likely to contract gonorrhoea, syphilis, condyloma acuminatum, etc [16,29], further research therefore is needed to explore the difference of clinical and laboratory evidences between those who do and do not practice oral sex, and the causes behind them.

Previous research has shown that oral sex can transmit HIV [6–8] and specific STDs [1–4]. Only 43% of our subjects who engaged in oral sex believed that STDs could be transmitted through oral sex. Their risk perception for STDs and HIV was poor. More importantly, condom use during sex was extremely low. These data underscore the need to educate heterosexual STD clinic attendees practicing oral sex about their risk of orally transmitted STDs and HIV.

Our findings are limited by the cross-sectional design of the study, which does not permit us to ascertain cause-and-effect relationships. The participants may have differed from those who chose not to participate. The use of a consecutive sampling in 4 clinics over a limited period of time may result in selection bias, and limit the generalisability of our findings. Nevertheless, we believe that our findings have value as we compared the 908 participants in this study with 3072 participants from 12 HIV sentinels at STD clinics in 2007 for gender, age, marital status, and residence, and found that the distributions of them were all similar. Our findings may also be limited by the validity of the self-reported measures, as some participants may over-report socially desirable behaviours or under-report socially undesirable behaviours. Finally, those who practice insertive oral sex might be different from those who practice receptive oral sex to some extent. However, their exact difference is unknown in this study.

Our findings have important implications. First, although the reported prevalence of oral sex is low, and the risk of transmitting STDs via oral sex is lower than via vaginal intercourse, those heterosexual STD clinic attendees who practiced oral sex tended to have a profile placing them at higher risk for STD, including early sex initiation, multiple sexual partners, more frequent sex, and no increase of condom use even though they were more knowledged about HIV. Therefore, clinicians at STD clinics should note the characteristics and related risks of practitioners of oral sex. STD/HIV intervention targeting this population should focus more on sexual behaviour than knowledge. Second, the majority of our participants who practiced oral sex also performed vaginal intercourse and their rate of consistent condom use was extremely low. Therefore, this population is at a potential risk of contracting STDs or HIV through both vaginal and oral sex. STD clinics should highly recommend condom use during both vaginal and oral sex, in particular, emphasize that STD and HIV can be transmitted by oral sex as well. Third, heterosexual STD clinic

attendees from a high socioeconomic level might be more sexually active and at greater risk. The characteristics of this group should be noted at STD clinics. In summary, oral sex practitioners among heterosexual STD clinic attendees are more sexually active and risky in comparison with that practising no-oral sex. STD clinic in China should take heed of the characteristics of this group, and implement appropriate behavioural and medical intervention for identifying and counselling them to reduce their sexual risks related to STD and HIV.

Acknowledgments

The authors are grateful to the 4 STD clinics, as well as the doctors, nurses, and attendees involved in the research.

Author Contributions

Conceived and designed the experiments: QM XP GC JY YX MOK MK. Analyzed the data: QM GC. Contributed reagents/materials/analysis tools: XP JY YX. Wrote the paper: QM. Coordinated the study in field: QM XP JY. Supervised statistical analysis and made critical comments on the manuscript: MOK MK.

References

1. Edwards S, Carne C (1998) Oral sex and the transmission of viral STIs. Sex Transm Inf 74: 6–10.
2. Edwards S, Carne C (1998) Oral sex and the transmission of non-viral STIs. Sex Transm Inf 74: 95–100.
3. Ballini A, Cantore S, Fatone L, Montenegro V, De Vito D, et al. (2012) Transmission of nonviral sexually transmitted infections and oral sex. J Sex Med 9: 372–84.
4. Centers for Disease Control and Prevention (2004) Transmission of primary and secondary syphilis by oral sex–Chicago, Illinois, 1998–2002. MMWR Morb Mortal Wkly Rep 53: 966–8.
5. Campo J, Perea MA, del Romero J, Cano J, Hernando V, et al. (2006) Oral transmission of HIV, reality or fiction? An update. Oral Dis 12: 219–28.
6. Robinson E, Evans B (1999) Oral sex and HIV transmission. AIDS 13: 737–8.
7. Rothenberg RB, Scarlett M, del Rio C, Reznik D, O'Daniels C (1998) Oral transmission of HIV. AIDS 12: 2095–105.
8. Hawkins D (2001) Oral sex and HIV transmission. Sex Transm Infect 77: 307–8.
9. Gindi RM, Ghanem KG, Erbelding EJ (2008) Increases in oral and anal sexual exposure among youth attending sexually transmitted diseases clinics in Baltimore, Maryland. J Adolesc Health 42: 307–8.
10. Aral SO, Patel DA, Holmes KK, Foxman B (2005) Temporal trends in sexual behaviors and sexually transmitted disease history among 18- to 39-year-old Seattle, Washington, residents: results of random digit-dial surveys. Sex Transm Dis 32: 710–7.
11. Mosher WD, Chandra A, Jones J (2005) Sexual behavior and selected health measures: men and women 15–44 years of age, United States, 2002. Adv Data 362: 1–55.
12. Gilbart VL, Mercer CH, Dougan S, Copas AJ, Fenton KA, et al. (2006) Factors associated with heterosexual transmission of HIV to individuals without a major risk within England, Wales, and Northern Ireland: a comparison with national probability surveys. Sex Transm Infect 82: 15–20.
13. Johnson AM, Mercer CH, Erens B, Copas AJ, McManus S, et al. (2001) Sexual behaviour in Britain: partnerships, practices, and HIV risk behaviours. Lancet 358: 1835–42.
14. Ono-Kihara M, Sato T, Kato H, Suguimoto-Watanabe SP, Zamani S, et al. (2010) Demographic and behavioral characteristics of non-sex worker females attending sexually transmitted disease clinics in Japan: a nationwide case-control study. BMC Public Health 10: 106.
15. Leichliter JS, Chandra A, Liddon N, Fenton KA, Aral SO (2007) Prevalence and correlates of heterosexual anal and oral sex in adolescents and adults in the United States. J Infect Dis 196: 1852–9.
16. Xu J, Dong D (2007) Survey on oral sexual activity among 357 STI patients. Dermatology and venereal l29: 54–5.
17. Prinstein M, Meade C, Cohen G (2003) Adolescent oral sex, peer popularity, and perceptions of best friends' sexual behavior. J Pediatr Psychol 28: 243–9.
18. Wong ML, Chan RKW, Koh D, Wee S (1999) Increase in oral sex and pharyngeal gonorrhea: an unintended effect of a successful condom promotion programme for vaginal sex. AIDS 13: 1981–2.
19. Hu Q, Lu F, Gong J, Li Y, Li G, et al. (2006) Knowledge, attitudes, and practice about STI)/AIDS among the men who have sex with men in Nanchang City,Jiangxi Province. Chinese Journal of Health Education 22: 647–9.
20. Xu Y, Shi W, Hu S (2005) HIV related sexual behavior and knowledge among homosexual men in Hangzhou. Chin J Prev Med Trib 39: 37–9.
21. Zhang B, Zeng Y, Xu H, Li X, Zhou S, et al. (2007)Study on 1389 men who have sex with men regarding their HIV high-risk behaviors and associated factors in mainland China in 2004. Zhonghua Liu Xing Bing Xue Za Zhi 28: 32–6.
22. Teng F, Yue X, Gong X (2011) The epidemic dada for syphilis and gonorrhea in China in 2010. Bulletin for STI prevention and control 25: 1–2.
23. Gong X, Yue X, Teng F, Jiang N (2012) The epidemic report for syphilis and gonorrhea in China in 2011. Bulletin for STI prevention and control 26: 9–14.
24. Ma Q, Pan X, Cai G, Yan J, Ono-Kihara M, et al. (2013) HIV antibody testing and its correlates among heterosexual attendees of sexually transmitted disease clinics in China. BMC Public Health 13: 44.
25. Wu M, Fan M, Huang J, He Z, Hong C (China Sexual Science) Investigation on sexual love among married women in urban area of Jiangmen 3: 4–6.
26. Ma Q, Ono-Kihara M, Cong L, Xu G, Pan X, et al. (2009)Early initiation of sexual activity: a risk factor for sexually transmitted diseases, HIV infection, and unwanted pregnancy among university students in China. BMC Public Health9: 111.
27. Davis P, Lay-Yee R (1999) Early sex and its behavioural consequences in New Zealand. J Sex Res 36: 135–44.
28. Harrison A, Cleland J, Gouws E, Frohlich J (2005) Early sexual debut among young men in rural South Africa: heightened vulnerability to sexual risk? Sex Transm Infect 81: 259–61.
29. Zhi H, Xu L, Hou L, Ding R (2001) Investigation of the oral sexual behaviors conducted by sex illegality woman. World Journal of Infection 1: 255–6.

Ma et al. BMC Public Health 2013, 13:44
http://www.biomedcentral.com/1471-2458/13/44

BMC Public Health

RESEARCH ARTICLE Open Access

HIV antibody testing and its correlates among heterosexual attendees of sexually transmitted disease clinics in China

Qiaoqin Ma[1,2*], Xiaohong Pan[1], Gaofeng Cai[1], Jiezhe Yan[1], Masako Ono-Kihara[2] and Masahiro Kihara[2]

Abstract

Background: This study was conducted to determine the prevalence of HIV antibody testing and associated factors among heterosexual sexually transmitted disease (STD) clinic attendees in China.

Methods: A self-administered questionnaire was administered among 823 attendees of 4 STD clinics of Zhejiang Province, China in October to December 2007. Psychosocial and behavioural factors associated with HIV antibody testing were identified in both genders using univariate and multivariate analyses.

Results: Of all 823 STD clinic attendees, 9.3% of male and 18.0% of female attendees underwent HIV antibody testing in the most recent 6 months, and 60% of the participants had gotten no educational/behavioral intervention related to HIV prevention. The correlates for HIV antibody testing in the most recent 6 months as identified by multivariate analysis were ever condom use [odds ratio (OR), 10.37; 95% confidence interval (CI), 1.32–81.22]; ever anal/oral sex (OR, 3.13; 95% CI, 1.03–9.50) during their lifetime; having ever received three to seven types of behavioural interventions in the most recent 6 months (OR, 3.70; 95% CI, 1.32–10.36) among male subjects; and ever condom use (OR, 12.50; 95% CI, 2.20–71.01), STD history (OR, 3.86; 95% CI, 1.26–11.86) over their lifetime, or having ever received three to seven types of behavioural interventions in the most recent 6 months (OR, 8.68; 95% CI, 2.39–31.46) in female subjects. A lifetime experience of casual/commercial sex partners was strongly negatively associated with HIV testing in female subjects (OR, 0.08; 95% CI, 0.01–0.83).

Conclusion: The low prevalence of HIV antibody testing and behavioural intervention among STD clinic attendees indicates a need for more targeted, intensive behavioural interventions to promote HIV antibody testing in this population.

Keywords: HIV, HIV antibody testing, Sexually transmitted diseases, China

Background

The HIV epidemic in China continues to expand. It is driven by high-risk behaviour within particular sub-populations. The Ministry of Health, UNAIDS, and WHO assessed in 2009 that by the end of that year, approximately 740,000 Chinese people would be HIV-positive (range, 560,000–920,000) with an HIV prevalence of 0.057% (range, 0.042%–0.071%). Data from national sentinel surveillance and a survey in 61 cities showed that the HIV positive rates exceed 5% among men who have sex with men in some parts of China. Among affected individuals, heterosexual transmission accounts for 44.3% and homosexual transmission accounts for 14.7%. The proportion of sexual transmission is increasing annually; heterosexual transmission increased from 30.6% in 2006 to 47.1% in 2009, homosexual transmission increased from 2.5% in 2006 to 8.6% in 2009. Of the estimated 48,000 new HIV infections that took place in 2009, heterosexual transmission accounted for 42.2% and homosexual transmission accounted for 32.5%, sexual transmission is now the main mode of transmission of HIV [1]. Meanwhile, the prevalence of syphilis has increased rapidly in recent years, indicating the re-emergence of an epidemic. The reported national syphilis incidence increased from 7.39

* Correspondence: qiaoqinma@yahoo.com.cn
[1]Center for Disease Control and Prevention of Zhejiang Province, Hangzhou 310051, People's Republic of China
[2]Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto 606-8501, Japan

per 100,000 in 2004 to 24.66 per 100,000 in 2009, which is an annual rate of increase of 26.6% [2]. The increasing prevalence of sexually transmitted diseases (STDs) has complicated the HIV epidemic in China.

Research conducted in developed and developing countries has shown that knowledge of one's HIV status is the basis for accessing care and preventing further infection. HIV antibody testing could encourage safer behaviours of the tested individual to prevent contraction of HIV and other STDs. A positive test may prevent them from infecting others and encourage acquisition of early access to specific care, support, and anti-retroviral therapy [3-6].

In 2003, the Chinese government began to enforce the free voluntary counselling and testing (VCT) policy. In response to this, many VCT clinics, mainly at different levels of centres for disease prevention and control (CDC) have been established nationwide. In 2006, the Chinese government further required every county to establish at least 2 to 3 VCT clinics at CDC, and/or general hospitals, gynaecology and obstetrics hospitals (it is not compulsorily requested to establish VCT at STD clinic, which is usually affiliated to a general hospital or run independently)[7]. The number of VCT clinics climbed to approximately 8000 by 2010 [8]. However, by the end of 2009, the cumulative total of reported HIV-positive patients was 326,000. Reported cases and epidemic estimations show that about 55% of HIV-positive individuals have not been identified. The high proportion of HIV-positive individuals who do not know their status are particularly high-risk in terms of the potential spread of HIV infection, indicating the critical importance of promoting HIV testing in China.

In 2010, the State Council of China issued a document that stated the requirement to further strengthen HIV/AIDS prevention and control; one of its aims is expansion of the coverage of HIV/AIDS surveillance and testing services to the greatest extent possible [9]. To promote HIV testing, it is important to conduct surveys to elucidate the correlates of HIV testing among various populations. Some Chinese literature has documented that VCT could promote HIV testing among drug users [10], sex workers [11-13], men who have sex with men [14,15], premarital examinees [16], pregnant women [17-19], rural-to-urban migrants [6,20], and general adults [21,22]. Although the literature focuses on high-risk populations, including STD clinic attendees using VCT services [23,24], studies of HIV antibody testing and its correlates among STD clinic attendees are few, let alone among heterosexual STD clinic attendees. Given the high risk of sexual transmission of HIV among STD clinic attendees [25-28], it is crucial to understand the indicators that influence the performance of HIV testing to address the efficiency of identification of HIV cases among this population. Therefore, a cross-sectional survey of four STD clinics in Zhejiang Province was conducted.

Methods

Participants and data collection

The participants in the present study were derived from a cross-sectional survey conducted among attendees of four STD clinics in Zhejiang Province of Eastern China in October to December, 2007. In 2007, a total of 12 HIV surveillance sentinels at STD clinics performed surveillance on HIV prevalence and collected information on behaviours related to HIV transmission from April to June in Zhejiang Province. Of them, four clinics participated in this study; the remaining eight declined participation due to a lack of interest in this research after review of the study protocol. Analysis was performed to compare the HIV prevalence and the attendees' demographic characteristics in terms of gender, age, marital status, and residence among the four STD clinics and the remaining eight non-participating clinics. The analysis revealed that significant difference was not shown for HIV prevalence (0.40% versus 0.23%) and these demographic characteristics were generally evenly distributed between the two groups. In principle, all >14-year-old sexually active attendees visiting these four STD clinics for diagnosis and treatment of STDs were included in the research. Those attendees who were not sexually active, not willing to participate in the research, had a language barrier, or visited clinics for general skin diseases were excluded from the research. During the study period, 1187 individuals (721 males, 466 females) visited the clinics for STD-related problems, and 935 (601 males, 334 females) agreed to participate in the research. The response rate was 83.4% for males, 71.7% for females, and 78.8% overall. Of the 935 respondents, 908 responded validly.

Of the 908 attendees, 16 of 586 males and 6 of 322 females had ever participated in sex with a same-sex partner and were not included in the analysis, resulting in a sample size of 886. Those attendees who completed the questions regarding HIV antibody testing in the most recent 6 months were included in the analysis; therefore, the final sample size of this study was 823.

The questionnaire was developed based on that used for HIV surveillance at the STD clinics at that time and a thorough review of the domestic and international literature, then modified according to repeated discussions among the research team and the doctors and nurses at the clinics studied. The final questionnaire comprised five sections that contained 7, 10, 21, 8, 5, questions, respectively. The questionnaires were self-administered and anonymous and were collected by doctors or nurses of the clinics during October and December, 2007.

Ethical considerations

This research was ratified by Zhejiang Provincial Health Ministry. The institutional review board of Zhejiang Provincial Centre for Disease Prevention and Control

reviewed the protocol and approved this research. All attendees of the four clinics who met the criteria for recruitment were advised of the study's purpose and assured that their privacy and confidentiality would be strictly protected. Every attendee was invited to participate in the research, but the final decision was theirs.

Measures

Those attendees who engaged in any oral, anal, or vaginal sex activities were defined as sexually active. HIV antibody testing during the most recent 6 months was used as a dependent variable in the analysis. The independent variables used included sociodemographic measures, those related to sexual behaviour and STD/HIV risk awareness, and scales of HIV-related knowledge and intervention that each participant received. For each scale, Cronbach's alpha coefficients for internal consistency and the range of scores were computed; participants were categorised into three or four groups according to the ranges of scores based on the frequency distribution of each scale.

The HIV-related knowledge scale included four statements about whether the number of HIV cases reported in Zhejiang province has increased rapidly in recent years, whether HIV is spreading from high-risk populations to the general population through sexual intercourse, whether STDs make a person more vulnerable to HIV, and whether correct use of a condom can reduce the transmission of HIV. There were three possible responses to each of these four statements: 'correct', 'incorrect', and 'unsure'. The scores for this scale ranged from 0 to 4, with 4 reflecting a high level of knowledge, 0 reflecting a low level of knowledge, and 1 to 3 reflecting an intermediate level of knowledge. The Cronbach's alpha coefficient for this scale was 0.826.

The intervention scale reflected the educational/interventional services that an attendee received during the most recent 6 months, including seven statements regarding whether an attendee had ever received any pamphlets, lubricants, condoms, STD diagnoses or treatments, individual-to-individual counselling related to HIV/STD, group training for HIV/STD prevention, or services other than those listed. The possible responses of each statement were 'yes' or 'no'. This scale had a Cronbach's alpha coefficient of 0.710, and scores ranged from 0 to 7, with scores of 3 through 7 classified as high, 0 representing a person who received no interventional services, and 1 and 2 representing a person received one or two types of services, respectively. The seven statements of this scale were first analysed separately in bivariate analyses. Associations were found between HIV antibody testing and each above-mentioned service other than pamphlet and lubricant distributions.

Statistical analysis

Data were analysed using SPSS for Windows (version 17.0; SPSS Inc., Chicago, IL). Frequency distributions of the independent variables and the prevalence of HIV antibody testing were determined by univariate analysis. Associations between the dependent variable and each independent variable were computed using an odds ratio (OR) with corresponding 95% confidence interval (95% CI) and a p value based on a chi-square test of proportions. Variables identified as significantly associated with HIV antibody testing in the bivariate analyses were then entered into a multivariate logistic regression model to determine the independent contribution of each factor to prediction of HIV antibody testing. A backward elimination procedure was adopted with a p value of > 0.10 as the removal criterion. Age, residence, income per month, marital status, and educational background were fixed in the model to control for possible confounding effects. A p value of < 0.05 was considered to indicate statistical significance in these analyses.

Results

Characteristics of study participants

Of the 823 attendees, 517 were male and 306 were female. A total of 34% of males and 55% of females were aged < 30 years old, 69% of males and 65% of females were married, and 76% of males and 66% of females were local residents (Table 1). Most males and females had a junior high school education and above and earned an income of > 1000 yuan/RMB per month.

Behavioural and psychosocial factors and performance of HIV antibody testing

Of all participants, 9.3% (48) of males and 18.0% (55) of females (total, 12.5% [103]) underwent HIV antibody testing in the most recent 6 months.

Among females, but not males, those who had two or more sexual partners during their lifetime were less likely to report HIV testing during the most recent 6 months (OR, 0.50) (Table 2). Participants were classified into two groups with respect to type of sexual partner: those who had only regular partners (regular partner-only group) and those who had ever had a casual or commercial partner (ever-casual/commercial partner group). Those who engaged in ever-casual/commercial partnership were less likely to have undergone HIV testing (OR, 0.31) among females, but this was not significant among males. Condom use was strongly associated with HIV testing; the OR was 17.63 and 36.00 for sometimes and always users among males, respectively, and 3.52 for sometimes users among females. Participants were categorised into three groups with respect to type of sex: those who conducted only vaginal sex, those who ever conducted anal sex, and those who ever conducted oral sex (excluding anal sex). Ever oral sex was associated with HIV antibody testing

Table 1 Socio-demographic characteristics of the participants

	Male	Female	Total
	(n = 517)%[a]	(n = 306)%[a]	(n = 823)%[a]
Age			
<30	33.5	55.2	41.6
30-39	33.7	27.5	31.3
≥40	32.9	17.3	27.1
Marriage			
Single	22.2	14.4	19.3
Cohabitation	7.5	18.3	11.5
Married	69.2	65.4	67.8
Residence			
Local resident	76.2	65.7	72.3
Out of the city	20.7	30.8	24.5
Education			
Illerate/Primary school	13.2	19.0	15.3
Junior high school	47.0	52.9	49.2
High school and over	38.7	27.8	34.6
Income			
<1000	14.7	29.4	20.2
1000-1999	41.0	37.3	39.6
≥2000	37.5	15.7	29.4

[a]The percentage of respondents may not add up to 100% due to missing data.

among males (OR, 2.98), but not females. HIV testing was associated with a participant's history of STDs among females (OR, 2.89), but not among males; however, HIV testing was associated with unintended pregnancies among male's partner (OR, 1.97), but not among female.

Those who thought it was possible to be infected with STDs showed no association with HIV testing in both genders, but those who thought it was possible to be infected with HIV were more likely to undergo HIV testing among males (OR, 4.04). Awareness that every county has established a VCT clinic that is free of charge and anonymous was associated with HIV testing (OR, 2.99 and 2.75 for males and females, respectively). It seems that there was a trend in that those with a higher level of knowledge were more likely to undergo HIV testing among both males and females compared with those with a lower level of knowledge. The OR for attendees with knowledge scores of 1–3 and 4 was 5.93 and 9.90 for males and 1.13 and 3.16 for females, respectively, compared with the reference indicator score of 0.

Behavioural intervention and performance of HIV antibody testing

Regarding the type of intervention received during the most recent 6 months, 60% of the participants received no educational/intervention; 15–24% received condoms, STD/HIV counselling, and STD checks and treatments; and 3–10% received lubricants, pamphlets, training for STD/HIV prevention, and others interventions not mentioned above (Table 3). Participants who responded that they received condoms, services related to STD/HIV counselling, training for STD/HIV prevention, STD checks and treatments, and other services during the most recent 6 months were markedly more likely to have undergone HIV antibody testing in the most recent 6 months than were those who responded otherwise (OR, 1.91–6.41 for males and 4.42–9.05 for females). Whether a participant received pamphlets and lubricants was unrelated to HIV antibody testing.

Our findings showed that receipt of a high number of intervention services was a strong indicator for undergoing HIV testing among both males and females. There was a clear trend showing that the greater the types of services an individual received, the more likely they were to have undergone HIV antibody testing. Only 5.0% of males and 9.0% of females received HIV testing among those who received no services during the most recent 6 months, which increased to 30.4% and 71.4% among male and female participants, respectively, who received three to six types of services.

Multivariate analysis

Table 4 shows the results of multiple logistic regression analyses. After age, marital status, residence, educational background, income per month had been controlled for; ever condom use (OR, 10.37), and ever anal/oral sex (OR, 3.13) during their lifetime, having ever received three to seven types of behavioural interventions (OR, 3.70) among males; and sex only with a regular partner (OR, 1), ever condom use (OR, 12.50), and STD history (OR, 3.86) over their lifetime, and having ever received behavioural intervention (OR, 8.68) among females remained significant correlates of HIV testing during the most recent 6 months. In addition, in the multiple logistic regression model the trend for STD clinic attendees who received a greater number of types of intervention services showed that they were more likely to have been HIV tested compared with those who received fewer types of interventions.

Given the coexistent relationship between the numbers of casual/commercial partnerships and sexual partners, those who ever engaged in casual/commercial partnerships are probably more likely to have more than one sexual partner than those with regular partners. Therefore, we excluded the partner type over lifetime variable from the model, and found that those females with more than two sexual partners were less likely to have undergone HIV testing (OR, 0.27; 95% CI, 0.09–0.83), which corroborated the results of the bivariate analysis.

Table 2 Bivariate correlates of HIV testing in the recent 6 month with sexual behavioural and psychosocial factors

Variable	Male (n = 517)				Female (n = 306)			
	n(%)[a]	HIV testing	Crude OR (95% CI)[b]	P value	n(%)[a]	HIV testing	Crude OR (95% CI)[b]	P value
Partner number over life time								
1	98 (19.0)	12.2	1.00		162 (52.9)	20.4	1.00	
≥ 2	384 (74.3)	7.3	0.56 (0.28-1.15	0.117	133 (43.5)	11.3	0.50 (0.26-0.96)	0.038
Partner type over life time								
Regular only	170 (32.9)	10.0	1.00		232 (75.8)	20.3	1.00	
Ever casual/commercia	342 (66.2)	8.8	0.87 (0.46-1.62)	0.651	68 (22.2)	7.4	0.31 (0.12-0.82)	0.018
Condom use over lifetime								
Never	133 (25.7)	0.8	1.00	98 (25.7)	8.2	1.00		
Sometime	365 (70.6)	11.8	17.63 (2.40-129.33)	0.005	193 (70.6)	23.8	3.52 (1.59-7.80	0.002
Always	14 (2.7)	21.4	36.00 (3.45-375.70)	0.003	10 (2.7)	10.0	1.25 (0.14-11.16)	0.842
Type of sex over lifetime								
Only vaginal	465 (89.9)	8.0	1.00		284 (92.8)	18.0	1.00	
Ever anal	3 (0.6)	33.3	5.78 (0.51-65.29)	0.156	6 (2.0)	16.7	0.91 (0.11-7.99)	0.935
Ever oral	44 (8.5)	20.5	2.98 (1.33-6.66)	0.008	10 (3.3)	0.0	0.00	0.999
STD history over lifetime								
No	432 (78.1)	10.3	1.00		211 (69.0)	13.3	1.00	
Yes	75 (19.4)	22.5	1.60 (0.76-3.36	0.219	85 (27.8)	30.6	2.89 (1.57-5.30	0.001
Unintended pregnancy overlifetime								
No	403 (77.9)	7.9	1.00		175 (57.2)	15.4	1.00	
Yes	110 (21.3)	14.5	1.97 (1.04-3.75)	0.038	128 (41.8)	21.9	1.54 (0.85-2.76)	0.152
STD risk								
Impossible/unsure	175 (33.8)	12.6	1.00		99 (32.4)	18.2	1.00	
Possible	332 (64.2)	7.8	0.59 (0.32-1.08)	0.086	203 (66.3)	17.2	0.94 (0.50-1.76)	0.84
HIV risk								
Impossible/unsure	490 (94.8)	8.4	1.00		298 (97.4)	17.8	1.00	
Possible	26 (5.0)	26.9	4.04 (1.60-10.16)	0.003	7 (2.3)	14.3	0.77 (0.09-6.53	0.811
HIV related knowledge								
0	120 (23.2)	1.7	1		88 (28.8)	12.5	1	
1-3	197 (38.1)	9.1	5.93 (1.35-26.04)	0.018	137 (44.8)	13.9	1.13 (0.51-2.50)	0.768
4	188 (36.4)	14.4	9.90 (2.31-42.43	0.002	74 (24.2)	31.1	3.16 (1.42-7.03)	0.005
Awareness that every county has established VCT site								
Incorrect/unsure	388 (75.0)	6.4	1		210 (68.6)	12.9	1	
Correct	123 (23.8)	17.1	2.99 (1.61-5.56)	0.001	90 (29.4)	28.9	2.75 (1.50-5.06)	0.001

[a]Percentages may not add up up to 100 due to missing data for some items;
[b]OR, odds ratio; CI, confidence inerval.

Discussion

This is the first study in China specifically examining actual HIV testing correlates among heterosexual STD clinic attendees. Therefore, this study not only augments the limited data available on HIV testing among STD clinic attendees in China, but, more importantly, provides information valuable for development of more effective HIV testing services for this population.

Our data suggest that the prevalence of having undergone HIV antibody testing in the previous 6 months among STD clinic attendees was 9.3% for males and 18.0% for females, indicating that a high proportion of the STD clinic attendees had not undergone HIV antibody testing. The facts that the rate of always condom use was < 5% and multiple sexual partnerships and commercial/casual sex were quite prevalent among our participants suggests the importance of promotion of safer behaviours among this group. Such health behaviour promotion should include HIV testing because there is a concern that such a low testing rate may lead

Table 3 Bivariate correlates of HIV testing in the recent 6 month with various intervention exposed

Variable	Male (n = 517)				Female (n = 306)			
	n(%)[a]	HIV testing	Crude OR (95% CI)[b]	P value	n(%)[a]	HIV testing	Crude OR (95% CI)[b]	P value
Intervention								
Condom								
No	390 (75.4)	7.4	1.00		236 (77.1)	11.9	1.00	
Yes	121 (23.4)	15.7	2.32 (1.25-4.31)	0.008	67 (21.9)	37.3	4.42 (2.35-8.33)	0.000
Lubricant								
No	484 (93.6)	9.5	1		277 (90.5)	17.3	1	
Yes	25 (4.8)	8.0	0.83 (0.19-3.63)	0.802	24 (7.8)	16.7	0.95 (0.31-2.92)	0.934
Pamphlet								
No	460 (89.0)	9.1	1		272 (88.9)	16.5	1	
Yes	49 (9.5)	12.2	1.39 (0.56-3.45)	0.480	28 (9.2)	28.6	2.02 (0.84-4.87)	0.118
STD/HIV counselling								
No	425 ()82.2	5.9	1		254 (83.0)	11.8	1	
Yes	83 (16.1)	27.7	6.13 (3.27-11.49)	0.000	46 (15.0)	47.8	6.84 (3.42-13.68)	0.000
Training for STD/HIV Prevention								
No	491 (95.0)	8.6	1		286 (93.5)	15.7	1	
Yes	17 (3.3)	29.4	4.45 (1.50-13.25)	0.000	15 (4.9)	46.7	4.69 (1.62-13.57)	0.000
STD check/treatment								
No	405 (78.3)	5.2	1		228 (74.5)	9.6	1	
Yes	104 (20.1)	26.0	6.41 (3.45-11.93)	0.000	73 (23.9)	41.1	6.53 (3.44-12.40)	0.000
Other								
No	483 (93.3)	9.1	1		284 (92.8)	14.8	1	
Yes	25 (5.2)	16.0	1.91 (0.63-5.80)	0.000	18 (5.9)	61.1	90.5 (3.32-24.68)	0.000
Intervention scale								
0	308 (59.6)	5.2	1		182 (59.5)	9.3	1	
1	80 (15.5)	8.8	1.75 (0.69-4.41)	0.235	44 (14.4)	11.4	1.24 (0.43-3.58)	0.685
2	57 (11.0)	15.8	3.42 (1.43-8.18)	0.006	34 (11.1)	23.5	2.99 (1.17-7.62)	0.022
3-7	60 (11.6)	25.0	6.08 (2.81-13.15)	0.000	36 (11.8)	55.6	12.13 (5.31-27.70)	0.000

[a]Percentages may not add up to 100 due to missing data;
[b]OR, odds ratio; CI, confidence interval.

to a possible delay in the diagnosis of HIV/AIDS in this high-risk population.

HIV testing services are widely available in China, especially in economically developed areas such as Zhejiang Province, where all local CDCs and some hospitals offer free, anonymous, voluntary HIV counselling and testing services. In addition, the majority of hospitals in every county offer HIV testing if a doctor or patient believes it to be necessary. Considering the fact that free anti-retroviral therapy services were already available for all AIDS patients in China at the time of this study, the introduction of anti-retroviral therapy may dramatically drive people to get HIV testing, the low prevalence of HIV antibody testing in this population is surprising. This may be be related to the inadequacy of relevant HIV prevention programs. Our findings showed that ~60% of attendees had received no intervention services during the most recent 6 months. This may be related to inadequate risk assessment and mobilisation of doctors at hospitals and clinics, which was reported to be a predictor for undergoing HIV testing services [29-32]. However, many medical providers are reluctant to discuss HIV risk behaviour with a patient, which has already been reported in the US [33-35]. This may be related to the perception of a low risk of HIV infection. The majority of our participants believed that it was impossible for them to contract HIV. This may be related to fear of stigmatisation and a positive result [36], therefore, they refrained from testing. This may be possibly because of a low awareness of the VCT services that have been established in every county. Our results showed that awareness of VCT services is associated with HIV testing, but this factor was present in < 30% of both genders. Multiple efforts, therefore, should be made to remove the psychosocial barriers that prevent HIV testing,