Published in final edited form as:

J Assoc Nurses AIDS Care. 2019 ; 30(4): 428–439. doi:10.1097/JNC.0000000000000004.

Female Condom Use and Its Acceptability Among HIV-serodiscordant Couples in China

Lahong Ju, MD [Associate Professor],

National Center for AIDS/STD Control and Prevention and National Institute for Nutrition and Health, Chinese Center for Disease Control and Prevention, Beijing, China.

Cynthia X. Shi, MSc [Doctoral Student],

Department of Epidemiology of Microbial Diseases and Center for Interdisciplinary Research on AIDS, Yale School of Public Health, Yale University, New Haven, Connecticut, USA.

Fan Lv, PhD* [Professor],

National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Houlin Tang, PhD [Associate Professor],

National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Gang Zeng, PhD [Associate Professor],

National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Peng Xu, PhD [Professor],

National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Wanying Chen, MD [Assistant Professor],

National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Huijing He, MD [Assistant Professor],

National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Liping Ma, MD [Assistant Professor],

National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Linglin Zhang, MD [Professor], and

Sichuan Center for Disease Control and Prevention, Sichuan, China.

*Corresponding author: Fan Lv, lvfan_1965@163.com.

Disclosures

The authors report no real or perceived vested interests that relate to this article that could be construed as a conflict of interest. Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

Xi Chen, MD [Professor]

Hunan Center for Disease Control and Prevention, Hunan, China.

Abstract

Intimate partners of people living with HIV are at risk of HIV infection. We assessed the acceptability of female condom use among 89 married, heterosexual, HIV-serodiscordant couples from Sichuan and Hunan provinces in China for this prospective observational cohort study. Participants used female condoms for 3 months, reporting use and attitudes in written logs and questionnaires. At the end of the study, 58.4% of couples expressed willingness to continue using female condoms. Factors associated with willingness to use female condoms were (a) the female partner reporting having experienced forced sex by the male partner, (b) applying a lubricant to the penis, (c) understanding the correct application method, (d) being married more than 20 years, and (e) experiencing no difficulty during the first use. Most HIV-serodiscordant couples found female condoms to be acceptable. Increasing access to female condoms could be an acceptable alternative barrier method to male condoms for preventing HIV transmission.

Keywords

China; female condom; HIV; serodiscordant couples

Although many public campaigns and interventions have focused on increasing male condom use for HIV prevention, relatively little attention has been paid to female condoms (Peters, Jansen, & Van Driel, 2010; Yang et al., 2005). Developed in the 1980s, female condoms provide an alternate barrier method for protection against pregnancy and sexually transmitted infections (STIs), including HIV (Hoffman, Mantell, Exner, & Stein, 2004; McNamee, 2000). Because of gender power inequalities, many women experience difficulties in negotiating male condom use, which reduces their ability to protect themselves from HIV (Choi & Holroyd, 2007; Pulerwitz, Amaro, Jong, Gortmaker, & Rudd, 2002). It has long been recognized that female-initiated HIV prevention methods are needed to empower and to protect women, and the female condom is a potential tool to address this need (Elias & Coggins, 1996; Gallo, Kilbourne-Brook, & Coffey, 2012; Gollub, 2000). Female condoms have appeal as the only female-initiated dual protection method to prevent both pregnancy and STIs (Gallo et al., 2012). There is strong evidence from randomized controlled trials and observational studies that female condoms are not inferior to male condoms in effectively preventing STI transmission (French et al., 2003; Gallo et al., 2012; Minnis & Padian, 2005; Vijayakumar, Mabude, Smit, Beksinska, & Lurie, 2006); similarly, studies suggest that with consistent use, the female condom contraceptive failure rate is around 5%, effectively the same as the male condom (McNamee, 2000). Nevertheless, awareness and knowledge about female condoms remain low (Gollub, 2000; Peters, van Driel, & Jansen, 2014). Research has found differing levels of acceptability across populations; reasons for non-acceptability include unfamiliarity, lack of access, and cost (Mantell et al., 2015; Peters et al., 2014; Stockman et al., 2012; Wang, Huang, & Qian, 2014; Weeks et al., 2015).

China's HIV epidemic is rapidly changing, and corresponding prevention strategies must adapt in response. HIV in China is now primarily spread through sexual transmission (Chunlan, Shi, & Lu, 2008; National Health and Family Planning Commission, 2015; Yang et al., 2005). In 2014, the proportion of newly diagnosed individuals who were infected with HIV through heterosexual contact was 66.4% (National Health and Family Planning Commission, 2015). HIV-uninfected individuals in serodiscordant relationships are at particularly high risk of HIV infection (He et al., 2013; Smith et al., 2015; Yang, Gui, Xiong, Gao, & Yan, 2015). National estimates place the HIV incidence in serodiscordant couples in China at 1.3/100 person-years when the partner living with HIV is on antiretroviral therapy and 2.6/100 person-years when the partner with HIV is antiretroviral therapy naive (Jia et al., 2013). Other Chinese studies have reported the HIV prevalence among intimate partners of people living with HIV in the range of 9.8%–60.68% (Xi, Kong, Su, Hou, & Zhang, 2009; Qiao et al., 2009; Zhuang, 2002).

In this context of high levels of heterosexual HIV transmission, alternative HIV prevention methods are needed to reach individuals at risk. In China, female condom acceptability has been predominantly evaluated among sex workers, and the studies have shown that most female sex workers in China are willing to use female condoms, particularly after interventions and training (Nie et al., 2013; Wang et al., 2013; Yimin et al., 2002). Several studies have examined female condom acceptability outside of the sex industry but were not focused on HIV-serodiscordant couples (Beksinska et al., 2013; Wang et al., 2014; Zirong et al., 2012). These studies were conducted in Shanghai, a city with distinct demographic characteristics that limit generalizability to the rest of China. We conducted a study to assess the use and acceptability of female condoms among HIV-serodiscordant couples at three county-level sites in China.

Methods

Study Sites and Participants

We conducted a prospective observational study from May to December 2013. Three sites were selected for the study because they reported a high number of serodiscordant couples relative to other counties: Meishan and Leshan counties in Sichuan province and Shaoyang county in Hunan province. A serodiscordant couple was defined as a stable married relationship wherein only one spouse was living with HIV infection. Couples were recruited by the local Centers for Disease Control and Prevention (CDC) staff if they met the following criteria: (a) husband and wife were both between ages 18 and 50 years, (b) the couple was sexually active within the marriage, and (c) the partner living with HIV did not have an opportunistic infection. Exclusion criteria were the following: (a) partners had been separated for an extended duration of time, (b) pregnancy or intention to conceive, (c) refusal to use female condoms, and (d) unwilling to provide informed consent.

At enrollment, couples received training on female condom use and participated in baseline interviews and surveys. Couples were followed for 3 months during which they were asked to keep a log on the frequency and experience of using female condoms. At the end of the follow-up period, the study staff conducted individual in-depth interviews and surveys to

understand attitudes about female condoms, the couple's experience, and willingness to use female condoms in the future.

Study Procedures

Potential study participants living within the bounds of the study sites (Meishan, Leshan, and Shaoyang) were identified from CDC HIV care medical records. Eligible couples were contacted, and if the couple was interested, they were asked to present at the local CDC for screening and enrollment. Written informed consent was obtained from all participants.

At enrollment, the couples were separately surveyed through a face-to-face questionnaire by a CDC staff member. Data were collected on demographics, knowledge of HIV, sexual behaviors, choice of contraception, familiarity with female condoms, and attitudes toward female condoms. Training sessions on the use of female condoms were conducted to explain the purpose of female condoms, method of use, and how to address potential problems. To ensure understanding of use, couples were asked to explain back to the staff member how to use the female condom. Couples were asked to log each female condom use on a standardized study form and to immediately report any adverse reactions. Female condoms were distributed free of charge to the participants. The female condoms used in this study were produced by Shanghai Medical Apparatus Company, Ltd. (Dahua), branded as O'Lavie (Figure 1). The use of male condoms was permitted.

Follow-up Sessions

Couples were contacted over the phone or through an in-person CDC visit at 1 week, 1 month, 2 months, and 3 months after enrollment. Logs on the frequency and experience of using female condoms were collected and checked for completion; the information collected on the logs included each use of a female condom, adverse reactions, lubricant use, usage process, and attitudes toward use. Couples were asked about the number of times they had used a female condom, their experiences, and if they had experienced any adverse reactions. Female condoms were distributed to the couples as needed, and additional trainings were provided if the couples were not able to use the female condoms properly. At the end of the third month, couples completed a final study interview to assess their sexual behaviors, use of condoms, and their attitudes toward female condoms.

Data and Statistical Analysis

Data were entered into Epidata software (<http://www.epidata.dk/download.php>) and audited for accuracy. Frequencies were tabulated to describe demographics, knowledge of HIV, sexual behaviors, female condom acceptability, and other characteristics. The Fisher exact test, T-test, and chi-square test were used to compare differences in female condom knowledge and awareness stratified by gender and by partner infection status. Acceptability measures were rated on a five-point Likert scale with response categories in rating scales from 1 = *very unsatisfactory* to 5 = *very satisfactory*. Acceptability measure results were coded as a dichotomous variable (1 = *very satisfactory/satisfactory/neutral*, 0 = *unsatisfactory/very unsatisfactory*). Multilevel modeling (mixed effects model) was used to identify factors related to female condom acceptability, and the couple variable was included as a random factor. A two-level random-intercepts model was analyzed with individuals

(Level 1) and couples (Level 2). Variables significant at $p < .05$ were used to identify the main factors associated with acceptability. All analyses were conducted in SAS version 9.4 (Cary, NC).

Ethics Review

The study protocol (x130205270) was reviewed and approved by the Institutional Review Board of the National Center for AIDS/STD Control and Prevention of the Chinese National CDC.

Results

Baseline

The study cohort included 89 HIV-serodiscordant heterosexual couples for a total of 178 participants. Demographic characteristics are shown in Table 1. For most couples (66.3%), the partner with HIV was male. The mean age of the partners with HIV was 38.5 years (± 8.6 , range = 22–55), and the mean age of the uninfected partners was 37.6 years (± 8.3 , range = 20–56). Most participants (64.0%) had a primary school education or less. Among the partners with HIV, 85.4% had been diagnosed in the previous 5 years, and 86.5% reported that they were infected through heterosexual contact. Most couples had been married for more than 10 years (55%) and had a household income of less than 3,000 renminbi (RMB; ~\$480 USD) per month (77.5%).

At baseline, nearly all participants knew that HIV infection could be acquired through sexual behavior (97.2%, 173/178) and believed that consistent and correct use of condoms could prevent transmission of STIs and HIV (99.4%, 177/178). Female condom knowledge and experience were low; only 10 participants (5.6%) had heard of female condoms, 1 participant (0.6%) had learned how to use a female condom, and none had previously used a female condom.

In the 3 months before enrollment (Table 2), the most common frequency of intercourse was two to three times per month. Nearly 7% of women reported that they had experienced forced sex (physical penetration without consent) from their spouse. Most couples (86.5%) had consistent use of male condoms, i.e., they used male condoms during each act of sexual intercourse in the previous 3 months, and couples with a male partner living with HIV were significantly more likely to report consistent male condom use (91.5%) compared with couples with a female partner living with HIV (77.8%, $p = .07$). Reasons for inconsistent use of male condoms were unwillingness by the male partner (50%), intention to conceive (30%), and unavailability of condoms or forgetting to use a condom (20%).

Study Period

During the 3-month study period (Table 3), the most commonly reported frequency of sex was 2–3 times per month (62.9%), which was consistent with the prestudy baseline frequency. The percentage of women reporting forced sex was lower (3.4%) compared with 6.7% prestudy. All couples reported using a female condom at least once, and most couples (85.4%, 76/89) used 9–12 female condoms, with the remainder using fewer than 8.

Couples reported that the average time needed to prepare for female condom use was 4.1 minutes (± 2.8 , range = 1–22 minutes). The proportion of couples using a lubricant inside of the pouch, inside of the pouch + penis + capsule, and inside of the pouch + penis was 33.6%, 22.8%, and 12.6%, respectively. Experiences and attitudes toward using female condoms are described in Table 4. There were no significant differences between men and women in their knowledge about female condoms after the study period (Table 5). Most couples reported that they heard noise while using a female condom (63.5%), and most agreed that an advantage of female condoms was that they did not need to be removed immediately after use (58.4%).

Four events (0.5%, 4/768) of breakage were reported. Fourteen participants reported a total of 23 adverse reactions. The proportion of participants who experienced adverse reactions was 13.5% (12/89) among women and 2.2% (2/89) among men. The most frequent adverse reactions were pain (11 events), itching (10 events), concurrent pain and itching (1 event), and foreign body sensation (1 event). More than half (60.9%, 14/23) of the adverse reactions occurred during use, 34.8% (8/23) occurred after use, and 4.4% (1/23) occurred after insertion and before intercourse. The median duration of a negative reaction was 10 minutes, ranging from 1 minute to 3 hours. Participants categorized all adverse reactions as minor problems. Actions were not taken to address most events (87.0%, 20/23), and the other three reactions were relieved through lotion, water, and/or pain medication.

Acceptability

At the end of the study, 58.4% of the couples expressed acceptance of the female condom. In the multivariate multilevel model (Table 6), significant predictors for acceptability of female condom use included more than 10 years of marriage (odds ratio [OR]: 1.317, 95% confidence interval [CI]: 1.050–1.653), forced sex in the relationship (OR: 1.489, 95% CI: 1.044–2.125), applying a lubricant to the penis (OR: 1.335, 95% CI: 1.089–1.636), understanding the correct application method (OR: 1.190, 95% CI: 1.021–1.387), and no difficulty during the first use (OR: 1.445, 95% CI: 1.928–1.083).

Reasons given for willingness to use female condoms were as follows: free (78.8%, an artifact of the study), prevention of HIV transmission (51.0%), and the ability of the woman to initiate use (44.2%). The main reasons cited for unwillingness to accept female condoms were as follows: difficult to use (81.1%), satisfaction with using male condoms only (54.1%), and physical discomfort (33.8%). Of the 104 participants who were accepting of female condoms, the preferred channels of acquiring female condoms were from family planning clinics (48.1%), CDCs (39.4%), and pharmacies (29.8%). Most of these individuals (63.5%, 66/104) said that they would be willing to recommend female condom use to others. Participants also named the maximum price that they would be willing to pay per female condom (in RMB) was 0–5 (77.9%), 5–10 (18.3%), 10–15 (1.9%), and more than 15 (1.9%).

Discussion

Increasing the available methods for HIV prevention is necessary to encourage safer sex among serodiscordant couples, a key population with high rates of HIV transmission. Studies have shown that female condoms can prevent STIs, HIV, and pregnancy at rates

similar to male condoms (French et al., 2003; Gallo et al., 2012; Minnis & Padian, 2005; Vijayakumar et al., 2006). Female condom acceptability has not been previously evaluated among HIV-serodiscordant couples in China. To address this research gap, we conducted a cohort study on the use of female condoms as an HIV prevention method in this population. Our findings suggest that among serodiscordant couples, female condoms were an acceptable alternative to male condoms for preventing HIV transmission. Studies conducted in a wide range of settings have found that female condoms were acceptable to 50%–70% of respondents (Campbell et al., 2011; Peters et al., 2014; Spizzichino et al., 2007; Vijayakumar et al., 2006), and the level of acceptability noted in our study was consistent with the literature. We found that very few participants were aware of female condoms before the study, indicating that this HIV prevention method may be underutilized in China. Most participants expressed interest in continuing to use female condoms after the study, and nearly all participants agreed that female condoms were an effective way to prevent HIV transmission.

The female condom is a particularly valuable tool in HIV prevention efforts because the high frequency of unprotected sex among serodiscordant couples in China is concerning (Lau et al., 2013; Yang et al., 2015; Zhang et al., 2015). The most common reason given in our study for not consistently using male condoms was unwillingness by male partners, which pointed to the need for acceptable and effective prevention alternatives to encourage safer sex.

The concerning lack of female agency during sex was also reflected by the women in our study who acknowledged experiencing forced sex before (6.7%) and during (3.4%) the study period. Uninfected women in serodiscordant relationships who are disempowered to negotiate condom use and who experience nonconsensual unprotected sex are at distressingly high risk of HIV infection. Relationship power inequity and gender-based violence are known HIV risk factors for women (Jewkes, Dunkle, Nduna, & Shai, 2010). Interventions, research, and programs are urgently needed to address these issues, which are too often unacknowledged. Because the female condom is a female-controlled method, researchers have suggested that female condoms are particularly useful in promoting safer sex when gender status inequalities are present (Macaluso, Demand, Artz, Fleenor, et al., 2000; Macaluso, Demand, Artz, & Hook, 2000; Minnis & Padian, 2005). Notable research evidence from the United States has shown that female condoms are acceptable to women who are less likely to use other dual protection methods (Vijayakumar et al., 2006). The use of the female condom has also been noted to improve communication between the partners about sex (Witte et al., 2006; World Health Organization, 2000).

Although female condom use reduces unprotected sex, there are numerous barriers to increased uptake of female condoms, the most noticeable of which are higher costs compared with the male condom, limited accessibility, lack of awareness among health care providers, and resistance from policymakers (Artz, Demand, Pulley, Posner, & Macaluso, 2002; Peters et al., 2010). Our study found that female condoms had no significant effect on sexual pleasure, so this was not a barrier to acceptability. Our study confirmed that cost is a major concern; approximately 80% of couples reported that they would only be willing to pay up to five RMB (~\$0.75 USD) per female condom. It is likely that female condom use in China will be limited until there is greater market availability and accessibility; to achieve

this, it will be necessary to identify ways to decrease the unit cost, improve product design, and increase awareness of female condoms.

Besides the cost barrier, participants in our study who were unwilling to continue female condom use also reported that they found female condoms to be difficult to use, uncomfortable, and/or nonsuperior to male condoms. There are several new female condom products in development, and a 2013 crossover trial in Shanghai and Durban, South Africa, found that three such products were noninferior to the current second-generation design (FC2; Beksinska, Smit, Joanis, & Potter, 2012; Beksinska et al., 2013). Improved training and interventions have also been shown to substantially increase female condom acceptability (Artz et al., 2000; Campbell et al., 2011; Peters et al., 2014).

A limitation of our study was that we were only able to identify and enroll serodiscordant couples who were married. Most of the participants in our study had been married for more than 10 years, which reduces the generalizability of our findings to other serodiscordant relationships. We also provided female condoms at no cost to the participants. Although we asked our participants to name an acceptable cost per unit, we were not able to evaluate female condom utilization at different price points.

Conclusions

Female condoms should be considered for wider distribution to HIV-serodiscordant couples in China. The potential advantages of the female condom have been underappreciated as a dual STI/HIV and pregnancy prevention method. We suggest that future studies in China be conducted to assess the acceptability and effectiveness of female condoms for preventing STI/HIV transmission and pregnancy in other key populations and in real-world conditions. Presented as an alternative—not a replacement—for male condoms, female condoms could reduce the proportion of unprotected sex and serve as a helpful addition to a comprehensive package of HIV prevention methods.

Acknowledgments

The authors are grateful to the local staff members for their work in recruiting participants and conducting questionnaires. In addition, they extend their special gratitude to all participants for their cooperation. This study was funded by the Program for Appropriate Technology in Health (PI: Fan Lv, NET.1567-05937-SUB) and National Nature Science Foundation of China (PI: Peng Xu, 71573239). Cynthia X. Shi is additionally supported by awards T32MH020031 (PI: Trace Kershaw) and P30MH062294 (PI: Paul Cleary) from the U.S. National Institute of Mental Health.

References

- Artz L, Demand M, Pulley L, Posner SF, & Macaluso M (2002). Predictors of difficulty inserting the female condom. *Contraception*, 65(2), 151–157. [PubMed: 11927118]
- Artz L, Macaluso M, Brill I, Kelaghan J, Austin H, Fleenor M, ... Hook EW (2000). Effectiveness of an intervention promoting the female condom to patients at sexually transmitted disease clinics. *American Journal of Public Health*, 90(2), 237–244. [PubMed: 10667185]
- Beksinska M, Smit J, Joanis C, & Potter W (2012). New female condoms in the pipeline. *Reproductive Health Matters*, 20(40), 188–196. doi:10.1016/S0968-8080(12)40659-0 [PubMed: 23245425]
- Beksinska ME, Piaggio G, Smit JA, Wu J, Zhang Y, Pienaar J, ... Joanis C (2013). Performance and safety of the second-generation female condom (FC2) versus the Woman's, the VA worn-of-women,

- and the cupid female condoms: A randomised controlled non-inferiority crossover trial. *Lancet Global Health*, 1(3), e146–e152. doi:10.1016/S2214-109X(13)70054-8 [PubMed: 25104263]
- Campbell ANC, Tross S, Hu MC, Pavlicova M, Kenney J, & Nunes EV (2011). Female condom skill and attitude: Results from a NIDA Clinical Trials Network gender-specific HIV risk reduction study. *AIDS Education and Prevention*, 23(4), 329–340. doi:10.1521/aeap.2011.23.4.329 [PubMed: 21861607]
- Choi SY, & Holroyd E (2007). The influence of power, poverty and agency in the negotiation of condom use for female sex workers in mainland China. *Culture, Health & Sexuality*, 9(5), 489–503. doi: 10.1080/13691050701220446
- Chunlan L, Shi J, & Lu Q (2008). Analysis of the infection of HIV positive cases via homosexual behaviors in Nanyang in 2007. *Chinese Primary Health Care*, 9, 39.
- Elias CJ, & Coggins C (1996). Female-controlled methods to prevent sexual transmission of HIV. *AIDS*, 10, S43–S51.
- French PP, Latka M, Gollub EL, Rogers C, Hoover DR, & Stein ZA (2003). Use-effectiveness of the female versus male condom in preventing sexually transmitted disease in women. *Sexually Transmitted Diseases*, 30(5), 433–439. [PubMed: 12916135]
- Gallo MF, Kilbourne-Brook M, & Coffey PS (2012). A review of the effectiveness and acceptability of the female condom for dual protection. *Sexual Health*, 9(1), 18–26. doi:10.1071/SH11037 [PubMed: 22348629]
- Gollub EL (2000). The female condom: Tool for women's empowerment. *American Journal of Public Health*, 90(9), 1377–1381. [PubMed: 10983187]
- He N, Duan S, Ding Y, Rou K, McGoogan JM, Jia M, ... Wu Z (2013). Antiretroviral therapy reduces HIV transmission in discordant couples in rural Yunnan, China. *PLoS One*, 8(11), e77981. doi: 10.1371/journal.pone.0077981 [PubMed: 24236010]
- Hoffman S, Mantell J, Exner T, & Stein Z (2004). The future of the female condom. *Perspectives on Sexual and Reproductive Health*, 36(3), 120–126. doi:10.1363/3612004 [PubMed: 15306270]
- Jewkes RK, Dunkle K, Nduna M, & Shai N (2010). Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: A cohort study. *Lancet*, 376(9734), 41–48. doi:10.1016/S0140-6736(10)60548-X [PubMed: 20557928]
- Jia Z, Mao Y, Zhang F, Ruan Y, Ma Y, Li J, ... Shao Y (2013). Antiretroviral therapy to prevent HIV transmission in serodiscordant couples in China (2003–11): A national observational cohort study. *Lancet*, 382(9899), 1195–1203. doi:10.1016/S0140-6736(12)61898-4 [PubMed: 23206835]
- Zhuang K (2002). Mechanisms and risk factors in the spread of HIV [in Chinese]. *Archives of Foreign Medical Infectious Disease Epidemiology*, 29(6), 321–324.
- Lau JT, Yu X, Mak WW, Cheng Y, Lv Y, Zhang J, ... Wang Z (2013). Prevalence of inconsistent condom use and associated factors among HIV discordant couples in a rural county in China. *AIDS and Behavior*, 17(5), 1888–1894. doi:10.1007/s10461-012-0269-z [PubMed: 22802078]
- Macaluso M, Demand M, Artz L, Fleenor M, Robey L, Kelaghan J, ... Hook EW III. (2000). Female condom use among women at high risk of sexually transmitted disease. *Family Planning Perspectives*, 32(3), 138–144. [PubMed: 10894260]
- Macaluso M, Demand MJ, Artz LM, & Hook EW III. (2000). Partner type and condom use. *AIDS*, 14(5), 537–546. [PubMed: 10780716]
- Mantell JE, Smit JA, Exner TM, Mabude Z, Hoffman S, Beksinska M, ... Stein ZA (2015). Promoting female condom use among female university students in KwaZulu-Natal, South Africa: Results of a randomized behavioral trial. *AIDS and Behavior*, 19(7), 1129–1140. doi:10.1007/s10461-014-0860-6 [PubMed: 25092513]
- McNamee K (2000). The female condom. *Australian Family Physician*, 29(6), 555–557. [PubMed: 10863812]
- Minnis AM, & Padian NS (2005). Effectiveness of female controlled barrier methods in preventing sexually transmitted infections and HIV: Current evidence and future research directions. *Sexually Transmitted Infections*, 81(3), 193–200. doi:10.1136/sti.2003.007153 [PubMed: 15923284]
- National Health and Family Planning Commission. (2015). 2015 China AIDS response progress report. Retrieved from http://www.unaids.org/sites/default/files/country/documents/CHN_narrative_report_2015.pdf

- Nie L, Liao S, Weeks MR, Wang Y, Jiang J, Zhang Q, ... Dunn J (2013). Promoting female condoms in the sex industry in 4 towns of Southern China: Context matters. *Sexually Transmitted Diseases*, 40(3), 264–270. doi:10.1097/OLQ.0b013e31827c58c9 [PubMed: 23403607]
- Peters A, Jansen W, & Van Driel F (2010). The female condom: The international denial of a strong potential. *Reproductive HealthMatters*, 18(35), 119–128. doi:10.1016/S0968-8080(10)35499-1
- Peters A, vanDriel F,&Jansen W (2014). Acceptability of the female condom by sub-Saharan African women: A literature review. *African Journal of Reproductive Health*, 18(4), 34–44.
- Pulerwitz J, Amaro H, Jong WD, Gortmaker SL, & Rudd R (2002). Relationship power, condom use and HIV risk among women in the USA. *AIDS Care*, 14(6), 789–800. doi: 10.1080/0954012021000031868 [PubMed: 12511212]
- Qiao X, Shen J, Wei J, Guo X, Liang Z, Xing H, ... Shao Y (2009). Marital sexual HIV transmission and risk factors among couples in Shanxi, China [in Chinese]. *Chinese Journal of Preventative Medicine*, 10(11), 976–979.
- Smith MK, Westreich D, Liu H, Zhu L, Wang L, He W, ... Wang N (2015). Treatment to prevent HIV transmission in serodiscordant couples in Henan, China, 2006 to 2012. *Clinical Infectious Diseases*, 61(1), 111–119. doi:10.1093/cid/civ200 [PubMed: 25770173]
- Spizzichino L, Pedone G, Gattari P, Luzi AM, Gallo P, Valli R, & Rezza G (2007). The female condom: Knowledge, attitude, and willingness to use: The first Italian study. *Annali dell'Istituto Superiore di Sanità*, 43(4), 419–424.
- Stockman JK, Morris MD, Martinez G, Lozada R, Patterson TL, Ulibarri MD, ... Strathdee SA (2012). Prevalence and correlates of female condom use and interest among injection drug-using female sex workers in two Mexico-US border cities. *AIDS and Behavior*, 16(7), 1877–1886. doi:10.1007/s10461-012-0235-9 [PubMed: 22711225]
- Vijayakumar G, Mabude Z, Smit J, Beksinska M, & Lurie M (2006). A review of female-condom effectiveness: Patterns of use and impact on protected sex acts and STI incidence. *International Journal of STDs and AIDS*, 17(10), 652–659. doi:10.1258/095646206780071036
- Wang CY, Huang ZR, & Qian JF (2014). Acceptability of woman's condom among 30 couples in Shanghai, China. *Journal of International Reproductive Health/Family Planning*, 33(2), 89–91.
- Wang Y, Liao S, Jiang J, Weeks MR, Nie L, Li J, ... Zhang Q (2013). Who are the preferential targets for intervention programs related to the female condom among sex workers in southern China? *AIDS Education and Prevention*, 25(4), 349–361. doi:10.1521/aeap.2013.25.4.349 [PubMed: 23837812]
- Weeks MR, Zhan W, Li J, Hilario H, Abbott M, & Medina Z (2015). Female condom use and adoption among men and women in a general low-income urban U.S. population. *AIDS and Behavior*, 19(9), 1642–1654. doi:10.1007/s10461-015-1052-8 [PubMed: 25840799]
- Witte SS, El-Bassel N, Gilbert L, Wu E, Chang M, & Hill J (2006). Promoting female condom use to heterosexual couples: Findings from a randomized clinical trial. *Perspectives in Sexual and Reproductive Health*, 38(3), 148–154. doi:10.1363/psrh.38.148.06
- World Health Organization. (2000). The female condom: A guide for planning and programming. Retrieved from http://apps.who.int/iris/bitstream/handle/10665/67437/WHO_RHR_00.8.pdf?sequence=1
- Xi J, Kong X, Su J, Hou WJ, Zhang JX (2009). HIV/AIDS spouses' partners HIV infection status [in Chinese]. *Soft Science of Health*, 23(2), 232–233.
- Yang H, Li X, Stanton B, Liu H, Liu H, Wang N, ... Chen X (2005). Heterosexual transmission of HIV in China: A systematic review of behavioral studies in the past two decades. *Sexually Transmitted Diseases*, 32(5), 270. [PubMed: 15849527]
- Yang RR, Gui X, Xiong Y, Gao SC, & Yan YJ (2015). Five-year follow-up observation of HIV prevalence in serodiscordant couples. *International Journal of Infectious Diseases*, 33, 179–184. doi:10.1016/j.ijid.2015.02.007 [PubMed: 25677723]
- Yimin C, Zhaohui L, Xianmi W, Shiyang W, Lingzhi H, Yueying X, ... Yulian L (2002). Introductory study on female condom use among sex workers in China. *Contraception*, 66(3), 179–185. doi: 10.1016/S0010-7824(02)00350-5 [PubMed: 12384207]

- Zhang YJ, Feng XX, Fan YG, Jiang ZY, Zhong XH, Li MQ, & Ye DQ (2015). HIV transmission and related risk factors among serodiscordant couples in Liuzhou, China. *Journal of Medical Virology*, 87(4), 553–556. doi:10.1002/jmv.24093 [PubMed: 25583348]
- Zirong H, Junqing W, Coffey PS, Kilbourne-Brook M, Yufeng Z, Wang C, ... Hongbo P (2012). Performance of the woman's condom among couples in Shanghai, China. *European Journal of Contraception and Reproductive Health Care*, 17(3), 212–218. doi: 10.3109/13625187.2012.663016 [PubMed: 22497293]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Key Considerations

- Female condoms are particularly valuable tools in HIV prevention efforts.
- Additional training about female condoms would increase knowledge among health care providers and couples in China.
- Female condoms are an acceptable alternative barrier method to male condoms for preventing HIV transmission, and steps should be taken to increase access to female condoms.

Figure 1.
O'Lavie female condom by Shanghai Medical Apparatus Company, Ltd. (Dahua).

Table 1.

Demographics of Serodiscordant Couples (*N* = 89)

Characteristics	Partner With HIV Infection		Partner Without HIV Infection		All Participants	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Areas						
Shaoyang, Hunan	38	42.7	38	42.7	76	42.7
Meishan, Sichuan	30	33.7	30	33.7	60	33.7
Leshan, Sichuan	21	23.6	21	23.6	42	23.6
Gender						
Male	59	66.3	30	33.7	89	50.0
Female	30	33.7	59	66.3	89	50.0
Age (years)						
20–29	16	18.0	16	18.0	32	18.0
30–39	31	34.8	39	43.8	70	39.3
40–49	32	36.0	29	32.6	61	34.3
>50	10	11.2	5	5.6	15	8.4
Education level						
Did not complete primary school	20	22.5	21	23.6	41	23.0
Primary school	40	44.9	33	37.1	73	41.0
Senior/vocational schools	20	22.5	26	29.2	46	25.8
Junior college and above	9	10.1	8	10.1	18	10.1
Monthly family income (RMB per month)						
0–999	—	—	—	—	15	16.9
1,000–1,999	—	—	—	—	25	28.1
2,000–2,999	—	—	—	—	29	32.6
>3,000	—	—	—	—	20	22.5
Transmission category						
Heterosexual contact	77	86.5	—	—	—	—
Injection drug use	7	7.9	—	—	—	—
Male-to-male sexual contact	2	2.2	—	—	—	—

Characteristics	Partner With HIV Infection		Partner Without HIV Infection		All Participants	
	N	%	N	%	N	%
Blood donation or transfusion	1	1.1	—	—	—	—
Unsure/unknown	2	2.2	—	—	—	—
Years since HIV diagnosis						
<1	32	36.0	—	—	—	—
1	26	29.2	—	—	—	—
2–4	18	20.2	—	—	—	—
5	13	14.6	—	—	—	—
Years of marriage						
0–4	—	—	—	—	26	29.2
5–9	—	—	—	—	14	15.7
10–19	—	—	—	—	26	29.2
20	—	—	—	—	23	25.8

Note. RMB = renminbi, the official currency in China.

Table 2.

Sexual Behavior During 3 Months Before Enrollment

Sexual behavior	Couples With a Male Partner		Couples With HIV		Couples With a Female Partner		With HIV		All Couples	
	N	%	N	%	N	%	N	%	N	%
Sexual intercourse frequency										
1 time per month	12	20.3	2		2	6.7			14	15.7
2-3 times per month	26	44.1	14		14	46.7			40	44.9
1-2 times per week	17	28.8	14		14	46.7			31	34.8
3 times per week	4	6.8	0		0	0.0			4	4.5
Forced sex by a male partner ^a										
Yes	3	5.1	3		3	10.0			6	6.7
No	56	94.9	27		27	90.0			83	93.3
Male condom use ^a										
Always	43	91.5	21		21	77.8			64	86.5
Sometimes	3	6.4	6		6	22.2			9	12.2
Never	1	2.1	0		0	0.0			1	1.4
Reason for not using a male condom ^a										
Male unwilling to use	2	50.0	3		3	50.0			5	50.0
Wanting to be pregnant	2	50.0	1		1	16.7			3	30.0
No condom available or forgot	0	0	2		2	33.3			2	20.0

^aResponses do not add up to the total number of couples (N= 89) because some couples had not engaged in sexual intercourse, did not experience forced sex, or had not yet been identified as a serodiscordant couple.

Table 3.

Sexual Behavior During the 3-Month Follow-up Period

Sexual Behavior	Couples With a Male Partner With HIV (N = 59)		Couples With a Female Partner With HIV (N = 30)		All Couples (N = 89)	
	N	%	N	%	N	%
Sexual intercourse frequency						
1 time per month	2	3.4	1	3.3	3	3.4
2–3 times per month	39	66.1	17	56.7	56	62.9
1–2 times per week	15	25.4	12	40.0	27	30.3
3 times per week	3	5.1	0	0.0	3	3.4
Forced sex by a male partner						
Yes	1	1.7	2	6.7	3	3.4
No	58	98.3	28	93.3	86	96.6
Female condom use						
Yes	59	100.0	30	100.0	89	100.0
No	0	0	0	0	0	0

Table 4.

Experiences and Attitudes Toward Female Condom Use Among 89 Serodiscordant Couples During the 3-Month Follow-up Period

Usage Process and Feeling	N = 178	%
Difficulty in insertion	32	17.7
Insertion on the first attempt	144	81.0
Male assisted in insertion of the condom	72	40.5
Felt the outer ring	59	33.1
Male felt hard to insert	14	7.6
Penis insert between the female condom and the vagina	6	3.6
Outer ring slipped inside	11	6.4
Slipped out of the vagina	6	3.3
Breakage during or after intercourse	1	0.5
Discomfort, pain, and/or itching	18	10.0
Increased sexual pleasure compared with the male condom	33	18.5
Decreased sexual pleasure compared with the male condom	43	24.2
Negatively affected the intercourse duration	24	13.5
Easy to remove	166	93.0

Table 5.

Awareness About Female Condoms Among 89 Serodiscordant Couples by Gender

True/False Questions	Male Partner		Female Partner		χ^2	p-Value
	N	%	N	%		
The purpose of FCs is the same as male condoms.	60	67.4	56	62.9	0.490	.485
FCs can be inserted before sex.	64	71.9	65	73.0	0.032	.856
FCs cover most of the vulva to better prevent STI transmission.	66	74.2	61	68.5	0.903	.345
FCs may produce noise during use.	53	59.6	60	67.4	1.416	.237
FCs are not easy to do harm to the genital tract.	72	80.9	74	83.2	0.160	.694
FCs are not more likely than male condoms to break.	72	80.9	66	74.2	1.299	.259
FCs need to be removed immediately after use.	53	59.6	51	57.3	0.116	.733
FCs are disposable products and cannot be used multiple times.	84	94.4	82	92.1	0.410	.526
FCs are a female-initiated contraceptive.	74	83.2	79	88.8	1.369	.243
FCs can effectively prevent HIV infection.	86	96.6	86	96.6	0.000	1.000

Note. FC = female condom; STI = sexually transmitted infection.

Table 6.

Multilevel Model Analysis for Factors Associated With Female Condom Acceptability

Parameter	Estimate	Standard Error	t Value	Pr> t	OR	95% CI
Fixed effects						
Intercept	0.421	0.349	1.21	0.231		
Areas						
Meishan vs. Shaoyang	0.108	0.121	0.90	0.373	1.114	0.876–1.417
Leshan vs. Shaoyang	−0.164	0.144	−1.14	0.258	0.849	0.638–1.130
Gender						
Female vs. male	−0.012	0.063	−0.19	0.849	0.988	0.872–1.120
Age (years)						
30- vs. 20-	−0.058	0.094	−0.62	0.54	0.944	0.782–1.139
40- vs. 20-	−0.194	0.120	−1.62	0.11	0.823	0.648–1.046
Education level						
Junior high school vs. primary school and below	0.116	0.088	1.31	0.193	1.123	0.942–1.338
Senior high/technical school vs. primary school and below	0.058	0.111	0.52	0.602	1.06	0.849–1.323
Junior college and above vs. primary school and below	0.043	0.171	0.25	0.803	1.044	0.742–1.469
Family income (yuan/month)						
1,000- vs. 0-999	0.008	0.128	0.06	0.952	1.008	0.782–1.299
2,000- vs. 0-999	−0.086	0.123	−0.7	0.486	0.917	0.717–1.173
3,000- vs. 0-999	−0.011	0.148	−0.07	0.943	0.989	0.736–1.329
HIV infection route						
Others vs. heterosexual behavior	0.114	0.130	0.87	0.386	1.12	0.864–1.453
HIV detection time (years)						
1- vs. 0-1	−0.159	0.100	−1.6	0.115	0.853	0.699–1.040
2- vs. 0-1	0.048	0.119	0.4	0.687	1.049	0.828–1.330
5- vs. 0-1	−0.069	0.136	−0.51	0.613	0.933	0.712–1.223
Years of marriage						
20- vs. 0-19	0.276	0.114	2.42	0.018	1.317	1.050–1.653
Frequency of sex						

Parameter	Estimate	Standard Error	t Value	Pr> t	OR	95% CI
2–3 times/month vs. 1 time/month	0.132	0.126	1.05	0.299	1.141	0.888–1.467
1 time/week vs. 1 time/month	0.123	0.139	0.89	0.376	1.131	0.858–1.491
Experienced forced sex in the relationship						
Yes vs. no	0.398	0.178	2.23	0.029	1.489	1.044–2.125
Any unprotected sex before research						
Yes vs. no	0.203	0.142	1.43	0.158	1.225	0.923–1.625
Difficulty during the first FC use						
Yes vs. no	0.368	0.145	2.54	0.013	0.692	0.519–0.923
Difficulty during the last FC use						
Yes vs. no	0.035	0.098	0.36	0.719	1.036	0.853–1.259
Total failure events reported						
11- vs. 0–10	0.007	0.104	0.07	0.947	1.007	0.818–1.239
Any discomfort, pain, or itching in O'Lavie use						
Yes vs. no	−0.016	0.197	−0.08	0.935	0.984	0.664–1.458
Lubricant was applied to the penis						
Yes vs. no	0.289	0.102	2.83	0.006	1.335	1.089–1.636
FC produces noise during use						
Yes vs. no	−0.149	0.103	−1.45	0.151	0.862	0.702–1.057
Female partner with HIV						
Yes vs. no	0.115	0.100	1.15	0.252	1.122	0.920–1.368
Understanding of the correct application method						
Complete understanding vs. basic understanding	0.174	0.077	2.26	0.027	1.19	1.021–1.387
Random effects						
Level 2	0.113	0.017	6.56	<.0001		
Level 1	1.000	0.000				

Note. CI = confidence interval; FC = female condom; OR = odds ratio.